

NTPC Limited

(A Government of India Enterprise)



LARA SUPER THERMAL POWER PROJECT STAGE-II (2x800 MW)

TECHNICAL SPECIFICATION

FOR

EPC PACKAGE

PART – B

(BOOK 4 OF 5 – CIVIL WORKS)

SECTION - VI

BIDDING DOCUMENT NO.: CS-9587-001R-2

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CLAUSE NO.	TECHNICAL REQUIREMENTS 		
D-1-1 1.01.00	<p>GENERAL</p> <p>This specification is to cover, survey works, site leveling works, design, preparation of general arrangement drawings, construction and fabrication drawings, supply of labour & materials and construction of all civil, structural and architectural works by the Bidder.</p> <p>Description of various items of work under this specification and nature of work in detail are given hereinafter. The complete work under this scope is referred to as civil works. Various buildings, structures, plant and systems, facilities, etc., covered under the scope is given in Part-A and herein.</p> <p>The work to be performed under this specification consists of design, engineering, construction, erection and providing all labour, materials, consumables, equipment, temporary works, temporary storage sheds, temporary colony for labour and staff, temporary site offices, constructional plants, fuel supply, transportation and all incidental items not shown or specified but reasonably implied or necessary for the completion and proper functioning of the plant, all in strict accordance with the specifications including revisions and amendments thereto as may be required during the execution of work.</p> <p>All construction materials including cement, reinforcement steel, coarse & fine aggregate, structural steel and construction water etc., shall be arranged by the Bidder.</p> <p>The scope shall also include setting up by the Bidder a complete testing laboratory in the field to carry out all relevant tests for structural steel, reinforcement steel & reinforced concrete (RCC) works.</p> <p>Preliminary geotechnical investigation in the proposed area has been carried out by the Owner and the bore-log data is furnished in Annexure 'C'.</p> <p>The work shall be carried out according to the design/drawings to be developed by the Bidder and approved by the Employer. For all buildings, facilities, systems, structures, etc., necessary layout and details are to be developed by the Bidder keeping in view the statutory and functional requirements and providing enough space and access for operation, use and maintenance. The Bidder's work shall cover the complete requirements as per IS codes, fire safety norms, requirements of various statutory bodies, International Standards, best prevailing practices and to the complete satisfaction of the Employer.</p> <p>The Bidder shall make the layout and levels of all structures from the general grid of the plot and the nearest GSI benchmark or other acceptable benchmark of Government department. As per the directions of the Engineer. The Bidder shall be solely responsible for the correctness of the layout and levels and shall also provide necessary instruments, materials, access to works, etc., to the Engineer for general checking of the correctness of the civil works.</p> <p>All the quality standards, tolerances, welding standards and other technical requirements shall be strictly adhered to.</p> <p>The Bidder shall fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, soil conditions, local conditions and site-specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications.</p>		
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<p>CLAUSE NO.</p>	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> <div style="text-align: right;">  </div>		
	<p>In case of any conflict between stipulations in various portions of the specification, most stringent stipulation would be applicable for implementation by the Bidder without any extra cost to the Employer.</p> <p>Wherever there is an anomaly in the design concept between the data furnished in the General Design Criteria & Design Concept of Buildings, the data furnished in the design concept of buildings shall be treated as final.</p> <p>Bidder or his agencies engaged as detailer for fabrication drawings should have the experience of detailing for powerhouse structures or steel plant or Industrial structures like Petro/ Chemical/Refinery/Cement etc.</p>		
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
D-1-2 2.01.00 2.02.00	SCOPE OF WORK The scope of work for the EPC contractor shall include the analysis, design, construction, erection of all civil, structural & architectural works and all other items mentioned in Part-A of this Specification. Construction Facilities For details of construction facilities refer to Part-A of this specification. Exclusions: The details of exclusions and terminal points, refer to Part-A of this specification.			
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<p>D-1-3</p> <p>3.01.00</p> <p>3.02.00</p> <p>3.03.00</p>	<p>SUBMISSIONS</p> <p>The drawings included in the Bidding Document provide a general idea about the work to be performed under the scope of this contract. These are preliminary drawings for bidding purposes only and are by no means the final drawings or show the full range of the work under the scope. Work has to be executed according to drawings prepared by the contractor. The following documents and drawing shall be submitted and got approved before commencement of detailed engineering. The list given below is not exhaustive but indicative only.</p> <p>a) Project design intent, design criteria which shall cover all design aspects, design parameters, material of construction and its specifications, structural idealization including framing system for gravity loads and lateral loads(wind and seismic), load cases, load combinations, assumptions, references, basis of analysis & design of all buildings, machine foundations, facilities, systems and structures etc.</p> <p>b) Survey drawings indicating spot levels for the area under the scope of work.</p> <p>c) Plants 'General Layout Plan' drawing with coordinates of roads, boundary wall, buildings and facilities, pipe/cable corridors, railway lines, Green Belt etc..</p> <p>d) Geotechnical investigation scheme</p> <p>e) Geotechnical Investigation report including foundation system recommendations.</p> <p>f) Typical design of pile, if applicable, in terms of type, rated capacity, length, diameter and the termination criteria to locate the founding level.</p> <p>g) Scheme for initial and routine load test of Pile foundation high strain dynamic load test and pile integrity test methodology.</p> <p>h) Details of corrosion protection measures for all structures, foundations etc.</p> <p>i) Architectural concept designs which shall cover all concept plans and elevations, finishes and area statements of all buildings and facilities</p> <p>j) The following sequence of submission of drawings/ documents is to be followed: - Architectural drawings, wherever applicable - Relevant GA drawings & loading document - Analysis & design of structures/ buildings/ facilities with drawings. - Analysis & design of foundations with drawings.</p> <p>Detailed construction drawings and design calculations for all civil works for static as well as dynamic analysis shall be submitted for approval prior to undertaking construction work.</p> <p>Design calculations shall be done in M.S. Office (latest version) and Drawings shall be prepared in Auto Cad (latest version). The analysis shall be done by using STAAD PRO / ANSYS/SAP2000 (latest version). However, design may be carried out manually, using computer work sheets or by using suitable software programs, as mutually agreed by Employer. Final calculations and drawings shall be submitted as mentioned in General technical specification.</p>			
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CLAUSE NO.	TECHNICAL REQUIREMENTS 		
3.04.00	<p>Civil Task drawings indicating various equipment loading and supporting arrangement and floor loads shall be submitted along with design calculations. Soft copies of all STAAD/Other Softwares input and output files shall be submitted along with the design calculations for all revisions.</p>		
3.05.00	<p>Structural steel fabrication drawings to be prepared by the contractor will not be approved by the Employer. However, the Contractor shall submit all fabrication drawings for Employer's reference. Copy of detailed bar bending schedule as prepared by contractor shall also be submitted to Engineer in charge for the reference.</p>		
3.06.00	<p>Approval of construction drawings prepared by the contractor shall not relieve the Contractor of his responsibility regarding the safety and adequacy of design and correctness of the drawing.</p>		
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	<p>prepared and submitted, one showing the spot levels and contours with grid lines and the other showing the grid lines, contours and permanent features.</p> <p>Established methods of surveying like triangulation, traversing, fly leveling etc. shall be adopted for the survey work. Spot levels shall be taken at 25 meter interval and at closer intervals where pits, undulations etc. are met with. These levels shall be taken in two orthogonal directions. Contours shall be plotted at 5m interval.</p> <p>It is proposed that for the purposes of site leveling the entire plant and associated areas will be divided into various blocks as defined in the drawing no. 9587-001-POC-A-003 titled, "Site Levelling Plan". Each block shall be finished to the formation level as specified in drawing. Bidder shall deploy adequate number of experienced site leveling contracting agency(s) with requisite earth moving and compacting equipment to complete the work as per schedule.</p> <p>Preparation of leveling & grading as per proposed finished ground level (FGL) is in the Bidder scope.</p> <p>Bidder shall ensure that road access and drainage facilities for each block is available when site leveling in that block is completed. Unless otherwise mentioned, all roads and drains within a block shall be constructed by the bidder within a month from the date of completion of site leveling of that block.</p> <p>The specified formation level(s) shall be achieved either by excavation where the existing ground levels are higher than the specified formation level or by raising by controlled filling with borrowed earth where the existing ground levels are lower than the specified level.</p> <p>The excavation shall be in all types of soils or rock or a mixture of these. Bidder should assess and satisfy himself about the actual nature of soil present at site, before submitting his bid.</p> <p>All natural materials arising out of site clearance and excavation shall be the property of owner. They shall be dealt with in the manner specified by the Engineer. Earth / boulders / rock etc. excavated and useful portion (serviceable materials) of trees cut shall be stacked at suitable places within Owner's acquired land for the plant in a manner as directed by the engineer. Woods, branches, trunks of trees shall be termed as serviceable material. Other materials like twigs, leaves, roots, vegetable and organic matters etc. shall be termed as unserviceable material and shall be sorted out from the serviceable materials before disposal. They shall be cleared from the area and disposed off at places within Owner's acquired land for the plant in a manner as directed by the engineer.</p> <p>If the excavated material is suitable and accepted by the Engineer as fill material, the same can be used for filling in other areas where raising by filling is required. Otherwise, the same shall be taken and stacked at places(s) within the plant boundary as directed by the Engineer.</p> <p>Filling with rock shall be done only after the written permission of the Engineer in the following manner:</p> <p>For filling the areas involving water bodies, dewatering, removal of much, dismantling of existing slope protection of water including all other scope of work required for filling of area to be done by the bidder.</p> <ul style="list-style-type: none"> - Filling with rock shall be done only in areas identified for laydown and preassembly and ash based units. - Maximum size of rock used for filling should not be more than 150mm in all direction. - Original ground after removal of all organic and vegetable matters shall be consolidated by rolling as directed by the engineer subject to a minimum of six passes of 8-10 tonne roller. 		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-4 CIVIL WORKS GENERAL LAYOUT PLAN</p>	<p style="text-align: center;">PAGE 2 OF 4</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>4.03.02</p> <p>4.03.03</p> <p>4.03.04</p>	<ul style="list-style-type: none"> - Over the compacted layer of rock (300mm), soil shall be filled in horizontal layers not exceeding 300mm in compacted thickness. The soil shall be compacted as specified elsewhere. - It shall be ensured that the top soil layer is in minimum 3 layers of 300 mm each. To achieve this the thickness and number of rockfill layers below can be suitably adjusted. <p>Contour map and spot levels of the area based on the preliminary survey carried out by Owner is enclosed for the purpose of guidance of Bidder. Refer tender drawing no. "9587-999-POC-F-002". However, Owner does not lake any responsibility about the accuracy of the survey details furnished and any variation of the said data shall not constitute a valid reason for changing the terms and conditions of the contract. Bidder is requested to carry out his independent assessment of the existing ground levels before furnishing his bid. Detailed survey shall be carried out by Bidder after award of work and all findings as stated earlier shall be submitted for Owner's review.</p> <p>All existing drains/channels in the plant and other areas associated with the plant except those proposed to be constructed by the Owner shall be suitably diverted by the Bidder before taking up any construction. These diversions shall be so designed as to ensure effective disposal of water without any accumulation or flooding within the limits of overall land acquisition line and in adjoining areas.</p> <p>Before commencement of cutting/filling, all organic and vegetable matters like grass, plants, shrubs bushes, weeds, trees etc. in the areas to be filled, shall be completely removed along with their roots and disposed off. It shall also be ensured that the area to be filled is clear of any water, slush etc. Original ground shall be compacted by rolling as directed by the Engineer subject to a minimum of six passes of 8 to 10 tonne roller. The earth shall then be spread in horizontal layers not exceeding 300 mm in compacted thickness. Each layer shall be watered and compacted with proper moisture content and with such equipment as may be required to obtain a compaction of 95% or more of Standard Proctor's maximum dry density. The moisture content of the fill material shall be controlled to obtain near optimum moisture content during compaction. The fill material shall be tested for determining optimum moisture content and maximum dry density by Standard Proctor Test as per IS: 2720 (Part-VII). The fill material shall also be tested for determining moisture content before compaction as per IS: 2720 (Part-II). For each of the above tests, one sample for every 10,000 cubic metre of fill material shall be tested. Additional samples shall be tested, whenever there is a change in the source or type of fill material. The compacted soil shall be tested for its dry density as per IS: 2720 (Part-XXIX) or Part-XXVIII). Samples shall be taken at the rate of one sample for every 10,000 sq.m. area for each compacted layer. In addition, random checks shall be carried out in compacted soils by means of Proctor needle penetration. Bidder shall submit to the Engineer, the test results immediately after completion of the tests. A sample shall be deemed to have passed the test when the in-situ dry density is equal to or more than the specified percentage of maximum dry density. If a sample taken from a layer fails to pass the test, the layer shall be further compacted till two samples taken and tested from this layer pass without any negative deviation. Only after this. spreading of further layers shall be taken up.</p> <p>Before start of filling, the Bidder shall submit to the Owner his proposal for the methodology to be adopted for compaction for each type of fill material. The Bidder shall also carry out compaction trials to establish the proposed methodology. The Bidder shall start the compaction work only after approval of the methodology by the Owner</p>			
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CLAUSE NO.	TECHNICAL REQUIREMENTS 		
4.03.05	<p>The surface of the cut/filled up areas after reaching final level shall be dressed to the required levels and slopes. The difference in levels shall not be more than +/- 10cm locally.</p>		
4.03.06	<p>The borrow areas outside the overall plant boundary limits for obtaining suitable fill material which is required over and above the earth available after cutting high grounds within the plant area, for site levelling shall be arranged by the Bidder himself and all expenses in respect of royalties, taxes, duties, etc. for borrow areas/fill material shall be borne by him. He shall also obtain and submit to the Owner the necessary clearances/permission from the concerned authorities for the borrow areas/fill material.</p>		
4.03.07	<p>Material suitable for filling shall be loaded and transported to the filling site by the Bidder. Any coarse grained or fine grained low plastic soil, free from shingle, salts, organic matter, sod or any other foreign substances, may be used for filling. The Bidder shall test the fill material to establish its suitability and submit its results to the Owner. Fill material shall be approved by the Owner. The following types of materials shall not be used for filling:</p> <ul style="list-style-type: none"> a) Material from swamps, marshes and bogs. b) Expansive clays c) Peat, logs, stumps, sod and perishable materials. d) Materials susceptible to combustion e) Any material or industrial and domestic produce which will adversely affect other materials in the work. a) Materials from prohibited areas 		
4.03.08	<p>Bidder shall include in his offer any extra filling that may be required on account of subsidence of the original ground due to overburden of filling above and/or compaction works for site levelling.</p>		
4.03.09	<p>After levelling, the contractor shall establish concrete pillars at the intersection points of the grid lines for future reference. These pillars shall project at least 450 mm above the formation level and shall be labelled permanently with their respective coordinates and reduced levels.</p>		
4.03.10	<p>Filling upto the specified formation level shall extend at least 2.0 m beyond the outside face of boundary wall/fence. Thereafter, it shall be finished at a suitable slope (not steeper than 1 Vertical: 2 Horizontal).</p>		
4.03.11	<p>For site levelling of railway siding area (as marked in site levelling drawing) shall also comply to Railway Design & Standards Organisation (RDSO) guidelines.</p>		
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TECHNICAL REQUIREMENTS



D-1-5

SALIENT FEATURES & DESIGN CONCEPT

This section of specification covers salient features and design concepts of Civil, Structural and architectural works pertaining to Power Plant components as detailed below.

5.01.00

Architectural Concepts & Design:

- a) All the Architectural design works shall be carried out by professionally qualified architects having adequate experience (minimum five years) in the design and detailing of architectural work of power plant buildings. Bidder may have in-house Architects with the required experience for the above or engage Architect Consultant having similar experience.
- b) Power plant buildings shall be architecturally treated, based on functional requirements, in such a way that they retain the desired scale, and present a pleasing composition of mass and void. The overall impact of the buildings shall be one of aesthetically unified architectural treatment having a comprehensible scale, blending colour scheme with the surroundings.
- c) All buildings and structures shall be architecturally treated in such a way so as to be in complete harmony with the main plant building, surrounding structures and environment. Due considerations shall be given to orientation, landscape design, and interior design. All finishes for floors, walls, ceiling, structural elements, partitions for offices and industrial areas shall be suitable for their aesthetics, durability and functional requirements and shall include the latest building material & technology. Consideration shall be given for achieving standardization & fast track construction.
- d) Overall colour scheme of the buildings shall be designed judiciously and in a comprehensive manner taking into account the mass and void of buildings, its facade, equipment, exposed structural elements, piping, trestles, bus ducts, and other service elements. Architectural design of all power plant buildings shall be suitable for installation of photovoltaic panel on rooftop for renewable energy purpose.
- e) For adequate light and ventilation, National Building Code recommendations shall be followed. All buildings having height more than 4.0 m shall have fixed glazed ventilators.
- f) Architectural design of all Power Plant Building shall be suitable for installation of solar photovoltaic panels on roof tops for renewable energy purpose.
- g) All the buildings shall be architecturally designed to meet the National Building Code requirement & Fire Safety Regulations.
- h) All public buildings shall be designed incorporating the provision of barrier free environment for physically disabled persons.
- i) All the buildings and site development including landscaping shall be designed to take care of rain water harvesting & ground water recharging. Development of rainwater harvesting scheme for the project and obtaining approval of the scheme from Central Ground water board is in bidder's scope

TECHNICAL REQUIREMENTS



- j) For Control Rooms, CER, UPS Charger Room area in MPH dry wall construction technology shall be incorporated. Control room shall be designed as designer control room with ACP Cladded wall paneling for housing LVS.
- k) Full glass wall partition with aluminium frame over solid wall with skirting 150 mm high to be provided between CCR and CER of AHP CR, WS CR & CHP control room and MPH Control room.
- l) All control room shall be provided with air lock lobby.
- m) The development of green belt is not in bidder scope. However, bidder has to plan the facilities leaving the space for green belt as indicated in "General Layout Plan". In addition to that laydown areas and other vacant land of the plant will be used by owner for the development of green belt.
- n) All floor areas indicated in subsequent pages shall be total floor area required.

5.02.00

Main plant Buildings/Structures shall comprise of:

- a) Mill Bunker Building
- b) Transfer Points, Conveyor Galleries & Trestles
- c) Machine Foundations in Main Plant
- d) Boiler Structure
- e) Compressor House
- f) ESP Structure
- g) ESP Control Building
- h) Pipe & Cable Gallery
- i) Main Power House

The, Main Power House, Bunker building, transfer points, conveyor galleries and trestles, boiler supporting structure, compressor house, ESP supporting structures including inlet and exhaust duct support structures, Pipe cable Galleries & trestles shall have structural steel framed super structure.

All other buildings may have either RCC or structural steel framework.

Brief description of the above mentioned Main Plant Buildings is furnished herein:

5.02.01

Mill and Bunker building

i. Salient Features

The mill bunker building shall house coal mills, feeders, Cylindrical Coal Bunker & Conical Hopper, Tripper Conveyor & its drive and monorails. All columns, main beams and secondary beams shall be made of structural steel. The RCC floor slabs (supporting the Feeder and Tripper Conveyors) shall comprise RCC slab supported on profiled metal deck sheet (to be used as permanent shuttering) not to be considered for design of RCC slab as composite slab) and shear anchor studs welded to the top flange plate of secondary & main structural steel beams, (which supports the RCC slab & metal deck sheet).

Bidder shall integrate the Mill & Bunker Building with boiler supporting structure.

TECHNICAL REQUIREMENTS



Access platforms shall be provided at minimum one (1) level above bunker supporting level for inspection and testing of bunker and hopper connections. Minimum (1) Nos. of man hole/ access window shall be provided for maintenance of silo.

The bottom level of base plates of columns shall be 1.20 m below the finished paving level in the Boiler Area. The columns of Mill-Bunker building shall consist of built up structural steel I-sections. Rolled sections with additional cover plates on column flange shall not be acceptable for column sections.

The cylindrical coal bunker and conical hopper shall be made of structural steel. The inside surface of hopper shall be lined with stainless steel plates the details of which are mentioned hereafter in this specification.

Structural steel brackets with PTFE bearings shall be provided at the end columns to support the external gallery of the Tripper Conveyor

The Mill-Bunker building roof shall be provided with Pre-fabricated insulated metal sandwich panels. Composition of Insulated Metal Sandwich Panels shall be as described in Clause 9.08.00, Part-B (Civil) of Technical Specification. Adequate slope shall be provided for quick drainage of rain water.

The RCC floor supporting the Tripper Conveyor shall be fully covered up to the Roof level with single skin metal sheet (& structural steel runners).

ii. Design Concept

The Mill Bunker Building shall be conceptualized as moment resisting frames in transverse direction and braced in longitudinal direction. In the transverse direction the bracings may be provided, wherever feasible, in order to meet the deflection requirement specified elsewhere in this section. Bracing member shall be connected to column flange plate through gusset plate (minimum 12mm thick).

Minimum thickness of structural steel Bunker plates shall be 12mm inclusive of 4mm corrosion allowance. Minimum wall thickness of Hopper shall be 8mm. Minimum thickness of stainless steel liners on the entire inner surface of hopper wall shall be 4mm conforming to ASTM A240 S304 (Type 304) with Mill finish 2B cold rolled, annealed, descaled (pickled) and skin passed. To ensure smooth flow of coal, the hopper surface shall be provided with minimum angle of 73° with the horizontal plane.

The top of the cylindrical bunker shall bear no load/ reaction from the tripper floor and accordingly neoprene bellow strap shall be provided at the interface between the two structures to allow free deflection of the tripper floor. Neoprene bellow strap shall be provided all-round the bunker to effectively seal the gap between top of bunker and sealing plate below bunker.

For all other design methodology, refer to Design Criteria specified hereafter in this specification.

iii. Architectural Features

The Mill & Bunker Building shall be a structural steel framed structure having RCC floors and prefabricated insulated metal sandwiched panel sloped roof. The tripper floor side cladding shall be Single skin Metal cladding with steel louvered windows and fixed windows with poly carbonate sheet glazing. Area of windows shall be minimum 10 % of floor area. Rainwater down comer shall be of galvanized MS pipes and shall be located at every column location.

5.02.02

DELETED

5.02.03

Machine Foundations in Main Plant Area

A. SG Area

TECHNICAL REQUIREMENTS



i. Salient Features

The scope of work of the Bidder shall be design and construction of all Civil & Structural Works of Machine Foundations including supply of all materials.

PA/ FD/ID Fan and Mill foundations:

PA/ FD/ ID Fan and Mill foundations shall be RCC block foundation directly resting on virgin soil/ pile below Ground level. The vertical faces of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 Kg/cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.

ii. Design Concept:

- a) For the foundations of Fans (ID, FD and PA), Mills, etc. detailed static and dynamic analysis shall be done.
- b) Wherever block foundation is adopted by the bidder, suitable provisions to be ensured by the bidder in their General Arrangement and design to prevent transmission of vibration from these machine foundations to other nearby structures / foundations.
- c) The bidder or his consultant should have adequate prior experience in design of machine foundations and the machines should be in successful operation for at least one year prior to the date of submission of bid.

B. STG Area

i. Salient Features

The scope of work of the Bidder shall be design and construction of all Civil & Structural Works of Machine Foundations including supply of all materials, springs & viscous dampers.

Turbo-Generator (TG) foundation:

Alternative-1

The TG foundation shall comprise of RCC top deck supported on steel helical springs & viscous dampers (called herein as the Vibration Isolation System – VIS) and shall be located in the Turbine bay of Main Power House. The springs-cum-viscous dampers shall be placed on a group of RCC/ Structural Steel columns. These TG columns can be interconnected to the Main Power House Building frame either rigidly or connected through PTFE bearings on corbels/ brackets of the TG Columns. The general arrangement & details of springs/ viscous dampers and supporting group of columns and beams shall be based on TG Equipment detail of the Bidder.

Alternative-2

The TG foundation shall be conventional machine foundations comprising of RCC top deck directly supported on substructure comprising of columns and beams without any steel helical springs and viscous dampers. The columns shall be rigidly connected to the RCC deck at top and shall rest on open / pile supported foundation at bottom. The entire foundation system (including deck, columns and raft) shall be isolated from the main plant building structural system and no connection between the main plant structure and TG foundation is permitted.

Bidder has the option to choose either Alternative -1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.

TDBFP & MDBFP foundations:

TECHNICAL REQUIREMENTS



Alternative-1

TDBFP&MDBFP foundations shall consist of RCC top deck supported on steel helical springs & viscous dampers inside Main Power House. In case the top deck is located at operating floor/mezzanine floor level, the springs/ viscous dampers shall be supported on a group of structural steel columns-beam grid which shall be rigidly integrated with the Main Power House Structural frame.

Alternative-2

TDBFP&MDBFP foundations shall consist of RCC top deck directly supported on RCC/ structural beams and columns without any steel helical springs & viscous dampers inside Main Power House. The structural columns and beams supporting the TDBFP / MDBFP shall be independent of the Main Power House Structural frame and shall also have independent foundation without any connection to other nearby foundations. Further each TDBFP / MDBFP shall have independent supporting structural arrangement without any interconnection among themselves.

Bidder has the option to choose either Alternative-1 or Alternative-2 based on his design philosophy and practice. However in case Alternative-2 is adopted by bidder, then the bidder has to furnish extended warranty of five years for satisfactory static and dynamic performance of the foundation system.

BFPs in ground floor

In case the MDBFP/TDBFP foundation is envisaged to be located at ground floor of Main Power House, then these shall be designed as block foundations directly resting on soil / pile. Vertical facing of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 Kg/Cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.

ii. Design Concept:

- a) For the foundations of Turbo-generator, Boiler feed pumps, etc. detailed static and dynamic analysis shall be done.
- b) The vibration isolation system (where ever applicable) supplied shall be of proven make and shall be in successful operation supporting machines like steam turbo-generators, BFPs, etc.,
- c) Wherever alternative-2 is adopted by the bidder for TG or BFPs, suitable provisions to be ensured by the bidder in their General Arrangement and design to prevent transmission of vibration from these machine foundations to other nearby structures / foundations.
- d) The bidder or his consultant should have adequate prior experience in design of machine foundations for the respective alternative to be adopted by the bidder and the machines should be in successful operation for at least one year prior to the date of submission of bid.

For detailed specification of steel helical springs and viscous dampers refer General Specification Chapter.

5.02.04

Boiler Structure

i. Salient Features

The Boiler supporting structure shall be structural steel framed superstructure adequately braced in vertical planes in both the orthogonal directions. The general arrangement & details of structural steel columns, beams, bracings, ceiling girders etc shall be as per the Bidders Boiler Structure design and detailed engineering scheme.

TECHNICAL REQUIREMENTS



The bottom base plates of Boiler structure columns shall be 1.20m below the finished paving level in the Boiler area. The RCC pedestals supporting the column base plates shall be extended in order to provide RCC encasement to the structural steel columns up to at least 350mm above the top of the paving RCC slab. Steam Generator roof (pent house)/canopy/side cladding shall have single skin troughed profile permanent colour coated sheet. Cladding for Boiler elevator enclosure except its machine room shall be with single skin troughed profile permanently colour coated sheet.

Bidder shall integrate the boiler supporting structure with Mill & Bunker Building Structure.

Waterless Bio Urinals with enclosure are to be provided by the contractor on each floor elevation of each boiler. Maintenance of toilet in hygienic condition till COD of the unit shall be the responsibility of the bidder.

ii. Design Concept

Boiler supporting structure shall be designed by the Bidder based on provisions of IS 800 for structural steel and IS: 456 for RCC works.

Boiler Elevator Machine Room

Floor of Machine Room shall be provided with profiled metal decking sheet. Trough shall be filled with Insulating Material (glass wool or rock wool) and thereafter finished with Minimum 50 mm thick wooden flooring, consisting of 37 mm thick hardwood planks, finished with 11mm thick laminated wooden flooring (of 'pergo' or equivalent) with plank size 193x1195mm (material class shall be 34 as per EN13329), over 2 mm expanded polystyrene foam and polythene sheet under laying.

Roof and Side enclosure of Machine Room shall be provided with Prefabricated Insulated Metal Sandwich panels. Composition of Insulated Metal Sandwich Panels shall be as described in Clause 9.08.00 of Part-B (Civil) of Technical Specification.

Doors of Machine Room shall be Double Plate Steel flush doors of thickness 45 mm with steel sheets of 18 gauge with necessary stiffeners. Space between two sheets shall be filled with mineral wool insulation. Frame of doors shall be pressed steel sheets of 16 gauge. All necessary fittings for the doors shall be provided by the Bidder. Rubber sealing, for making the Doors airtight shall also be provided.

Windows/ventilators shall be of standard extruded anodised Aluminium Sections of minimum 2 mm thickness with 24 mm hermetically sealed double glazing consisting of two 6 mm thick toughened glass separated by 12 mm. gap.

Technical requirements of prefabricated insulated metal sandwich panels/decking sheets shall be same as given elsewhere in this specification.

5.02.05

Compressor House

i. Salient Features:

The compressor house shall be a structural steel framed superstructure with a overhead crane as per requirements specified in Part-A Sub Section IIA-19 and Part-B Sub Section A-25 of Technical Specification. The gantry girder for the crane shall have walkway with chequered plate on both rows and cage ladder access.

The roof shall comprise minimum 40mm thick RCC slab (with additional water proofing) supported on profiled metal deck sheet and purlins. The ground floor slab shall comprise of all RCC block foundations, cable trenches and pipe trenches. The building shall be completely covered with vertical cladding and roof.

Design Concept:

TECHNICAL REQUIREMENTS



	<p>The Design of Compressor House steel structure shall be based on provisions of IS 800 & IS 456 for RCC works. The structural frame shall be moment resisting sway frame in the lateral direction and longitudinally braced in the longitudinal direction. Design shall also be based on the Design Criteria specified elsewhere in this specification.</p> <p>ii. Architectural Features</p> <p>This building shall be steel framed structure with brick wall up to window sill height & Single Skin Metal Panel cladding above it. The roof system shall be as per the detail furnished in the salient features of this building</p> <p>Cut-outs and opening shall be provided in floors and walls as per requirements.</p> <p>Metal Panel cladding shall be composed of different colour shades to match with the existing surroundings. External finish shall be of Premium Acrylic Smooth Paint with Silicone additives</p> <p>The size, height, door/window/rolling shutter details and building size shall be as per the approved equipment layout plan of the bidder.</p>
5.02.06	<p>ESP Structure</p> <p>i. Salient Features</p> <p>The ESP structure shall be a structural steel superstructure with vertical bracings in the required vertical planes in both longitudinal and transverse directions, the details of which shall be as per the approved ESP equipment GA & details of the bidder.</p> <p>The bottom of base plate for ESP structure columns shall be 300mm above the finished paving level in ESP area. The RCC pedestals supporting the column base plates shall be extended accordingly above the top of the paving RCC slab. Further, the gusset plate / base plate shall be encased in concrete up to the top of bolts. ESP roof (pent house)/canopy/side cladding shall be single skin troughed profile permanently colour coated sheet.</p> <p>ii. Design Concept</p> <p>Design of ESP structure shall be based on provisions of IS 800 for structural steel and IS 456 for RCC works. It shall be an axially braced structure in both orthogonal directions. The ESP supporting columns shall be suitably strengthened about the minor axis for sliding movement of the base plate of ESP due to thermal movement.</p>
5.02.07	<p>ESP Control Building</p> <p>i. Salient Features</p> <p>ESP Control Building can either be structural steel superstructure or RCC framed structure with RCC floors at ground floor level and upper levels. The RCC floors at upper levels shall support the Switchgears, cable galleries and Control Room. The RCC floors at upper levels shall be cast in situ RCC slabs.</p> <p>For steel framed building the RCC floors shall be supported on profiled metal deck sheet and structural steel beams and roof of the building shall comprise of minimum 40mm thick RCC slab supported on profiled metal deck sheet and structural steel beams.</p> <p>The rainwater down comers shall be as per specification and shall be suitably concealed.</p> <p>The external Transformer Yard of the building shall comprise the transformer foundations and cable slit below ground level.</p>

TECHNICAL REQUIREMENTS



The building shall have Lift structure with lift pit below ground level and staircase at each gable end of the building.

ii. Design Concept

The Design of ESP Control Building shall be based on provisions of IS 800 for Structural Steel & IS 456 for RCC works.

iii. Architectural Features

This building shall be completely covered with Light Weight Autoclaved aerated concrete blocks on all four sides except for the portion in front of the external Transformer Yard and toilet and pantry block. Provision for glazed/ fire proof doors & windows shall be included. Minimum 345mm thick brick wall shall be provided for the external brick wall facing the adjacent transformer yard and the brick wall height shall be 600mm above the highest point of the transformer. Inside the building, AHU rooms, UAF Room & Battery rooms shall have brick masonry of one brick thickness. The internal walls of air-conditioned area shall be finished with 2 hour fire rated Aluminum Composite Panel Cladding.

Entire transformer yard, which shall be adjacent to the building, shall be provided with metal fencing with gates.

The building shall accommodate cable vault, toilet, staircase, switchgear rooms, control rooms and AHU room. An auxiliary transformer yard with fencing and gate shall be provided adjoining to the building. Control room and VFD room shall be air-conditioned and shall have false ceiling. Windows & Ventilators all shall be provided with Aluminium sections. All doors, windows in air conditioned area shall be provided with hermetically sealed toughened glass glazing in Aluminium frame work Steel doors and Fire proof doors shall be provided as per requirements. Internal columns in Control Room shall be encased with Aluminium Composite Panel cladding.

Minimum 2 Nos. of stairs and 2 Nos. of Toilets shall be provided as per requirement. Cut-outs and opening shall be provided in floors and walls as per requirements.

External finish shall be of Aluminum Composite Panel Cladding except Transformer area where premium smooth Acrylic Paint shall be provided.

5.02.08

Pipe & Cable Galleries

i. Salient Features

The Pipe- Cable Gallery shall be Structural Steel Superstructure with Steel Truss (Lattice Girder) having a general span of 15.0m/20.0m. The steel truss shall be supported on 2 legged/ 4 legged trestles the arrangement of which shall be developed by the Bidder. Trestles for pipe and cable galleries shall also be of structural steel.

The width of the Gallery shall vary depending on the functional requirement. A walkway of minimum width 600mm shall be provided along the Cable Trays supporting floor of the gallery. The walkway shall comprise 40mm thick MS grating and 1.0m high handrail made of 32NB MS pipes. For pipe cable galleries carrying ash pipes, galvanized MS grating shall be provided over entire width of the gallery.

Plan bracings shall be provided at all chord levels of the cable gallery truss. Minimum gusset plate thickness shall be 8mm for all connections.

The level of the bottom chord (bottom of steel) of the gallery shall be at least 3.0m above the finished paving level in general. However, at all road/rail crossings, the level of bottom of steel of the gallery shall be at least 8.0m from the top of road surface and 8.5 m from top of rail track. Before and after the road/rail crossings, a barrier of suitable height shall be constructed so as to prevent the approach of cranes (having height more than 8 m) up to the pipe/cable racks/trestles.

TECHNICAL REQUIREMENTS



5.02.09

Main Power House

(i) Salient Features:

Main Power House shall consist of the Turbine bay, adjacent Deaerator Bay, electrical bay & common control room building (CCR Building) (as stipulated elsewhere in this specification). The turbo – generator (TG) foundation, boiler feed pumps foundations and shall be located inside the power house and their foundation system shall be as per design concept of machine foundation. All other equipment foundations (including Heaters & Deaerators) shall be supported on RCC floors with structural steel beams. The RCC floors shall comprise RCC slab over profiled metal deck sheets (to be used as permanent shuttering but not to be considered for design of RCC slab as composite slab). Shear anchor studs shall be provided through metal deck at regular interval on all top flange / flange plate of structural beams. However, steel gratings, chequered plate flooring as well as precast RCC covers shall be provided as per the functional requirements. All RCC pits & trenches below ground floor slab (including Condensate Extraction Pump (CEP) pit) shall be covered with minimum 40 mm thick MS grating supported on structural steel beams. The RCC pits shall also be provided with a sump at the corner for dewatering with submersible pumps. Staircases & ladders shall be provided for access to these pits. Electrically Operated Travelling (EOT) cranes shall be placed in the turbine bay with the gantry girders (supporting crane wheel loads) supported on structural steel brackets on A & B row columns). Walkway with chequered plate shall be provided at crane girder level at both 'A' row & 'B' row side with caged ladder access from the operating floor.

All main columns & beams of Main Power House shall be of structural steel girder (open web or solid web) with base plate level of columns 1.20m below ground floor slab level in

TECHNICAL REQUIREMENTS



general except for other pit areas where structural steel column shall be extended below upto a depth lower than the pit top surface such that the column base plate & stiffeners are concealed below the pit raft level are concealed below the pit raft level. Auxiliary columns in main power house shall be either of structural steel construction.

The roof system in turbine bay shall comprise a structural steel girder (open web or solid web) for the entire bay width. The roof slab shall consist of 40mm thick (min. above the crest of metal deck sheet) RCC slab supported on profiled metal deck sheet. The metal deck sheet shall be supported on structural steel purlins. The purlins shall be in turn be supported on turbine bay roof girder top chord at regular interval. Additional waterproofing shall be provided above the roof RCC slab as per details mentioned elsewhere in this specification. 1 in 100 slope shall be provided for the turbine bay roof sloping downwards towards the A-row (towards transformer yard). Minimum 150mm dia. galvanized mild steel pipes shall be used at A-row & C-row as Rainwater Down comers. Staircases in main power house shall be of structural steel. Treads of each staircase shall be 40mmthick MS grating and handrail/ hand post shall be 32mmNB circular hollow sections unless specified otherwise in architectural section of the specification. All staircases in turbine Bay and Deaerator Bay shall be enclosed with minimum 230 thick brick masonry wall with fireproof doors at all floor landing levels. The parapet wall shall be of minimum 1m height and shall be provided all the around roof of main plant building.

All edges of openings shall have edge protection angles (minimum ISA 75x75x6) and handrails with hand posts (Hand post spacing 1m maximum).

ii. Design Concept:

Main Power House shall be designed as moment resisting sway frame in the transverse direction and braced in the longitudinal direction. However, due to functional requirement, vertical bracings to the column in CCR Building not to be provided at (& above) the operating floor level and CCR Building frames shall be designed as moment resisting frames in both transverse and longitudinal directions.

All beam column moment connections shall be designed for adequate ductility. The building shall have connectivity with walkways from Boiler through sliding bearing only. The connectivity with cable gallery shall be as specified in Pipe & cable gallery section of this chapter. Floor level acceleration spectra shall be generated during seismic analysis for design of pipe supports / equipment located at the elevated floors. Adequate number of thermal expansion gap (minimum 2.00m) between adjacent structural frames at expansion joint and minimum 50mm between RCC slabs at expansion joint) shall be provided between the units and Common Control Building.

In the RCC floor/ roof slabs, the spacing of shear anchor studs on structural beams shall be minimum of the spacing required for

- i) Restraining the compression flanges of beams and
- ii) Transfer of the horizontal shear at floor/roof to the supporting beams.

The roof girder in Turbine Bay shall be provided with a camber to take care of deflection due to dead weight.

The Main columns in A, B & C rows of Main Power House Building shall be built-up I sections. Rolled sections/ I sections with additional flange plates shall not be acceptable for main columns & auxiliary columns. The roof girder (open web or solid web) to column connection shall be bolted connection using high strength bolts (grade 8.8/ IS 1367). The roof girder of Turbine Hall shall be adequately braced in plan using Tie level and rafter level bracings. The longitudinal bracing shall comprise a pair of members connected to the column flanges and detailing shall be adequate to restrain the entire column cross-section. Minimum gusset plate thickness for bracings shall be 12mm.

Common Control Room at operating floor shall have minimum 60% free space for

TECHNICAL REQUIREMENTS



movement, control room to be free of any auxiliary/stub columns other than the C-row central column with minimum depth as possible

For all other design methodology, refer to Design Criteria specified elsewhere in this specification.

iii. Architectural Features

This building shall be of Structural Steel Framed structure and shall be completely covered with external cladding and RCC roof. The external vertical face (herein stated as 'A' row) of main power house facing (& adjacent to) the transformer yard and also the two gable ends shall be completely covered with vertical cladding comprising 3.0m high brick wall (on ground floor slab) and single skin profiled vertical metal sheet for the remaining height except for the vertical segment between operating floor & gantry girder bracket level where double skin vertical metal sheet shall be provided.

In case of routing of bus-duct is done outside the A-row (part/full), there shall be a continuous cladding of metal sheeting covering steel structure supporting the bus duct to match the entire A-row elevation. The metal cladding shall be designed to suit the aesthetics of the entire main plant building.

In front of the power transformers, RCC fire barrier wall shall be provided as per functional requirement in lieu of brick wall at A-row. The above mentioned RCC wall shall be attached with single skin metal sheet on external face.

The 'A' row & Gable End columns projecting inside the turbine hall shall be concealed with single skin profiled metal sheet from operating floor level to crane girder bracket top level.

The external vertical face (herein stated as 'C' row) facing (& adjacent to) the Boiler area shall be completely covered upto the Deaerator floor level with vertical cladding comprising 3.0m high brick wall on ground floor followed by either single skin metal sheeting with runners or brick wall sandwiched with single skin metal sheeting on external face (for all floors requiring 2 hours of fire rating e.g. cable spreader room, ventilation/ air washer room, AHU Rooms and air conditioned areas)

The internal vertical interface plane between Turbine bay & Deaerator bay (herein stated as 'B' row) shall have brick masonry Wall from RCC roof slab level of turbine bay (AB bay) upto specified floor level below such that Turbine bay & Part of Deaerator bay below the Deaerator supporting floor level is completely covered on all sides.

Glazing for A Row & gable end shall be reflective 6mm thick clear toughened glass with Aluminium frame. Hermetically sealed double glazing shall be provided between air conditioned & non air conditioned areas. Internal glazed partition inside CCR/CER/Offsite Control Room and B-Row at operating floor level shall be of fire resistant glass having 2 (Two) hour fire rating and with suitable frame. Light weight aerated concrete panels with Single Skin Metal Panel cladding shall be provided in exterior of UPS Battery room area and Control Equipment Room area. All internal side of Aerated concrete panel and columns in air-conditioned areas other than CCR in MPH shall be encased with Aluminium Composite panel cladding from inside.

Inside the main power house building, brick masonry wall (and fire proof doors) shall be provided for switchgear rooms, cable spreader rooms, MCC rooms, AHU rooms, Air Washer room & Oil rooms and all other rooms where fire protection is envisaged.

Cut-outs and opening shall be provided in floors and walls as per functional requirement.

All door, windows in air conditioned area and all windows glazing shall be provided with Aluminium frame work Steel door and Fire Proof doors shall be provided as per requirements.

Stairs in BC Bay and on A-Row shall be provided as per functional requirement and as

TECHNICAL REQUIREMENTS



per National Building Code and Factories Act.

All stairs in BC Bay lift lobby Area shall be in RCC. Stainless steel railing shall be provided at TG floor level for all cut-outs/ openings, walkways, cut-outs at lower level that are visible from TG floor level and stairs near lift lobby. M.S. railing shall be provided for all other locations. All peripheral edges of floor cut-outs / openings at T.G floor level and covered with gratings/ chequered plates, expansion joints along T.G deck, structural expansion joints shall be covered with minimum 2mm thick stainless steel plate of grade SS 316.

For each unit minimum one no. gent's toilet with adequate facilities including drinking water space and janitor's space shall be provided at each level of power house building, in addition one no ladies toilet shall be provided in each unit at 0.00M and mezzanine floor level and CCR level. A separate ladies and gent's toilet and pantry shall be provided for CCR approachable from CCR / CER / Offsite Control Rooms.

B Row portion in TG Hall fronting Control Room & CER and glazed partitions in CER/ CCR/Offsite Control room shall be of **30 mm thick** Hermetically sealed double glass of Fire resistant of min 14mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control and 6 mm thick toughened tinted glass with **10 mm** gap and with suitable fire resistant frame of 1.6 mm thick powder coated steel sheet. The partitions shall be up to false ceiling level and wall above up to the soffit of floor slab above control room and shall be finished with Aluminum Composite panels cladding and shall also have FRP mural of theme matching to local art and Culture.

Glass partition between AC areas in CCR/CER and other areas in associated with CCR/ CER shall be single Fire Resistant glass in line with technical specs as per fire zoning requirement. It shall be single toughned glass minimum 10 mm thick if not within fire zone.

In CCR, EIC Room, Conference Room, Programmer's Room and Visitors Gallery etc. a theme based coordinated false ceiling shall be provided with latest state of art design.

In CCR, EIC Room, Conference Room, Programmer's Room and Visitor's Gallery etc., vitrified flooring shall be designed with theme and color coordination in line with the designed false ceiling.

Mullion-less glass wall with motorized curtain shall be provided in between the control room and the Visitor's gallery.

The fire resistant glass partition in between CER/PADO room & control room (control room left hand side wall) and shift in-charge room/Conference room & control room (control room right hand side wall) shall have motorized blinds (with provision of remote control from Unit in-charge desk) with central metallic panel column having NTPC signature icon.

The rest of the walls including LVS wall shall have coordinated design keeping in mind the overall theme of the control room using metallic panels with calcium silicate boards.

The control room gates shall have biometric physical security feature with double layer of sliding doors with air lock lobby.

Control room interiors shall be designed and executed by M/s EVANS / M/s Pyrotech or equivalent vendor who are specialized in control room interior design.

Control room/ Control Equipment Room / Offsite Control Rooms, entire area, False Ceiling shall have Cat Walk Way above for service/ maintenance.

Main power house building shall be provided with passenger lift in BC way as specified elsewhere in technical specification.

Adequate partitioning as per functional requirement above false ceiling in control Room & CER shall be provided for Inert Gas zoning.

TECHNICAL REQUIREMENTS



Internal steel columns in Air Conditioned Area of Main Power House Building (CER, UPS charger room, SWAS room, etc.) shall be encased with Aluminium Composite Paneling up to false ceiling.

Functionally the very heart of Power House Building is its Control Rooms. Special attention shall be given for conceptualization of interior design of the Control Rooms. Control rooms design shall be both functional and ergonomic for ensuring reliable and error free operation of the plant. Control room shall have metallic panels with calcium silicate boards cladded video wall housing large video screens and a separate visitor viewing gallery. A walk through view of the control rooms shall be submitted along with bill of quantity to illustrate the design scheme.

Metal Panel Cladding shall be composed of Different Colour shades to match with the surroundings. External finish of Masonry wall shall be premium acrylic smooth exterior paint with silicon additives finish.

Air Conditioned Office for 25 persons (Including 5 cabins for Senior persons) with Pantry, Toilet block(Ladies and gents toilet separately), conference room for 25 persons, shall be provided in MPH building in addition to other facilities specified . This area shall have access to natural light on three sides minimum. It shall have air lock lobby at entrance with auto sliding doors.

Minimum area of office area shall be 350 sq.m. This area shall be positioned over the CR with good aesthetic view and noise reduction and dust isolation.

5.02.10

Not Used

5.02.11

CPU CIVIL WORKS

5.02.11.01

Design Concepts for Buildings/ Shed

- i. All Buildings shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding.
- ii. Equipment/facilities with shed shall have structural steel superstructure with permanently colour coated metal sheeting at roof and side open. However, kerb wall shall be provided all around the plinth/ floor area above the Finished Floor Level (FFL). For other buildings brick wall cladding on exterior face shall be provided.
- iii. Unless specified, the wall cladding for buildings shall be with minimum one brick thick on exterior face. However, brick wall for buildings adjacent to transformers shall be minimum 345mm thick.

5.02.11.01.01

Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.

5.02.11.01.02

The load and load combinations and design criteria shall be as specified elsewhere in the specification.

5.02.11.01.03

All liquid retaining structures shall be designed for following load conditions.

Underground structures:

- a. Water filled inside up to design level and no earth outside.
- b. Earth pressure with surcharge of 2.0 T/m² and ground water table up to FGL outside and no water inside.
- c. Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure.

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d. The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table.

For design of over - ground liquid retaining structures appropriate load cases shall be considered.

5.02.11.01.04 All liquid retaining and conveying structures shall be designed by working stress method as given in clause 4.5 of IS 3370(Part2).

In the wall of liquid retaining structures with cylindrical shape such as clarifiers, vertical reinforcement shall be checked assuming the walls were fully fixed at the base, and the horizontal reinforcement shall be provided to resist horizontal (hoop) tension assuming hinged condition at the junction of the base slab & wall.

Wherever sandwich slabs are provided in liquid retaining structures to take care of stability against uplift, only well graded sand shall be used as fill material. The sand compaction shall be done with plate / disc compactors in such a manner that the bottom slab is not structurally damaged.

Clear free board of at least 300 mm above design (total) water level shall be provided in all liquid retaining / conveying structures.

Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.

The minimum grade of concrete for all RCC structures shall be M30. The minimum concrete clear cover to reinforcement bars in all RCC structures shall be as per IS:456(2000) and IS:3370(Part II) for water retaining structures. Durability of concrete shall conform to severe exposure conditions as per Table-3 of IS 456 except noted specifically otherwise.

5.02.11.01.05 Factor of safety against overturning and sliding

The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.

5.02.11.01.06 For detailing of Reinforcement IS 5525, IS 13920, IS 4326 and SP 34 shall be followed.

Two layers of reinforcement (on both faces) shall be provided for RCC sections having thickness of 150 mm and above.

Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows:

SI. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Stirrups/ ties/ Anchor Bars
a)	Foundation	12 mm	12 mm
b)	Beams	12 mm	8 mm
c)	Columns	12 mm	8mm

Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.

Suitable shrinkage reinforcement shall be provided at top face of foundations. Minimum shrinkage reinforcement shall be 10 mm dia. @ 200mm c / c.

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5.02.11.01.07	<p>Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area.</p> <p>Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.</p> <p>Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.</p> <p>Minimum thickness of all other elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm. Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.</p>
5.02.11.01.08	<p>All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter rods or 6 mm flats.</p> <p>Edge protection angles shall be provided as specified elsewhere.</p>
5.02.11.01.09	<p>All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.</p>
5.02.11.01.10	<p>2.0m wide walkway with M25 grade concrete paving over an under bed specified elsewhere shall be provided connecting all structures, buildings and facilities. The top of walkway shall be minimum 200mm above FGL Reinforcement of the RCC paving shall consist of minimum 8mm diameter bars @ 200 mm c / c in both directions at the centre of the slab.</p>
5.02.11.02	<p>Coating on RCC water retaining structures (other than drinking water)</p> <p>Epoxy phenolic coating shall be applied on (i) internal surfaces of the RCC water retaining structures and (ii) external surfaces of RCC Neutralisation-pit which is in contact with earth, as per details specified below:</p> <ol style="list-style-type: none"> a) All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT. Surface to be coated shall be absolutely dry, clean and dust free. b) Sealer coat shall be followed with the application of epoxy phenolic coating (solid by volume minimum 63%) of minimum 400 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.
5.02.11.03	<p>Coating on RCC water retaining structures (drinking water)</p> <p>Internal surfaces of RCC water retaining structures shall be provided with minimum 400 micron Food grade epoxy coating complying to FDA Title 21, Part 175.300. Surface to be coated shall be absolutely dry, clean and dust free.</p>
5.02.11.04	<p>Architectural Concepts and Finishing Schedule</p> <p>Architectural concepts and finishing schedule shall be as specified elsewhere in architectural specification.</p>
5.02.11.05	<p>Acid / Alkali Resistant Treatment:</p> <p>Acid / alkali resistant lining treatment shall be provided in different areas as follows:</p> <p>Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick Acid Resistant (A.R.) bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable pilasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification.</p>

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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>		
5.02.11.06	<p>The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R. bricks layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted.</p> <p>The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).</p> <p>Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 1.0M high with above treatment shall also be provided if applicable in case of walls nearby.</p> <p>The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer.</p> <p>Basket of Alum Solution Preparation tank: 5mm thick epoxy lining over a coat of epoxy primer.</p> <p>Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks.</p> <p>Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.</p> <p>Lime tank: Two coats of bitumen paint conforming to IS: 9862, with total DFT 150 microns.</p> <p>Guarantee</p> <p>The Contractor shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later.</p> <p>The Contractor shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.</p> <p>Foundation of Over Ground Steel Circular Water Storage Tanks</p> <p>General Requirements</p> <p>The tank foundation shall be as per IS 803 and as specified in relevant clause of foundation chapter.</p> <p>Sub Grade Preparation</p> <p>The surface of natural soil shall be thoroughly compacted by rolling or other means, as directed by Engineer, to obtain 95% of max. laboratory dry density for the soil, as per IS:2720 (Part-VII).</p> <p>Anti Corrosive Layer</p> <p>Anti-corrosive layer shall consist of screened coarse sand, mixed with 80/100 bitumen or equivalent 8% to 10% by volume.</p> <p>Bitumen shall be heated to a temperature 175^oC to 190^o C, with 3% kerosene, if required. Sand shall be thoroughly mixed with it in a mixing drum to obtain uniform mixture and shall be laid over the compacted surface, laid in line, grade and levels and as directed by the Engineer. Bitumen shall not be heated beyond the temperature limits given above.</p> <p>The premix carpet shall be laid in two layers of 3 cm and 2 cm respectively. After compacting and laying the first layer of 3cm, a tack coat of hot bitumen at the rate of 1 Kg. per Sq.m. shall</p>		
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5.02.11.07

be uniformly applied to the surface, by means of Sprayer and the Second layer of 2cm thick shall be laid, tamped and compacted to the satisfaction of the Engineer.

Sand shall be spread on the final surface at the rate of 0.5 Cu. m per 100Sq.m.

Premix

Materials

Sand

Sand shall be clean, dry, coarse, hard angular, free from coatings of clay, dust and mix of vegetable and organic matters and shall conform to IS 383 (Grade -III).

Stone Chippings

Stone chippings shall be hard black trap or granite or locally available stone and shall conform to IS 383. The grading shall be of normally 12mm down size and 6mm down size, in the ratio of 3:2 respectively.

Bitumen

Bitumen required for the work shall be 80/100 grade or its equivalent quality.

Laying

Areas on which the premix is to be laid shall be thoroughly cleaned of all dust and loose materials. On the cleaned surface, a tack coat at the rate of 1.0 Kg. per Sq.M. of hot Bitumen shall be uniformly applied by Sprayers. The applied Binder shall be evenly brushed.

The Binder bitumen 80/100 shall be heated to the temperature of about 190^o C with 3% kerosene, if required and mixed with stone chippings of size, as mentioned above, at the rate of 400 KG, with Six (6) Cu. M. of stone chips, for 100 Sq.M. of surface. The total mixed quantity, as mentioned above, is the quantity required for the total 50mm thick for 100 Sq. m. of area. Mixing shall continue until the aggregate is well coated.

5.03.00

CHIMNEY

5.03.01

Salient Features

Configuration and height of chimney(s) shall be as specified in mechanical portion of technical specification. There shall be one flue (liner) for each unit.

The chimney shell (windshield) shall be constructed using slip form shuttering. Internal platforms of steel structure shall be provided for enabling access to various elevations of the chimney and to provide support to the flue liners. Spacing of internal platforms shall not exceed 45.0 M. The platform beams shall be supported on concrete shell using suitable load bearing arrangement in the recesses provided for the purpose. The platform beams getting supported in the chimney shell shall have complete bearing support within the thickness of shell at that location and shall in no case be supported completely/partially on corbels/ brackets from the shell. "Through openings" in shell if provided to facilitate erection of platform beams shall be closed with cast-in-situ RCC closure wall on the external face of the shell. Necessary dowel bars shall be provided in the shell during construction for this purpose. Openings in the concrete shell for flue duct entry, access door & truck entry door at ground level, air ventilation etc shall be provided. Hand railing shall be provided all around internal staircase & around the ventilation voids in the internal platform using min. 32 mm nominal bore MS pipes of medium class conforming to IS:1161. Spacing of railing posts shall not be more than 1500 mm centre to centre with a minimum height of 1200 mm. The handrail shall have three rows of horizontal members between the railing posts including the top member. Kick plate of min. size 100x6 thick shall be provided in the hand railing.

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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>
<p>5.03.02</p>	<p>The flue duct outside the chimney shall be suitably connected to the vertical flue liner inside the chimney as per EPRI Wet Stack Design Guidelines.-Expansion Joint shall be provided at the interface between the flue liner and the absorber outlet duct as per design.</p> <p>The expansion joint in the flue liner shall comprise of non-metallic material suitable for wet stack operations, shall be acid resistant to withstand acidic flue gas condensates arising out of flue gas parameters & operating conditions as specified elsewhere in the specification and shall also prevent dust accumulation. If required as per design or as per the recommendation of expansion joint manufacturer, the space between the expansion joint material and the liner shall be packed and sealed by providing a bolster made up of light weight compressible material suitable for wet stack operations and acid resistant to withstand acidic flue gas condensates arising out of flue gas parameters & operating conditions as specified elsewhere in the specification. The bolster shall be confined in texturized glass fabric having a final covering of stainless steel wire mesh. Design of expansion joint shall comply EPRI guidelines to avoid contact of condensate with expansion joint material and to ensure drainage of condensate.</p> <p>Chimney roof shall be of RCC slab over a grid of structural steel beams and provided with rainwater drainage system. An internal structural steel staircase supported from chimney shell with chequered plate floor panels and pipe handrails, shall be upto the platform just below roof platform and an internal cage ladder for a small height, over last staircase landing to access the chimney roof through a roof access hatch.</p> <p>The other components of the chimney include liner test ports (for continuous pollution monitoring), liner hatches, grade level slab of RCC with metallic hardener floor finish, acid resistant treatment on roof slab, a large electrically operated grill type roll-up door and personnel access metallic door at grade level, roof drain basin, rain water down comer pipe (150 mm diameter galvanized pipe), connection to plant drains, louvers with bird screens for ventilation and all other openings in the wind shield, all finishing works, electrical power distribution boards, lighting panels, power & control cabling and wiring systems, stair and platforms lighting, socket outlet, lightning protection and grounding system, aviation obstruction lighting with photoelectric controller etc, communication system, a rack and pinion elevator and other items, though not specifically mentioned but reasonably implied and necessary to complete the job in all respects.</p> <p>Aviation Warning Lights (AWL) shall be mounted on door panel of required size (open able from interior of chimney shell) fixed to openings in the chimney shell at locations and levels specified elsewhere. Suitable provision for approach to the AWL shall be provided at the platform level. AWL shall be located at about 1-1.5 metre above the top of platform to enable easy handling for maintenance.</p> <p>The size of roll-up door shall be determined based on minimum requirement for ventilation and transportation & erection of flue segments.</p> <p>Design Concept</p> <p>Design and construction of various components and systems of the chimney shall be in accordance with relevant Indian Standard and where provisions are not covered in Indian Standard, reference shall be made to ACI, BS, CICIND and other international standards.</p> <p>In case of any conflict between this document and the Indian and International Standards, the stipulations of this document shall prevail.</p> <p>Imposed loading for design of all chimney components shall not be less than 5 kN/ Sq.m. An additional 25% of liner load shall be taken as impact loading for liner erection in addition to the liner load.</p> <p>The min. thickness of web for plate girders shall be kept as 12 mm.</p> <p>Seismic forces on the chimney system shall be determined based on site specific seismic information provided elsewhere in this document.</p>

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5.03.03

Wind Shield

Wind forces on the chimney system shall be determined based on site specific wind design criteria provided elsewhere in this document.

The chimney and its components shall be designed to resist the most onerous forces resulting from all the possible combinations of the various loadings.

The wind shield shall be designed for vertical loading, cross wind loading, seismic loading, circumferential wind loading, thermal gradients etc. The load calculation and load combinations shall be as detailed in IS 4998. The wind shield shall be analysed for cases with and without flue liner loads.

Forces/stresses in the wind shield due to eccentricity effects of local loadings, insulations effects, rotation of chimney foundations, construction tolerances and moments of second order shall also be considered.

Seismic response of the chimney shall be computed by the response spectrum method. Dynamic modulus of Elasticity shall be considered for calculating natural frequencies of the chimney. At least, the first five modes of vibrations shall be used for this analysis.

The across wind analysis of the chimney shall be carried out as per the provisions of IS 4998. Across wind loads shall be combined with co-existing along wind loads.

The effect of the openings/cut-outs in the chimney shell shall be duly considered in the design of the windshield. The minimum thickness of shell shall not be less than 500mm.

The minimum vertical reinforcement shall be 0.3% of the concrete area. The maximum spacing of the reinforcement bars shall not be more than 250 mm on each face. The minimum circumferential reinforcement shall be 0.2% of the concrete area. The maximum spacing of the reinforcement bars shall not be more than 200 mm on each face. The circumferential reinforcement in the top 3 meters of the windshield shall be twice that required from design forces. The clear cover to reinforcement shall be 50 mm.

There shall be a continuous ring of concrete shell without any opening for a height of atleast 5m below the soffit of flue duct openings.

There shall not be any reverse (outward) slope in the inside face of chimney shell. Where there is a sudden change in slope/ profile of the shell, the circumferential reinforcement shall be increased to twice the requirement as per the design in a circumferential band extending atleast 3m above and below such slope/profile change level.

The diameter of the reinforcing bar for the main vertical reinforcement of shell shall not be less than 25mm for a shell height up to the top level of flue duct opening.

Shell thickness between any two 10m reference levels shall not vary more than 150mm.

The minimum thickness of shell/closure wall at beam support recess/ opening locations shall be 100mm.

Grade of concrete for chimney shell, and other super structure shall be minimum M30. Only OPC cement shall be used for Chimney shell and other super structure.

The final design shall be checked & verified by 'Wind Tunnel Test' and shall be conducted at a reputed institution. Dynamic interference effects due to additional chimney(s)/NDCTS's and other tall structures located upto distance of 20 times diameter at 2/3rd height of subject chimney in the area or in the future expansion stage of the project, as envisaged by the owner at the time testing, shall be determined along with the other topographical features of the local area through model test.

5.03.04

Flue Liners

TECHNICAL REQUIREMENTS



	<p>The flue gas parameters & various operating conditions for selection of flue liner material, material specification for flue liner and the criteria of flue gas exit velocity for sizing the flue liner shall be as specified elsewhere in the specification.</p> <p>For flue liner with base metal as mild steel, the thickness of the base metal shall be determined from structural considerations. The thickness of any clad metal/coating/block lining etc. provided on the base metal shall not be considered for computing the structural strength of flue liner. The minimum thickness of the mild steel base metal shall, however, not be less than that specified elsewhere in the specification.</p> <p>Two manholes placed diametrically opposite shall also be provided in each flue at all internal platform levels.</p> <p>The supporting/restraining arrangements of the liners should be such that expansion of the liners longitudinally or circumferentially is not restrained.</p>		
5.03.05	<p>Internal Platforms</p> <p>The platforms shall be designed for dead, imposed (live), erection work and other possible loadings and temperatures effects. These platforms shall provide support and lateral restraint to the steel liners and provide access for inspections and maintenance. Forces imposed on the floors due to lateral restraint of flues shall be enhanced aptly for impact effects. These platforms shall also be designed suitably for the liner erection works. The platform shall be made up of chequered floor panels supported on grid of structural steel beams. All beams shall have bolted connections. The maximum permissible deflection in main steel girders supporting flue liner shall be span/1000.</p>		
5.03.06	<p>Internal Staircase</p> <p>The staircase shall have a clear passage way width of not less than 800 mm and a clear headroom of not less than 2100 mm. The riser height shall not be more than 175 mm and tread width shall not be less than 225 mm.</p>		
5.03.07	<p>Foundation</p> <p>The chimney foundation shall be designed as per limit state method as per IS 4998 for the most critical combination of forces and moments, resulting from all possible combinations of the various loadings from the chimney system during all stages of constructions. The effect of water table shall be considered and the foundation shall be checked for overturning for minimum and maximum vertical loads. There should be no uplift under any portion of the foundation/piles for any loading condition. Since chimney is a wind sensitive structure no allowance shall be made in the load carrying capacity of the bearing strata / piles under any load case/combination with wind. The foundation diameter to depth ratio shall not exceed 12. The diameter of the reinforcing bar for the main radial and tangential reinforcement for the foundation shall not be less than 25mm. The spacing of radial steel at the outer edge of the foundation shall not be more than 250mm. Grade of concrete for foundation shall be minimum M 30.</p>		
5.03.08	<p>Thermal insulation (Applicable in case of Titanium / C-276 Flue Liner)</p> <p>The insulation shall be semi-rigid, resin bonded type, in the form of slabs and shall conform to IS: 8183. Blanket type insulation shall not be used. The density of insulation shall not be less than 64 kg/cu.m for resin bonded glass wool insulation and 100 kg/cu.m for resin bonded rock wool. The coefficient of thermal conductivity of insulation shall not be more than 0.52mW/cm/°C at a mean temperature of 100°C.</p> <p>The insulation thickness shall not be less than 100 mm, in any case, and shall be provided in two layers with the second layer of insulation covering the joints of the first layer. The insulation</p>		
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5.03.09	<p>shall be wrapped on the outer-most surface with galvanised wire mesh using MS galvanised pins and speed washer.</p> <p>Chimney Painting</p> <p>(i) All exposed steel surfaces (including exterior surface of mild steel flue liner in case the design does not envisage provision of thermal insulation on the exterior surface of flue liner) except surfaces of steel wind strakes shall be painted as specified in corrosion protection clause of this specification.</p> <p>(ii) All steel parts embedded in concrete like Strake embedment assembly including bolts, nuts, washers, pipe sleeves and insert plate shall be galvanized as per IS:4736. The minimum weight for galvanizing shall be 610 g/sq.m and shall comply with relevant IS Codes.</p> <p>(iii) The inside surface of chimney shell above roof, horizontal surface of shell at top, underside of concrete roof slab, etc shall be painted with epoxy phenolic coating system having total 220 microns DFT.</p> <p style="margin-left: 20px;">a) All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% \pm2%) of minimum 50 micron DFT to be applied over cleaned surface in multiple coats. Surface to be coated shall be absolutely dry, clean and dust free.</p> <p style="margin-left: 20px;">b) Sealer coat shall be followed with the application of Intermediate coat of epoxy phenolic coating (solid by volume minimum 63%) of minimum 100 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.</p> <p style="margin-left: 20px;">c) Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% \pm2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer.</p> <p>(iv) The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iii) above in alternate bands of 'signal red' and 'bright white' colours.</p>		
5.03.10	<p>Rack and Pinion Elevator</p> <p>A rack and pinion elevator, with a load carrying capacity of 400 kg (min) (passenger cum goods), cabin floor size of 1100 mm x 1000 mm (min.) and an operating speed of 40 m/min. (approx.), shall be provided for travel from the grade level to the top of the chimney. A landing platform shall be provided at all access/ platform levels. The elevator shall be of a proven and approved make. Enclosure shall be fabricated from tubular steel and expanded metal or wire mesh, 2.1 m high (Approx.).</p> <p>A Safety device comprising of an over speed governor in constant mesh with the rack by means of a flame hardened steel pinion shall be provided to protect the cab against over speed during the cab downward motion and the same shall actuate the brake mechanism and stop the downward motion gradually. The lift shall be installed using anchor fasteners. The electrical requirement of the system shall conform to the main electrical specification. Drive motor shall be of S3 duty class with CDF of 25% and maximum number of 120 starts per hour in 55 degree Celsius ambient temperature. The motor shall be provided with internal 220V AC single phase space heaters or an alternate heating system. The elevator shall be supplied, installed, painted, tested, commissioned etc. complete with all mandatory spares (as specified in Part-F of this specification) and operation maintenance manual.</p>		
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5.04.00

RAW WATER RESERVOIR

5.04.01

Scope

The scope of work for Raw water reservoir generally involves design, preparation of general arrangement drawings, construction drawings, supply of labour, materials and construction of all civil and structural works like site clearance, site leveling & grading, excavation, filling, construction of earthen embankment, providing sand filters, sand chimney, sand blanket in embankment, cut-off trench, mechanical compaction, slope protection, HDPE lining, PCC lining, non woven geotextile, Inlet and Outlet Structures, RCC spillways, supplying & laying of MS pipes and associated Civil Works, road works, construction of drains along the reservoir boundary etc. and other ancillary works associated with the completion of reservoir as per directions of the Engineer.

Disposal of surplus excavated material in NTPC Land outside plant boundary(including dressing the top surface) and compacting the same by mechanical means in layers(not exceeding 300mm thickness, higher layer thickness upto 500mm in case of compaction using special type of equipment such as vibratory roller etc.) to minimum 85% Standard Proctor Denisty at optimum moisture content in case of soil and/ or to 85% of original volume in case of boulders , clearing grass and vegetation, levelling is in bidder's scope.

5.04.02

General Requirements

Raw water reservoir shall have gross usable capacity as indicated in the tender drawing.

5.04.03

Design Requirement

Sizing of the reservoir shall be such so as to utilize the maximum allocated area for the reservoir as per the layout drawing of the plant and as directed by the Owner. Bottom 500 mm (minimum) depth of water shall be treated as dead storage for settlement of any silt etc. The dead storage shall be over and above the total required capacity of the reservoir. The reservoir shall be provided with a free board as per requirements of IS 10635, but in no case, the same shall be less than 1500mm.

Earthen embankment shall be designed as an earthen dam as per IS: 12169 with internal drainage system i.e. sand chimney and sand blanket of 500mm (min.) thickness shall be provided inside the embankment. Slope stability of embankment shall be analyzed as per IS: 7894. However, the minimum slope of embankment shall be 1V:2.5H with a berm of 3.0m at every 6.0m interval. The founding level of embankment shall be at least 300mm below natural ground level. The top soil shall be stripped to a minimum depth of 300mm. However, the stripping depth, if required, shall be increased to the required level as per actual conditions to totally remove all vegetations, organic matters, roots, soft spots, etc.

The whole area of reservoir bed shall be graded & leveled by cutting and filling.

Wherever filling is required at the bed of the reservoir, area shall be stripped first and then embankment filling shall be done in layers of 300mm compacted thickness and compacted to minimum 90% of maximum dry density (Standard Proctor) by mechanical means at optimum moisture content.

Minimum top width of embankment shall be 6.0m with provision of single lane WBM road including black topping all around on top of embankment. WBM road shall be constructed in accordance with IRC: 19 (latest edition). On downstream slope of the embankment, rip-rap shall be provided from toe up to or higher level than the HFL. Turfing shall be provided from embankment top to rip-rap/HFL level. Rock-toe with toe drain shall be provided at the toe (bottom) of the embankment all around the reservoir. Toe drain shall be of adequate capacity to be constructed in RCC grade M30. An approach ramp of minimum 6m width and min. 1V:8H slope shall be provided for access to the top of reservoir embankment along with single lane WBM road including black topping. The side slope of ramp embankment shall be minimum 1V:2.5H and shall be provided with rip-rap/turfing (as required) on side slopes.

TECHNICAL REQUIREMENTS



5.04.04

In order to arrest the seepage/percolation losses through reservoir bed/embankment, 1mm thick high density polyethylene (HDPE) liner shall be provided at entire bed and upstream side slopes. HDPE liner shall be laid on the prepared soil bed which is free from any sharp objects, roots or any other organic materials. HDPE liner shall be anchored in PCC filled trench at the edge of top of embankment. HDPE liner shall be protected by providing non woven geotextile and 75 thick PCC lining.

Suitable underdrainage system consisting of Pressure Relief Valves (PRV) shall be provided below the HDPE liner in the reservoir bed to counter uplift forces on HDPE liner occurring when the reservoir is empty and ground water table in the vicinity is above the reservoir bed level. PRVs shall conform to IS 4558.

Earthen Embankment

Material for Filling

Material to be used for embankment filling shall be of approved quality excavated from inside the reservoir/plant area or brought from borrow area arranged by the Contractor. Material used for embankment filling shall not be organic soils, peat, cohesionless soil, sand dust, expansive soils and chemically aggressive soils. They shall be clean and free from shingle, salts, organic roots and sod, lumps, concrete or any other foreign substances. Fill shall be placed in horizontal layers not exceeding 300 mm compacted thicknesses. Compaction shall be done to achieve minimum 95% standard Proctor density by mechanical means.

Filling shall be accurately finished to line, slope, cross-section and grade as shown on the approved drawings. Finished surface shall be free of irregularities and depressions and shall be within (+/-) 20mm of the specified level.

When the borrow area is located contiguous to the embankment alignment then it must be ensured that the borrow area shall not be opened within a distance of 5 times the height of embankment contiguous to the heel or the toe of the embankment or 25 metre whichever is more.

The required approach roads and haul roads shall be constructed and maintained by the Bidder. The Bidder shall divert the existing roads, nallah/drain if any which are in the Raw Water Reservoir area at his own cost before the start of work.

Frequency of sampling and testing including the methods for conducting the tests are as given in Table-1. The testing frequencies set forth are desirable minimum and Engineer shall have the full authority to carry out or call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications.

Following Acceptance Criteria shall be followed:

- a. All individual samples collected and tested should pass without any deviation when only one set of sample is tested.
- b. For re-test of any sample, two additional samples shall be collected and tested, and both should pass without any deviation.
- c. Where a large number of samples are tested for a particular test then 9 samples out of every 10 consecutive samples tested shall meet the specification requirement.

5.04.05

DELETED

5.04.06

Graded Coarse Aggregate Filters

TECHNICAL REQUIREMENTS



Graded coarse aggregate shall be used in filters below rip-rap and rock-toe as per IS 8237. The coarse aggregate material shall consist of durable well graded broken rock of hard stone. The materials shall range in the size from 10mm to 75mm and shall satisfy the filter criteria.

The rock material used in the aggregate filters shall satisfy the following condition:

- a) Specific gravity shall not be less than 2.50.
(As per IS 1122)
- b) Sulphate soundness less than 10% loss of weight after 5 (Five) cycles
(As per IS 1126)
- c) Aggregate Impact value shall not exceed 30%
(As per IS 2386)
- d) Water absorption shall not exceed 2.5%
(As per IS 2386)
 - a) In slake durability test (as per IS 10050), the percentage retained after two ten (10) minutes cycles shall be more than 85%.

5.04.07

DELETED

5.04.08

HDPE Liner

The proposed lining system consisting of High Density Polyethylene (HDPE) membrane shall form the water-tight barrier to prevent seepage/leakage. Bidder shall examine in detail the prevailing conditions and provide a liner system to meet the above requirement.

The specification as outlined hereunder shall be treated as bare minimum. However, bidder shall offer the system to meet the site specific requirements and shall provide complete details in the offer. In case bidder deems it necessary to provide additional measures over and above what has been specified, he may do so at the quoted rate against the schedule of item. Bidder shall guarantee the satisfactory performance of the proposed liner system for a period of five years from the end of defect liability period.

REQUIREMENT OF HDPE MATERIAL

The High Density Polyethylene (HDPE) Liner shall be manufactured out of polyethylene resin. The resin composition and production shall meet the intended purpose as specified above. The natural polyethylene resin without the carbon black shall meet density of 0.932 g/cc or higher and melt index less than 1.0 g/10min. The test methods shall conform to ASTM D 1505 or ASTM D792 or equivalent for density test and ASTM D1238, condition E or equivalent for Melt Index test.

The HDPE liner shall not be less than 6.0 M in width. Carbon Black shall be included in the resin to render it ultra-violet resistant. The Carbon Black content shall be between 2-3 percent as per ASTM D 1603. The surface of liner shall not have striations, roughness, pinholes or bubbles. The liner may be smooth. The liner sheet thickness shall be 1.0MM (40 Mil) with sheet density not less than 0.94 g/cu.cm. The Melt Flow Index shall be less than 1.0 g/10min. The method for testing melt flow index shall be as per ASTM D 1238 or equivalent. The Tensile stress at yield shall not be less than 17.0 N/mm and the yield strain not less than 12%. The strain at break shall not be less than 700%. The Tear Strength as per ASTM D 1004 or equivalent shall not be less than 130 N. The Puncture Resistance as per ASTM D 4833 (or equivalent) shall not be less than 390 N. For all other properties & test methods specified elsewhere in this specifications shall conform to GRI test method GM13 (Latest revision).

Any sealants used shall be of type as per the recommendations of the HDPE manufacturer compatible with the intended use. However, before the use, Owner's approval shall be obtained.

TECHNICAL REQUIREMENTS



INSTALLATION AND LAYING OF LINING SYSTEM

The HDPE Liner sheet (Geo-membrane rolls) shall be brought to site by trailer/truck or by any suitable transport without damaging the geo-membrane. The geo-membrane rolls shall be stored in such a way that they are protected from puncture, dirt, grease, moisture and heat. In case any material gets damaged, it shall be segregated and stored separately for replacement. All the geo-membrane rolls shall be stored on a prepared smooth surface. The HDPE Liner works shall be executed at site by the supplier of HDPE liner only.

Subgrade (reservoir bed) shall be rolled and compacted and made flat and smooth. The top layer of reservoir bed subgrade shall be compacted with 2 passes of 8 to 10 flat footed roller over rock and soil surface. Any weak and soft spots, if present shall be removed and replaced with compacted fill. All subgrade surface where lining shall be placed should be smooth, free of all foreign and organic matter, sharp objects. Standing water or excess moisture shall not be allowed.

For the purpose of anchoring the geo-membrane, anchor trench shall be excavated to the line, grade and width as shown in the drawings, rounded corners shall be provided in the trench to avoid sharp bends in the geo-membranes.

Geo-membrane shall be laid using a spreader bar assembly attached to a loader bucket or any other method as approved by the Engineer. While laying the geo-membrane precaution shall be taken to avoid any damage to the lining system. Equipment or tools shall not damage the geo-membrane during handling, transportation and laying. Personnel working on the liners shall not smoke or wear shoes that may damage the geo-membrane. The method of unrolling the panels should be such that it should not cause scratches or crimps in the geo-membrane. While unrolling due care shall be taken to ensure that the subgrade is not damaged. In order to prevent uplift by wind, adequate loading by sand bags or similar items that will not damage the geo-membrane shall be placed over the geo-membrane. Continuous loading along the edges of the geo-membrane panels shall be provided in order to minimize the risk of wind flow under the panels.

Geo-membrane shall not be laid when ambient temperature is above 50°C. Placement of geo-membrane shall not be carried during rains or in presence of excessive moisture such as fog, dew, etc. In presence of high winds also laying of geo-membrane shall not be taken up.

Deployment of geo-membrane shall immediately followed by field seaming operation. The field seaming shall be as per manufacturer's recommended process. The field operation shall either be hot shoe fusion type or extraction welding type. Any other process may be acceptable subject to approval of the Owner.

On embankment slopes and other slopes, in general, seams shall be oriented in the general direction of maximum slopes. In other words, the seams shall orient down and not across the slope. In corners and other geometric forms, the number of field seams shall be minimized. At the base, T-seam shall not be closer than 1.5m from the toe of the slope. Seams shall be aligned with the least possible number of wrinkles and fishmouths. If a fishmouth or wrinkle is found, it shall be relieved and cap stripped.

All geo-membrane panels shall have a finished overlap of 100mm (minimum) in case of hot wedge welding and 75mm (minimum) for extrusion welding. Unless approved by the Engineer-in-Charge, cleaning solvents shall not be used.

Bidder shall provide all equipment as approved by the Owner. The equipment shall consist of, but not limited to, hot-wedge welder, Extrusion Welder, high speed side grinder, generator, necessary power grid, Vacuum Box Test Equipment for non-destructive seam testing, Air pressure test equipment for non-destructive seam testing, Field Tensiometer for performing shear and peel tests.

In order to verify that seam conditions are acceptable, field test on seams shall be conducted. Test seams shall be carried out at the outset of each seaming period and at least once every four hours for each seaming instruments and personnel deployed that day. All test seams shall

TECHNICAL REQUIREMENTS



be made in contact with the subgrade. All welding rods used for extrusion welding shall have the same properties as the resin used in the geo-membrane. The length of test seam sample shall be 3.0 meter in case of hot wedge welding and 1.0 meter in case of extrusion welding. At least five test specimens shall be cut from each end of the test seam. A tensiometer shall be used to test five specimens for shear and five specimens for peel. Each specimen shall be at least 25mm wide with a 100 mm plus width of the seam as grip separation, the seam shall be centered between the clamps. The rate of grip separation shall be 50mm per minute. Average of five specimens test results shall be considered for seam strength properties, four out of five specimens shall pass seam acceptance criteria. Shear and peel test shall result in film Tearing Bond (FTB), as defined in NSF std. 54 or equivalent, which is a failure in ductile mode of one of the bonded area. In case a test seam fails to meet the field seam requirements of the specification, the apparatus for seaming and / or seamer shall not be used until the deficiencies are corrected and a successful test seam results.

All fields seams are over their full length shall be tested non-destructively. The non-destructive test shall be conducted either by vacuum Box Testing Method and /or Air pressure testing Method.

Vacuum Box Testing (VBT)

VBT shall be carried out by bidder as per the procedure outlined hereunder. A vacuum box assembly consisting of a rigid housing with a transparent window and having a soft rubber gasket attached to be bottom, porthole or valve assembly and a vacuum gauge shall be used. A soapy solution in plastic bucket with a mop shall be made available. The excess sheet overlap, if any, shall be properly trimmed away. Then a strip or geo-membrane of length 300 mm shall be wetted by the length of box with the soapy solution. The box shall be place over the wetted area and compressed. Create a vacuum of 0.2kg/sw.cm to 0.35 kg/sq.cm. Care shall be taken to ensure that a leak proof seal is created. Vacuum shall be maintained for sufficient time. For a period of approximately 15 seconds, examine the geo-membrane through the viewing window for presence of any animated soap bubbles. In case no animated bubbles appears after 15 seconds, close the vacuum valve and open the bleed valve. Thereafter, move the box over the next area adjoining the tested area with a minimum 75 mm overlap. Repeat the process as described above.

In case animated soap bubbles appear all such areas shall be marked, repaired and then retested successfully.

In locations where seams cannot be non-destructively tested, the seam shall be spark tested according to the manufacturer's recommendations and directions of the Engineer.

Air Pressure testing (APT)

APT shall be applicable for all double fusion seams, only. Bidder shall furnish all required equipment. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 1.7 kg/sq.cm and 2.1 kg/sq.cm. The pressure gauge shall be equipped with a sharp hollow needle.

The Bidder shall seal one end of the seam to be tested. Then insert needle or any other approved pressure feed device through the sealed end of the channel created by the double wedge fusion weld. Then energize the air pump to verify the unobstructed passage of air through the channel. Seal the other end of the channel. Then energize the air pump to about 2.1 kg/sq.cm. Close the valve and allow 2 minutes for the injected air to come to equilibrium in the channel and keep the pressure approximately for 5 minutes. In case loss of pressure exceeds 0.28 kg/sq.cm or even pressure does not stabilize, then locate faulty area. The area to be repaired and then retested successfully. In case the test is successful, the air channel should be deflated.

Destructive seam testing shall be carried out as per the recommendations of the manufacturer. One destructive test shall be carried out for every 150 meter length of seam or as directed by the Engineer. Holes in the geo-membrane resulting from obtaining the seam samples shall be

TECHNICAL REQUIREMENTS



immediately patched and vacuum tested. The sample shall be 300mm wide and 1.0 meter long with the seam centered lengthwise. The sample shall be cut into three equal length pieces. One piece to be given to the Engineer and the other shall be with bidder for testing. Bidder shall test ten 25mm wide specimens, five specimens for shear strength and give for peel strength. To be acceptable, four out of five specimens must pass.

The Owner may send seam samples, at his own discretion, to a laboratory for testing.

In case the sample fails the destructive test, then the Bidder shall cap strip the seam between the failed locations. If the test fails, then process is repeated. Over the length of seam failure, the Bidder shall either cut out the old seam, then reposition the panel and re-seam or add a cap strip.

Bidder shall thoroughly inspect all seams and non-seams areas of the geo-membrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Surface of the geo-membrane shall be cleaned at the time of inspection by the Bidder. Each suspect location in seam and non-seam areas shall be further non-destructively tested in presence of Engineer, if so desired. Each location that fails the non-destructive e testing shall be marked and repaired by the Bidder. The defective seams shall be cap stripped or replaced. Small holes shall be repaired by extrusion welding. If the holes are larger than 6mm, if should be patched to the satisfaction of the Engineer. All tears shall be repaired by patch work, where the tear is on a slope or an area susceptible to stress and has a sharp end; the same shall be properly rounded before patching. Blisters, large cuts and undispersed raw materials shall be repaired by patches; Patches shall be done by extrusion welding. The weld area shall be ground not more than 10 minutes prior to welding. It shall be ensured that no more than 10% of the thickness is removed by grinding. Welding shall commence immediately after grinding and must overlap the previous seam by at least 50mm. Re-seaming over an existing seam shall be carried out, if permitted, only after regrinding. Generally, welding shall restart by grinding the existing seam and re-welding a new seam. Patches shall be round or oval in shape, made of the same geo-membrane, and extend a minimum of 150mm beyond the defective areas.

Each repair shall be non-destructively tested to the satisfaction of the Engineer-in-Charge. Repairs that pass the non-destructive tests shall be considered as an acceptable repair. In case the tests fails, the repair shall be repeated and retested until passing test results are obtained. The bidder shall keep daily reports and details of all non-destructive and destructive testing. The report/ documentation shall clearly identify all seams that initially failed the test and include all evidence/ certification from the Engineer that these seams were satisfactorily repaired and successfully retested.

All anchor trenches shall be casted by the bidder. Anchor trench material shall be plain cement concrete. It shall be suitably placed to the size as specified in the drawings without damaging geo-membrane. If damage occurs, it shall be repaired immediately.

For attachments to concrete, stainless steel concrete anchors and epoxy anchors, stainless steel nuts and washers along with stainless steel slotted flat bars (6mm thick) shall be provided at no extra cost to the owner. Bidder shall also provide closed cell neoprene gaskets and associated adhesive with no extra cost to the owner. Bidders shall make their own assessment of the requirements and include all cost in the quoted price of geo-membrane (HDPE Liner).

Wherever pipe penetrations are to be sealed, the geo-membrane shall be formed around the pipes with stainless steel clamps, closed cell neoprene gaskets, etc shall be provided all around the pipe to make it leak proof. The details of the seal generally follow the manufacturer's recommendations subject to the owner's approval. No separate payment shall be made for all pipe penetration sealing works. The bidder shall make his own assessment of the total work and provide for the same in the unit rate quoted for geo-membrane (HDPE Liner).

All quality control measures shall be deployed by the bidder. All tests are required to be carried out at Bidder's own cost during the production of materials as well as during laying operation.

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All resins for use in geo-membrane shall conform to the requirements. Each lot shall be sampled with following tests conforming to manufactures specifications.

- 1. Density : ASTM D 1505
- 2. Melt Index : ASTM D 1238

All additives are to be tested and approved prior to use with the following testing performed and compared to the manufacture's requirements'.

- 1. Carbon Black content : ASTM D 1603

Manufacturer's quality Assurance Testing shall conform to the provisions as stipulated here. Full width samples shall be taken as tokens from the end of each roll. The HDPE liner that is to be supplied, quality control testing shall meet following frequency.

Test	Description	Method	Frequency
1.	Thickness	ASTM D 5199	Every roll
2.	Tensile properties	ASTM D 638	Every 5000 Sq.m.
	a. Tensile strength at yield.		
	b. Tensile strength at Break		
	c. Elongation at Yield.		
	d. Elongation at Break.		
3.	Tear resistance	ASTM D 1004	Every 5000 Sq.m.
4.	Puncture Resistance	ASTM D 4833	Every 5000 Sq.m.
5.	Carbon Black Content	ASTM D 1603	Every 5000 Sq.m.
6.	Dimensional Stability	ASTM D 1204	Every 5000 Sq.m.
7.	Carbon Black Dispersion	ASTM D 5596	Every 5000 Sq.m.
8.	Density	ASTM D 1505/D792	Every 5000 Sq.m
9.	Melt Index	ASTM D 1238	Every 5000 Sq.m.
10.	Oxidative Induction Time	ASTM D 3895	Every 5000 Sq.m.
11.	Low Temperature Brittleness	ASTM S 746	One per resin lot
12.	Environmental Stress resistance	ASTM D 1693	Every 5000 Sq.m.
13.	High Pressure Oxidative Induction Time	ASTM D 5885	Every 5000 Sq. m.
14.	Oven Aging at 85 Deg C – High Pressure OIT (min. ave.)- % retained after 90 days – ASTM D 5885 - Every 15000 Sq. m. and each formulation		
15.	UV Resistance – High Pressure OIT (min. ave.)- % retained after 1600 hrs – ASTM D 5885 - Every 15000 Sq. m. and each formulation		
Welding rod samples shall be tested at the frequency of once per 25 rolls of welding rod. Following tests shall be performed on the samples.			
1.	Thickness/diameter as per ASTM D751	: ASTM D 751	
2.	Density as per ASTM D 1505	: ASTM D 1505	
3.	Melt Index as per ASTM D 1238	: ASTM D 1238	
4.	Carbon black content as per ASTM D 1603	: ASTM D 1603	

TECHNICAL REQUIREMENTS



All the reference to ASTM codes shall be tested as the base requirement. Other International codes of practices, which are equivalent to the above ASTM, shall also be acceptable to the owner subject to prior approval.

Results of all the tests shall be furnished to the owner for his review. Owner or his authorized representative reserve the right to inspect the testing facilities and witness the tests as and when desired.

Owner or his authorized representative reserve the right to retest some or all the parameters of HDPE liner at NTPC identified 3rd party testing laboratory anytime during the execution of contract. Sample shall be selected from site randomly jointly by NTPC and contractor. Cost of all testing shall be borne by the contractor. In case the sample does not meet the requirement of Technical Specifications, then owner reserve the rights to reject the HDPE liner lot from which the sample is selected.

Precautions to be taken for HDPE liner laying:

1. After the construction of reservoir embankment, the slopes shall be dressed properly and shall be free from any gravel or sharp rock pieces. The slopes & bed of reservoir shall be free from any gravel or sharp rock pieces which can puncture the HDPE liner.
2. After the bed preparation, HDPE liner roll shall be unrolled one at a time. The liner shall be adequately loaded with the sand bags and shall be immediately welded with the adjacent liner roll.
3. Once the welding of previous liner rolls is completed then only the next roll shall be unrolled.
4. The loading of HDPE liner shall be continuous at the edges and in a dense grid of 1mX1m at over the liner area.
5. Liner shall not be left open without adequate loading and it shall be pressed properly (in order to take out air pockets which causes undulation) before welding.
6. Anchoring of HDPE liner at reservoir top shall be done as per the construction drawing.
7. Non-Woven geotextile & over that 75 thick PCC M20 layer shall also be placed over HDPE liner to get finished surface.
8. In the reservoir bed, 300mm thick layer of specified soil shall be provided in rocky surface. Bed shall not consist of gravels and sharp rock pieces.
9. The welding of HDPE liner rolls shall be carried out simultaneously. Large number of rolls should not be left un-welded to avoid tearing off of liner.

5.04.09

PCC Lining

75mm thick Plain Cement Concrete of grade M-20 (design mix) shall be provided over non-woven geotextile laid over HDPE liner at all levels on the inner surface of reservoir embankment (upstream side slope) and reservoir bed with graded stone chips (12.5 mm nominal size).

Synthetic Polyester triangular fibre of length 12mm, effective diameter 10-40 microns and specific gravity of 1.34 to 1.40 shall be mixed in Plain Cement Concrete of grade by using 125gms of synthetic Polyester triangular fibre for 50 Kg cement used as per directions of Engineer.

Placing

After the slope & bed of reservoir has been dressed to line and HDPE liner has been provided over the compacted earth/soil, the entire upstream slope surface & bed shall then be covered with non woven geotextile followed by placing of 75 thick PCC lining. The PCC lining shall be

TECHNICAL REQUIREMENTS



5.04.10

free from impurities like particles of stone, lime and other foreign materials visible to the naked eye on the surface and shall be of uniform texture. On completion of PCC lining, the surface presented by the lining shall be even throughout, free from irregularities.

Non-Woven Geotextile

This specification covers the technical requirements for the Manufacturing and Installation of the nonwoven geotextile. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these specifications.

Submittals

- A. Prior to material delivery to project site, the contractor shall provide the engineer with a written certification or manufacturers quality control data which displays that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.
- B. The contractor shall submit, if required by the engineer, manufacturer's quality control manual for the geotextile to be delivered to the site.

Geotextile

- A. Geotextile shall be Needle punched Non-woven type.
- B. The geotextile shall be manufactured from prime quality virgin polymer.
- C. Geotextile shall be with U-V (Ultra-violet) treatment suitable for a temperature range from 0 Deg. C to 50 Deg. C so that the strength and the life of the same is not affected due to exposure to ultraviolet
- D. Geotextile shall meet or exceed all material properties as given below.
- E. In addition to the above, geotextile shall have good resistance to chemicals and to biological degradation

1. Material for Geotextile filter	100% Polypropylene
2. Mass per unit area	250 g/sq.m (ISO 9864)
3. Thickness in mm	2.2 (min.) (ISO 9863)
4. Tensile strength	19 kN/m (ISO 10319)
5. Elongation at break	80/35(md/cd)(ISO 10319)
6. Puncture strength	2900 N (ISO 12236)
7. Effective opening size	0.09mm (ISO 12956)
8. Horizontal water flow 20kPa	13 l/m.h (ISO 11058)
Horizontal water flow 200kPa	3.0 l/m.h (ISO 11058)
9. Vertical water flow 50mm head	72.0 l/sqm.h (ISO 11058)
10. Width to be supplied	minimum 3.5 m

MANUFACTURE

All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.

TRANSPORT

- A. Transportation of the geotextile shall be the responsibility of the contractor.
- B. During shipment, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.

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C. Upon delivery at the job site, the contractor shall ensure that the geotextile rolls are handled and stored in accordance with the manufacturer's instructions as to prevent damage.

INSTALLATION

A The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way. Any damage to the geotextile to the extent that it is no longer usable as determined by these specifications or by the engineer, the contractor shall replace the geotextile at his own cost.

B The geotextile shall be rolled down the slope in such a manner as to continuously keep the geotextile in tension by self-weight. The geotextile shall be securely anchored in an anchor trench where applicable, or by other approved or specified methods.

C. In the presence of wind, all geotextiles shall be weighted by sandbags or approved equivalent. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.

D. The contractor shall take necessary precautions to prevent damage to adjacent or underlying materials during placement of the geotextile. Any damage to such material occur due to the fault of the contractor, the contractor shall repair the damaged materials at his own cost and to the satisfaction of the engineer.

E. During placement of the geotextile, care shall be taken not to entrap soil, stones or excessive moisture that could hamper subsequent seaming of the geotextile as judged by the engineer.

F. The geotextile shall not be exposed to precipitation prior to being installed and shall not be exposed to direct Sun light for more than 15 days after installation.

G. The geotextile shall be seamed using heat seaming or stitching methods as recommended by the manufacturer and approved by the engineer. Sewn seams shall be made using polymeric thread with chemical resistance equal to or exceeding that of the geotextile. All sewn seams shall be continuous. Seams shall be oriented down slopes perpendicular to grading contours unless otherwise specified. For heat seaming, fusion welding techniques recommended by the manufacturer shall be used.

H. The contractor shall not use heavy equipment to traffic above the geotextile without approved protection.

I. The geotextile shall be covered (as per drawings) as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 15 days.

J. Material overlying the geotextile shall be carefully placed to avoid wrinkling or damage to the geotextile.

5.04.11

Spillways/Over Flow Structures

Bidder shall suitably design and construct spillways/over flow structures to prevent overtopping of the embankment. The discharge from the spillways/overflow structures shall flow to the nearest nallah or drains with capacity to accommodate it.

5.04.12

Inlet /Outlet Structures

Suitable outlet pipes of mild steel (MS) as per IS: 3589 shall be provided. The adequate nos. of outlet pipes (as per design requirement) of suitable diameter and minimum 500mm thick RCC encasement with concrete Grade M20 as per IS 456. Pipes shall be laid as per IS 783.

Inlet structure shall be suitably designed & constructed. Inlet pipes shall be of MS as per IS: 3589 and laying shall be done as per IS 783. The number and diameter of pipes shall be suitably designed to meet the capacity requirement. A minimum 500mm thick RCC

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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>		
5.04.13	<p>encasement with concrete Grade M20 as per IS: 456 within the embankment shall be provided. To dissipate the turbulence and energy of the falling water suitable energy dissipation devices/system shall be provided.</p> <p>Rip-Rap</p> <p>Rip-rap shall be hand placed on the slopes of the embankment as per IS: 8237 - "Code of practice for Protection of slope for reservoir embankments". The thickness shall be 300mm and shall be measured normal to slope of the embankment. The rock materials used for rip-rap shall satisfy the quality requirements specified in IS code.</p>		
5.04.14	<p>Rock Toe</p> <p>The rock material used for the rock toe shall satisfy the quality requirements. Rock toe shall be formed with rock material consisting of sound, durable and well graded broken rock obtained from approved quarries and shall be of approved quality. The materials shall range in size from 10 to 45 cm. All brush, roots or other perishable materials shall be removed from rock-fill during spreading and disposal off. Contamination of the rock with finer materials from any other zones shall be avoided. Accumulations of soil caused by contamination shall be removed. Rock materials shall not be dumped directly but shall be hand placed in layers.</p>		
5.04.15	<p>D/S Slope Protection Works – Turfing</p> <p>The D/S slope of embankment including berms, if any, shall be turf sodded from top of embankment to rip-rap level. Turfing shall consist of at least 5 cm thick grass turf sods of approved variety obtained from the tank beds or river margins for use in this work. The sod shall include a mat of roots and earth at least 5cm thick. Sod containing an excessive amount of obnoxious weed growth shall be excluded. The block of sod shall be laid on the slope in close contact and then tampered firmly in place so as to fill and close the joints between blocks.</p>		
5.04.16	<p>Diversion of Surface & Under Ground Water</p> <p>The whole of the works shall be carried out in the dry condition. Water from any source shall be diverted or pumped as required, clear of the works. Bidder shall make all necessary arrangement whatsoever required for keeping the work area dried by diverting and pumping of water, and also provision and operation of all temporary works including pumps, motors, fuel, piping and for the formation of any sumps, drainage channels, flumes, coffer dams and other protective works.</p>		
5.04.17	<p>Rainfall Run-Off</p> <p>As part of the work may have to be carried out in wet season, Bidders programme and methods must be capable of dealing with run-off from rainfall on the adjacent catchment area. The associated flow in the nallahs etc. shall be diverted clear of the works by an approved system of bunds and channels. Bidder shall supply, install and operate his own temporary pumping installation.</p>		
5.04.18	<p>Prevention of Pollution</p> <p>Arrangement shall be made by the Bidder to prevent pollution of the water in any streams, springs, nallahs and lakes. Arrangements for sprinkling of water in the construction and borrow area to prevent any dust blowing also shall be done by the Bidder. Bidder shall be solely responsible and liable for all damage caused by any pollution that may take place during the execution of the works, and he shall make arrangements, as the Engineer may approve, for preventing pollution but, not withstanding such approval, the entire responsibility for any pollution shall rest with the Bidder</p>		

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**Table-1
Frequency of sampling and testing**

S.No.	Nature of test/Characteristics	Method of test	No. of samples & frequency of test	Remarks
1	Suitability of fill material		One in every 2000 cum for each type and each source of fill materials subject to a minimum of two samples	Test for soil and sand
	a) Grain size analysis	IS: 2720 (Part-IV)		
	b) Liquid limit and Plastic limit	IS: 2720 (Part-V)		
	c) Shrinkage limit	IS: 2720 (Part-VI)	One in every 5000 cum for each type and each source of fill material	Test for soil The frequency of test can be increased depending on type of soil
	d) Free swell Index	IS: 2720 (Part-XL)		
	e) Chemical Analysis	IS: 2720	One in every 5000 cum for each type and each source of fill material	Test for soil and sand
	i) organic matter	Part-XXIL		
	ii) calcium carbonate	Part-XXIII		
	iii) Ph	Part-XXVI		
	iv) total soluble sulphate	Part-XXVII		
2.	Standard proctor Test	IS: 2720 (Part-VII)	One in every 2000 cum for each type and each source of fill material	Test for soil for determining optimum moisture content, dry density etc
3.	Moisture content for fill before compaction	IS: 2720 (Part-II)	One in every 2000 cum for each type and each source of fill material	Test for soil
4.	Degree of compaction of fill			
	a) Dry density by core cutter method or dry density in place for sand displacement method	IS: 2720 (Part-XXIX)	For area filling, one for every 1000 sqm area for each compacted layer	Test for soil
	b) Relative density (density Index)	IS: 2720 (Part-XIV)	For area filling, one for every 1000 sqm area for each	Test for soil

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			compacted layer	
	c) Dry Density for proctor needle penetration	Standard practice	Random checks to be carried out for each compacted layer in addition to tests mentioned under IV(a) above	Test for soil

5.05.00 ASH HANDLING SYSTEM

5.05.01 The civil works for Ash handling system shall comprise of bottom ash and fly ash handling systems, which includes Ash slurry pump house and their related sumps/tanks, Ash water pump house, Bottom Ash (BA) slurry transportation pump pit and their related sumps/tanks Slurry trench (In case of SCC system), Transport/instrument Air Compressor house, Conveying air compressor house, Switchgear /Control/RIO rooms, HCSD Pump house, AHP Control room building, Ash classifier, Ash silo, supporting structures and foundations for Bottom ash hopper, Buffer hoppers, dewatering bins, bottom ash overflow tank, Settling tanks and Surge tanks, Seal water tank, Bagging plant Complex, Silo Utility Building complex including development of silo area (i.e. paving, fencing/boundary-wall, access roads, office block and watchman cabin), miscellaneous equipment foundations, trenches, pipe racks, pedestals/thrust blocks for HCSD pipe supports (inside the plant boundary) including bridges/culverts for road/rail/drain/nallah as required. For the ballast-less rail track under silo area complex a 4.0m wide area (2.0 m either side of centre line of railway track) shall be left unpaved along the rail track in complete silo area complex same shall be constructed by railway siding agency. RCC peripheral drains, crossing rail track shall be covered with permanent RCC slab (minimum 150 mm thk.) & construction of these RCC drains such that it will not create any hindrance in construction of rail track. Top of paving level in balance silo area complex shall be governed by the top level of rail track in silo area complex. Steel gates of minimum 6.0m width for entry & exit of railway wagons in silo area complex shall be provided in boundary wall/ fencing of silo area complex. For the hindrance free movement of railway rack on the rail track under Silo following shall be provided however necessary approval shall be taken from the railway authority by successful bidder.

*Horizontal clearance: A minimum clearance of 3.5m shall be maintained between centre line of the Railway track to face of the crossing structure.
 *Vertical clearance: A minimum vertical clearance of 8.5m shall be maintained between Rail top level and bottom of structure.

5.05.02 Transport air compressor houses, Conveying air compressor houses, Ash slurry Pump House, HCSD Pump house shall have steel shed building with side sheeting and Silo utility building, shall have RCC framed structure, with RCC columns and profiled metal deck sheet roofing (filled with RCC) supported on steel purlins & truss / girders. Other buildings like MCC /switchgear rooms, control room, etc. shall have RCC framed structure with cast-in-situ RCC roof slabs. Bagging plant Complex building shall be closed steel shed. All RCC buildings shall have brick cladding. Crane girders or monorails shall be provided as per requirement and the same shall be of structural steel construction.

5.05.03 The documents and drawings as listed below are to be submitted for the approval of the Employer unless specified otherwise. The list given below is not exhaustive but indicative only.

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- a) Project design intent document giving the basis of design, which shall cover all the design philosophy aspects, parameters, assumptions, references, loading cases, load combinations, analysis and design of all buildings, structures, facilities etc. shall be furnished for approval, before commencement of detailed engineering.
- b) Structural analysis, design calculations and drawings of substructures and super structures for all buildings/structures, facilities like pump houses/shed, compressor houses, sumps / tanks, channels, pipe support structures, culverts/ bridges, pedestals, thrust blocks transformer yards, etc. shall be submitted for approval of the owner.
- c) The design and drawings for the equipment and their supporting structures like bottom ash hopper, buffer hopper/collector tanks, surge tank/settling tank, silos/bins, etc. associated with Ash Handling System, shall be submitted to the Owner for information only. However, the structural design criteria and basis of design as mentioned at (a) above, for these structures also shall be approved by the Owner.
- d) Top of RCC pedestal of foundation for bottom ash hopper, fly ash silo, other columns etc. shall be 300 mm above paving level or surrounding finished ground level (FGL).

5.05.04 ~~DELETED~~

5.05.05 The Silo utility building complex shall be fenced with chain linked fencing, if placed inside the plant boundary and shall be confined with boundary wall if placed outside plant boundary. Gates shall be provided for rails, truck movement and transformers. The boundary wall shall be of one brick thick of height 2.4 m with a 600 mm high galvanized concertina at top, such that total height is 3.0 m above formation level. The fencing shall be PVC coated G.I. Chain link of minimum 4 mm thickness (including PVC coating) of mesh size 75mm x 75 mm and of height 2.4 m above toe wall. The toe wall shall be 1 brick thick, minimum 200 mm high above paving/formation level and 300 mm below paving/formation level on 75 mm thick PCC (1:4:8) bedding. Entire area in the silo area complex shall be paved and have a peripheral RCC drain of adequate capacity & slopes covered with perforated precast RCC slabs of minimum 150 mm thickness with provision of openable galvanized steel grating covers of 1.0 m at every 4 m interval. The complex shall be provided with a sump for collection of ash water. In addition to the outer confinement, additional fencing with gates should be provided for all transformers in the complex. A watchman cabin with a minimum area of 5 Sq.m shall also be provided in this area.

5.05.06 Pipe supports shall be provided for ash slurry pipes—HCSD—pipes, dry fly ash(FA) pipes including RCC thrust blocks and any other supports required to complete the system. Over-ground pipes shall be supported on RCC pedestals except for FA pipes which shall be on elevated steel trestles. Unless noted otherwise, the top of concrete pedestals shall be minimum 500 mm above surrounding ground level/paving level. Pipes shall be suitably anchored with RCC pedestals to resist lateral and vertical movements as per system requirement. Conveyor Galleries, Trestles, Trasfer points shall be provided for Dry Bottom ash system

5.05.07 ~~DELETED~~

5.05.08 Where the pipes are crossing the road through RCC box culverts, the culvert top generally, shall not be not more than 100 mm above the road top and a hump with slope of 1:35 shall be provided on the road. All other road crossings inside the plant area can be either underground or overhead road crossings with necessary headroom clearance. For any boundary wall crossings, pipe shall be laid through casing pipe / RCC culvert. After laying the pipe, the boundary wall shall be restored. For other water body crossings, such as local Nallah / canal, local water bodies, local drains etc. suitable structural arrangement with 800 mm wide walkway shall be provided. Minimum clearance of the bottom of pipeline for all such locations shall be 1.50 M above the High flood level (HFL). Bidder to take all statutory clearance from concerned authorities for crossing his pipe/trestles over road / rail / culverts / nallah etc. at his own cost and initiative, without any commercial implication to the owner. For any other additional works,

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5.05.09	<p>bidder have to make their own assessment too of the quantity/ number of culverts, existing pipe pedestal crossings, nallah crossings etc., based on their site visit before quoting.</p> <p>All ash handling system pipe crossings with Railway Lines including MGR lines shall be laid by method accepted by concerned railway authorities for existing rail lines & by cast in situ RCC box culvert for future envisaged rail lines. The railway track crossings are to be designed in accordance with railway Standard/RDSO guidelines and all necessary approvals from the concerned Railway authorities shall be obtained by the Bidder, without any financial implications to the owner.</p>		
5.05.10	DELETED		
5.05.11	All liquid retaining structure shall be designed by working stress method as per IS 3370 (Part-1&2):2009. The thickness of base slab in liquid retaining/ carrying structures shall be minimum 150mm. Minimum grade of concrete for liquid retaining structures like Sumps/tanks/drain sumps etc shall be M-30.		
5.05.12	For liquid retaining structures, the minimum reinforcement in each direction shall not be less than 0.24% of the gross cross-sectional area.		
5.05.13	All liquid retaining structures shall be tested for leak proofness with full water level in accordance with clause no.12 of IS 3370(Part 1):2009 and IS 6494.		
5.05.14	<p>All pump houses and other substructures shall be checked for stability as per the following guidelines:</p> <p>a) Stability of structure against sliding during construction as well as operating conditions for various combinations of applied characteristic loads. In case where dead load provides the restoring moment, only 0.9 times the characteristic dead load shall be considered. Factor of safety against sliding shall not be less than 1.4 under most adverse combination of applied characteristic loads.</p> <p>b) Stability of structure as a whole against overturning. It shall be ensured that the resisting moment shall be not less than the F.O.S. times the maximum overturning moment. Factor of safety against overturning shall not be less than 1.2 due to characteristic dead load and shall not be less than 1.4 due to characteristic imposed load.</p> <p>c) Stability of structure against uplift due to the ground water table at finished ground levels during construction and after construction stages. Minimum factor of safety of 1.2 against uplift shall be ensured considering 0.9 times dead weight, empty condition inside and ignoring the superimposed loadings. Inclined wedge action shall be limited to 15 degree with vertical plane. Provision of pressure relief valve / flap valves etc. shall not be permitted to counter the uplift. Also FOS against uplift, to be taken as 1.0 considering the dead weight of structure and soil resting on side projections, if any, in the vertical plane. Inclined wedge action of soil shall not be considered in this case.</p>		
5.05.15	<p>Architectural Features of Ash Handling System Buildings</p> <p>a. Building shall have Aluminium and Steel doors/ windows/ rolling shutters / ventilators.</p> <p>b. Safety norms shall be followed as applicable. The buildings shall be provided for Pump houses, Switch Gear Room, Control Room etc. as per ash handling system requirements.</p> <p>c. External finish shall be of premium acrylic smooth exterior paint with silicon additives.</p> <p>d. All the air conditioned rooms shall be provided with hermetically sealed double glazing in windows and false ceiling.</p> <p>e. Encased staircase shall be provided for double storeyed buildings and cage ladder shall be provided for roof access in single storeyed building.</p> <p>f. Each building shall have one toilet block with drinking water facility.</p>		
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<p>5.06.00</p> <p>5.06.01</p> <p>5.06.02</p> <p>5.06.02.01</p> <p>5.06.02.02</p> <p>5.06.02.03</p> <p>5.06.03</p>	<p>FGD SYSTEM</p> <p>The civil works for FGD system shall comprise of civil, structural and architectural works below and above ground level of FGD control room building, slurry re-circulating pumps & oxidation blowers building, tank foundations, absorber tower foundation, MCC building, gypsum dewatering building, transformer foundation, equipment foundations, pipe & cable gallery/trestles, drainage, sanitation, water supply (from terminal points to various buildings/facilities) and all other civil, structural and architectural works associated with the complete FGD system specified elsewhere in this specification. Bidder may also refer terminal points & exclusions in this regard.</p> <p>Buildings for FGD System</p> <p>FGD System may comprise of various buildings based on the functional requirement viz. MCC/Control room building, Gypsum dewatering building, re-circulating pumps & oxidation blowers building, Gypsum storage shed etc.</p> <p>Control building, M. C. C. Buildings</p> <p>These shall be steel/RCC framed building with RCC roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams. Cladding shall be of brickwork/concrete block work with plastering on both sides. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification. Suitable arrangement shall be provided so as to prevent ingress of water into the cable trenches inside the building from cable entry locations. All air - conditioned areas, shall be provided with false ceiling system (details specified elsewhere) with under deck insulation.</p> <p>Not Used</p> <p>Gypsum Dewatering Building</p> <p>This shall be steel framed building with R. C. C. roof and floor. For steel building roof /floors shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only over structural beams). Cladding shall be of single skin metal sheeting or brickwork/concrete block work with plastering on both sides. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification</p> <p>Booster Fan foundations:</p> <p>Fan foundations shall be RCC block foundation directly resting on virgin soil/ pile below Ground level. The vertical faces of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 kg/cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.</p> <p>ii) Design Concept:</p> <p>a) For the foundations of Fans etc. detailed static and dynamic analysis shall be done.</p> <p>b) Wherever block foundation is adopted by the bidder for FAN foundations, suitable provisions to be ensured by the bidder in their General Arrangement and design to prevent transmission of vibration from these machine foundations to other nearby structures / foundations.</p>	<div style="border: 1px solid red; padding: 2px;"> <p>includes Ball mill building, Ball mill foundations</p> </div>	
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<p>5.06.04</p> <p>5.06.05</p>	<p>The bidder or his consultant should have adequate prior experience in design of machine foundations and the machines should be in successful operation for at least one year prior to the date of submission of bid.</p> <p>Pipe and cable gallery/ trestles shall be as per details given in clause no. 5.02.08.</p> <p>RCC Floors, Paving & Grade Slab details</p> <p>Passages shall be provided inside the FGD area connecting to the outer periphery road to have access to the various facilities/buildings. These passage areas shall be provided with heavy duty paving for movement of heavy vehicles. The top surface of the passages shall be finished with 50 mm thick metallic hardener topping. Heavy duty paving shall also be provided for the areas in the equipment lay down area, unloading & maintenance area, storage area with 50 mm thick metallic hardener topping.</p> <p>Lightly loaded areas such where no heavy traffic movement is envisaged shall be provided with Normal Duty paving. However, corridors below pipe/cable trestle gallery where no traffic movement is envisaged and in the area over the buried fire water pipes shall be provided with interlocking concrete blocks of minimum M35 grade and minimum 80 mm thickness underlain by 20mm thick layer of sand followed by 200mm thick 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil.</p> <p>All facility/buildings shall be provided with 750 mm wide plinth protection all around. It consists of 50 mm thick P.C.C. M-20 grade with 12 mm maximum size aggregate over 200 mm thick stone soling using 40 mm nominal size rammed, consolidated and grouted with fine sand.</p> <p>An area of minimum 7.5m width all around the tank foundations and other facilities/buildings shall be paved. This paving shall be beyond the extent of plinth protection. Further, heavy duty paving shall be provided for passages connecting the outer periphery road to have access to the various facilities/buildings.</p> <p>Wherever multiple FGD facilities are located in a cluster in the areas proposed for FGD, the entire extent of the cluster shall be provided with area paving maintaining minimum 7.5 m width around the facility buildings. Paving shall be extended up to nearest road for easy access to FGD facilities. Any functional requirement of paving for FGD facility not specifically mentioned in this document is also in scope of bidder.</p> <p>GRADE SLAB OF BUILDINGS AT GROUND FLOOR</p> <p>In buildings, the grade slab shall consist of 150mm thick RCC M25 grade base slab over an under bed as specified below. The under bed for ground floor slab shall consist of 75mm thick 1:4:8 PCC on stone soling of 200mm compacted thick with 63 mm and down aggregate with interstices filled with well graded selected sand/ moorum/ non-expansive soil on compacted and dressed sub - grade. Reinforcement for the slab shall consist of minimum 8mm dia. bars @ 200 mm c/c at top & bottom of the slab in both directions. However, at unloading & maintenance area, gypsum storage shed stone soling of minimum 400mm thick and grade slab with minimum 10mm dia bars @ 200 mm c/c at top and bottom in both directions shall be provided.</p> <p>Further, top surface of grade slabs shall be finished with 50mm thick metallic hardener topping.</p>		
<p>5.06.08</p>	<p>Bidder shall provide permanent access to all facilities/structures from the nearby existing roads of the Owner.</p> <p>Roads shall be of concrete as per IRC standards, with minimum thickness of pavement (PQC) as 250mm (in M 35 grade) and DLC of 150 thick (in M 10 grade). Double lane road (width 12m having 7.5m wide pavement & 2.25m wide shoulders on both sides) shall be provided.</p>		
<p>5.07.00</p>	<p>SEWERAGE SYSTEM:</p>		
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	<p>Complete sewerage system including Sewage Treatment Plant for facilities within the plant is in bidder's scope. Bidder shall provide 'De-centralized Sewage Treatment' units. The capacity of the Decentralized Sewage Treatment' units should be as per the design requirements, subject to minimum combined capacity of 75 Cum/day.</p> <p>Design of Sewage treatment plant shall be as per CPHEEO manual. Primary, Secondary and Tertiary treatment to be provided. Treated sewage water shall be used for horticulture purpose as per quality requirement of CPHEEO manual.</p> <p>Cement concrete pipes of class NP-3 as per IS 458 shall be used below ground level for sewage disposal in all areas other than main plant area. However, for pressure pipes and in main plant areas, and under roads spun Cast Iron pipes conforming to IS 1536 of required class shall be used. RCC manholes with CI cover shall be provided at every 30m along the length, at connection points, and at every change of alignment, gradient or diameter of a sewer pipeline. This shall be as per IS 4111.</p> <p>Sewage pump stations shall be provided as per IS 4111.</p> <p>Bidder shall have to provide complete arrangement for sewage disposal up to the sewage treatment plant including pumping facilities.</p>		
<p>5.08.00</p>	<p>Plant Storm Water Drainage System</p> <p>Complete storm water drainage system of Plant area is in bidder's scope. Storm water drain shall be designed taking into account the finished ground levels of the plant & surrounding area, drainage pattern, intensity of rainfall, etc. These values shall be based on minimum rainfall intensity of 75mm/hr. All RCC drains shall be either RCC Cast-in-Situ or RCC Pre-cast drains. The minimum grade of concrete shall be M25 for RCC Cast-In-Situ drains and M30 for RCC Pre-cast drains. The maximum velocity for RCC open drains shall be limited to 1.8 metre per second. However, minimum velocity of 0.6 metre per second for self - cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. The inside drain dimension at any point should not be less than 0.45m (height) x 0.75m (breadth).</p> <p>Open RCC rectangular section, unless required otherwise due to functioned requirement, shall be provided for all drains. The thickness of side walls and bottom slab of RCC drains shall be minimum 150mm or as per design considerations whichever is higher for drains upto depth of 1m from formation level. For depth of drain more than 1m from formation level, the thickness of side walls and bottom slab of RCC drains shall be minimum 200mm or as per design considerations whichever is higher.</p> <p>The drains shall be provided on both sides of the double lane roads and single lane roads. The drains shall be provided on one side of the patrol roads along boundary wall. These shall be designed to drain the road surface as well as all the free and covered areas, etc. Box culverts shall be provided at all rail, road and other crossings.</p> <p>Layout of drain shall be as per layout given in tender drawing "Layout of drain".</p> <p>Complete drainage upto outfall point to be completed to avoid flooding in the respective area.</p>		
<p>5.09.00</p>	<p>TRANSFORMER FOUNDATION</p> <p>Foundations of transformers shall be designed for seismic and wind loads in addition to other applicable loads. Solid RCC block foundation shall be provided for the main transformer block. Alternatively, transformer shall be supported on a RCC foundation comprising of common raft for rail supporting walls up to rail-cum-road along with pedestals for jacking pad, roller lock etc. Tie beams connecting roller lock pedestals at rail level shall also be provided. Common raft/solid RCC block shall be supported on soil or pile based on requirement specified elsewhere in the specification.</p>		
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Oil soak pit / oil water separation pit for transformer shall be provided as envisaged elsewhere in the specification.

The oil soak pit shall be provided for each transformer and shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store one-third (1/3) of the oil volume of transformer/reactor considering only 40% of the volume as available voids between gravel filling. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. Oil soak pits sump of individual transformers shall be connected to common oil retention /oil water separation pit through hume pipes and manholes.

Separate common oil retention pit/oil water separation pit shall be provided for a group of transformers in transformer yard area of each generation unit of plant.

The Oil-water Separation pit shall be designed for an effective capacity of complete oil of one transformer having highest volume of oil along with 10 minutes of firewater. For calculating effective capacity of oil-water separation pit, effective depth excluding 200 mm freeboard below invert level of inlet pipe shall be considered. Plan area and depth of oil-water separation pit shall be decided based on above consideration.

Oil-water Separation pit shall be provided with five separate chambers interconnected by pipes.

First chamber shall be for collecting oil-water mix from transformers' soak pits in case of fire. After entering into first chamber, oil being the lighter in density floats above the water. The water from lower elevation flows in to subsequent chambers interconnected through galvanized MS pipes. The accumulated oil in the first chamber to be pumped out for subsequent usage or disposal. Water collected in the last chamber to be pumped out for subsequent disposal after treatment. Invert level of inlet Hume pipes (of NP-3 grade and adequate capacity), carrying oil and water from transformers soak pits, shall be designed for gravity flow. Freeboard of 200 mm shall be provided below the invert level of inlet pipes. Invert levels of interconnecting pipes of subsequent chambers shall be decided accordingly.

Arrangement for moving the transformer into place using rail cum road, jacking pads and pulling blocks including inserts, as required, shall be provided along with the transformer/reactor foundations.

RCC Firewall shall also be provided between the transformers wherever required.

300 mm thick PCC M20 encasement all around the Pylon supports inside soak pit for firefighting system shall be provided up to top of gravel filling. However, the supply and erection of Pylon supports with anchor fasteners for HVW spray system are not under the scope of this package. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.

5.10.00

Roads

All roads shall be of rigid pavements unless otherwise specified. Rigid pavements shall be constructed with Geopolymer concrete. Concrete road/pavement or rigid pavement, mentioned in specification, shall mean road /pavement constructed with Geopolymer Concrete. All concrete roads shall be unreinforced jointed plain concrete pavement having dowels in transverse joints and tie bars at longitudinal joints.

A 40mm bitumen mastic wearing course over concrete pavement shall be provided with industrial bitumen of grade 85/25 conforming to IS : 702, prepared by using mastic cooker and laid to required level and slope, including providing antiskid surface with bitumen fine grained hard stone chipping of approved size at the rate of 0.005 precoated cum per 10 sqm and at approximate spacing of 10 cm centre to centre in both directions, pressed into surface protruding 1 mm to 4 mm over mastic surface, including cleaning the surface, removal of debris etc. all complete. (Considering bitumen using 10.2% as per MORTH specification).

This 40mm bitumen mastic wearing course shall be laid after completion of construction activities i.e at the time of handover.

All the road shall again be repaired/made good as per IRC : SP :83 after completion of construction activities i.e at the time of handover.

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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>		
5.10.00.01	<p>All service and utility lines like fire water line, sewerage line, electric cables line etc. crossing the road shall be taken through NP3 class RCC Hume pipe. Hume pipe shall be laid before road work so that the road shall not be damaged.</p> <p>Construction of road work shall be as per priorities given in Tender drawing 'Layout of Road Drawing'.</p> <p>For road to be constructed with Geopolymer Concrete:</p> <p>The design of rigid pavement shall be carried out as per IRC: 58. The effects of design wheel load, maximum tyre inflation pressures, tyre contact area for the vehicle, traffic loads, environmental factors such as temperature changes in the pavement, other factors, like impact, load repetitions, etc., are to be taken. The design traffic load shall be a minimum value of 4 million standard axles. The road shall be designed for 30 years of life and considering a minimum traffic growth rate of 1 per cent per annum. The concrete pavement for roads shall be minimum 250 mm thick slab.</p> <p>The road construction including its shoulders, base, sub base and concrete pavement shall be as per MORTH. The road base shall be with minimum 150 mm thick dry lean concrete over granular sub base. Dry lean concrete shall be laid by a mechanical paver and compacted by vibratory rollers. Concrete pavement of the road shall be done with fully mechanized paver fitted with electronic sensors for construction techniques. Laying /placing of Concrete DLC and PQC manually with hand-guided means or by semi-mechanized methods may be permitted around BTG area provided acceptance criteria as per MORT&H specification is achieved. Dry lean concrete shall be minimum M10 grade and concrete pavement slab shall be minimum M35 grade concrete pavement shall be provided with 125 micron polythene sheet below it. Concrete pavement shall also be provided with contraction and expansion joint with MS dowel bars and as per Ministry of Road Transport and Highways (MORTH) specification.</p> <p>The finished top (crest) of all roads shall be 350 mm above the surrounding finished ground level.</p> <p>All culverts and RCC bridges at crossings of all roads / rail tracks / facilities with drains / nallahs / channels / roads / rail tracks / pipes / other facilities, etc. are to be designed and constructed.</p> <p>Unless otherwise specified, all roads (excluding access roads to all buildings / facilities / structures, patrol road along boundary wall and road inside the switchyard) shall be double lane roads.</p>		
5.10.00.02	<p>Geo-polymer concrete road shall be constructed over soil sub-grade/embankment. Road section shall comprise of Granular Sub base over soil sub-grade, Dry Lean Concrete of M10 Grade (DLC) base and Pavement Quality Concrete of M35 grade (PQC) top layer. Thickness of different layers of pavement section shall be as per design. However, minimum thickness shall be 150 mm for DLC and 250 mm for PQC. Provisions of Clause 5.10.00.01 in respect of design, construction and other requirement shall also be applicable for Geopolymer concrete road. In addition, specific information pertaining to geopolymer concrete is provided in Chapter D-1-8.</p>		
5.10.01	<p>Double Lane Roads</p> <p>The double lane roads shall be (12 metre wide) with 7.5 metre wide concrete pavement and 2.25 metre wide raised shoulders on both sides of the roads as given in tender drawing "Details of road" .</p>		
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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>		
5.10.02	<p>Single Lane Roads</p> <p>All access roads to all buildings / facilities / structures, road approaches / connections, access roads to liquid fuel storage areas and other equipment areas where access is necessary from inspection, operation and maintenance point of view and all roads inside the switchyard shall be single lane roads as given in tender drawing “Details of road”.</p>		
5.10.03	<p>PATROL ROADS</p> <p>All patrol roads along the boundary wall shall be single lane roads with 3.75 metre wide concrete pavement and 1 metre wide shoulders on one side of the road. as given in tender drawing “Details of road”.</p>		
5.10.04	<p>Intermediate Road</p> <p>The intermediate lane roads shall be (8 meter wide) with 5.5 meter wide concrete pavement and 1.25 meter wide raised shoulders on both sides of the road as given in tender drawing Details of Road. *Concrete roads anywhere mentioned in specification shall be read as Geo-polymer concrete road.</p>		
5.11.00	<p>DELETED</p>		
5.12.00	<p>Fuel Oil Handling system</p> <p>The civil works are to be provided for following fuel oil handling system areas as mentioned below:</p> <ol style="list-style-type: none"> a. Fuel Oil pressurizing pump house. b. Foundation and dyke wall and all associated works for LDO tanks. c. Pedestals and foundations to support the interconnecting piping between LDO tanks to the pressurizing pumps as well as piping from tanker unloading area to the Unloading pump house and further on to the LDO tank. d. Oil water separator pit. 		
5.12.01	<p>Fuel Oil Pressurising Pump House</p> <p>Salient Features:</p> <p>This building shall be a single storeyed framed superstructure with RCC columns, structural steel roof truss (with rafter and tie level plan bracings), purlins and roof slab. The roof slab shall comprise minimum 40 mm thick (above the crest of metal deck sheet) RCC slab supported on profiled metal deck sheet connected through shear anchor studs. Waterproofing of Roof slab shall be done as per architectural specifications. The building shall be completely covered with 230mm thick brick wall with provisions for fire proof doors, windows, rolling shutters. The basement RCC slab and RCC wall shall be designed as for uplift and external surcharge load as per the design criteria specified elsewhere. All pump foundations shall be designed for both static and dynamic loading. The building shall have separate enclosures for the control room and the switchgear room. All rainwater down comers shall be concealed with brick wall. The minimum floor area of this building shall be as per the equipment layout plan of the bidder/EPC contractor.</p> <p>Design Concept:</p> <p>The grade of concrete shall be M 25 for all columns, beams, footing and slabs. The building shall be designed as per IS: 456, IS 800, IS 1893, IS 13920 (for ductility detailing).</p>		
5.12.02	<p>Fuel Oil Storage Tank Foundations</p> <p>The Fuel Oil Storage Tank foundations shall be either RCC raft or RCC Ring Beam system with compacted infill. The RCC raft /RCC ring beam shall be supported on virgin soil or pile foundation depending on the load bearing capacity of the soil. The tank bottom base plate shall</p>		
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be supported on flexible compacted fill comprising 75mm thick Bitumen aggregate mix on top and compacted sand/ soil fill below, compacted in layers of 200mm to minimum 85% relative density as per IS:2720. The bitumen-aggregate mix shall consist of compact crushed stone, screenings, fine gravel, clean coarse sand(river sand) mixed in hot asphalt (8 to 10 percent by volume) and rolled or compacted. In the GA & detailing of foundation RCC ring wall/ beam it should be ensured that no bearing stress from tank superstructure is transmitted to the concrete surface. The top of flexible compact fill and top of RCC Circular wall shall be atleast 325mm above the surrounding ground surface for effective drainage.

The finished tank grade (Top surface of flexible compact fill) shall be crowned from its outer periphery to its centre at a slope of 1 in 100.

The Tank foundations shall be inside a RCC dyke wall enclosure. The entire area outside the tank foundations and within the surrounding RCC dyke walls shall be paved with concrete. The thickness of concrete paving shall be minimum 100mm. The single layer reinforcement in paving slab shall be min 10 Tor@200c/c. The area paving RCC slab shall be supported on 230mm thick Rubble soling with the internal voids filled with coarse sand. The height of the RCC dyke wall shall be evaluated based on the depth of Oil spillage for full oil volume of one storage Tank in addition to a free board of 300mm. Structural steel cross over ladder shall be provided (min 2 numbers) for each RCC wall dyke enclosure. Operating platforms wherever required as per functional requirement shall be provided.

5.12.03
5.12.04
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Oil Water Separator Pit

The Oil-Water Separator RCC structure (pit) shall be designed as an underground structure. The sizing of the separator shall be based on the total surface run-off from the Fuel Oil Handling area and Hydraulic design for the oil separation. Surge load and ground water table up to ground surface shall be considered in addition to other functional loads for structural design of RCC wall for the separator pit.

Drainage trenches with proper bed slopes towards the oil-water separator pit shall be provided around the tank foundation. The entire area outside tank foundation shall have slope towards the drain trenches

Foundation for trestles and pedestal foundations, for supporting the pipes, shall be provided wherever required, at appropriate spacing. At pipe bends, necessary thrust resisting arrangement shall be provided.

The entire fuel Oil Handling area shall be fenced all round with minimum 1.50m high metal fencing with provision for gates at key locations.

Seismic design shall be carried out for the Fuel Oil Storage Tank foundation, Fuel Oil Unloading Pump House & the Oil water separator.

5.12.06

5.13.00

Architectural Features of Fuel Oil Handling Buildings

Spaces for Pump Rooms, MCC Rooms, Control Rooms etc. shall be provided as per functional requirement. One Toilet block with drinking water facility shall be provided in each building.

External finishing shall be of Premium Acrylic Smooth Paint with Silicone additives over suitable primer of water proof cement.

AREA PAVING

RCC paving of minimum 150 mm thick with M25 grade concrete, over an under bed as specified herein shall be provided for areas mentioned below. RCC paving shall be designed as rigid reinforced concrete pavement for the crane/ vehicular/ equipment movement loads which the paving has to bear. The under bed for paving shall consist of preparation and consolidation of sub-grade to the required level, laying of stone soling of 200mm compacted

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thickness for normal duty paving and 400mm compacted thickness for heavy duty paving with 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil followed by 75 mm thick 1:4:8 PCC (1 part cement, 4 parts sand and 8 parts stone aggregate) with 40 mm nominal size aggregate. For normal duty paving, reinforcement of the RCC paving shall consist of minimum 8mm diameter bars @ 200 mm c / c in both directions at the centre of the slab. For heavy duty paving/ passage, reinforcement of the RCC paving shall consist of minimum 10mm diameter bars @ 200 mm c / c in both directions at the centre of the slab.

Paving areas shall be provided with the metallic hardener floor finish as specified elsewhere in the specification.

Passages shall be provided inside the main plant block connecting to the outer periphery road to have access to the various facilities/buildings. These passage areas shall be provided with heavy duty paving for movement of heavy vehicles. The top surface of the passages shall be finished with 50 mm thick metallic hardener topping. Heavy duty paving shall also be provided for the areas in the complete Mill bunker building and handling areas for PA/FD/ID fans with 50 mm thick metallic hardener topping.

Ground floor area in the boiler shall be provided with normal duty paving and shall be finished with 50 mm thick metallic hardener topping.

Ground floor area in the ESP envelope shall be provided with normal duty paving with neat cement punning. Wherever paving is envisaged to be provided, RCC paving shall be provided. However, corridors below trestle where no traffic movement is envisaged and in the area over the buried fire water pipes shall be provided with interlocking concrete blocks of minimum M35 grade and minimum 80 mm thickness underlain by 20mm thick layer of sand followed by 200mm thick 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil.

All other areas inside the Main plant block shall be provided with normal duty paving without metallic hardener topping.

Suitable open RCC drains shall be provided to dispose off storm water drain. Separate open RCC drains shall be provided to dispose off floor wash and plant effluents into RCC sump pits. Separate RCC sump pits shall be provided for different types of effluents. The paving shall be provided with slope of 1:500 to dispose the surface water/wash water to the nearest drain. All drains/pits shall be provided with Heavy duty electro forged GI grating cover.

Sewer lines (Cast Iron), interconnected by sewer manholes (RCC) at regular intervals (not exceeding 30 meter centre to centre) shall be provided to dispose off sewage from main plant block.

For the purpose of area paving, Main plant block is defined as the entire area enclosed between peripheral roads encompassing the Transformer yard area, Main Plant Building area, Boiler area, ESP area, Chimney area & FGD area.

5.13.01

Ground Floor Slab of Buildings

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	<p>In all buildings including main plant building, the ground floor slab shall consist of minimum 150mm thick RCC M25 grade base slab over an under bed as specified below. The under bed for ground floor slab shall consist of 75mm thick 1:4:8 PCC on stone soling of 200mm compacted thick with 63 mm and down aggregate with interstices filled with well graded selected sand/ moorum/ non-expansive soil on compacted and dressed sub - grade. Reinforcement for the slab shall consist of minimum 8mm diameter bars @ 200 mm c/c at top & bottom of the slab in both directions. However, at passages, unloading & maintenance bays, stone soling of minimum 400mm thick and minimum 10mm diameter bars @ 200 mm c/c at top and bottom in both directions shall be provided.</p> <p>Further, top surface of ground floor slabs shall be finished with 50mm thick metallic hardener topping.</p> <p>5.13.02 Civil Works for Fire Detection & Protection System in Ground Floor/ Paving</p> <p>Fire water pipes shall be provided with either RCC trench/buried underground/on pedestal.</p> <p>Fire water trenches shall be open RCC type trench with removable RCC cover. RCC valve pit alongside trenches and RCC fire trenches crossing drains shall also be provided as per requirement.</p> <p>Interlocking concrete block paving shall be provided over the buried fire water pipes as specified elsewhere in the specification.</p> <p>At road/ drain crossings, NP3 class hume pipe encased in RCC shall be provided as per requirement at a depth of minimum 1m from FGL for routing of fire water pipes.</p> <p>In case of rail crossings, NP4 class hume pipe encased in RCC shall be used instead of NP3 class hume pipe.</p> <p>Each of the outdoor deluge valve and accessories shall be provided with housing comprising of Brick wall and RCC roof.</p> <p>5.14.00 DELETED</p> <p>5.15.00 DELETED</p> <p>5.16.00 DELETED</p> <p>5.17.00 Induced Draft Cooling Towers</p> <p>The civil , structural and architectural works for cooling towers are related mainly to following areas, but not limited to:</p> <p>5.17.00.01 Cooling Tower Basin</p> <p>The basin of the cooling tower for collection of cold water shall be made of Reinforced Cement Concrete (RCC M - 30 grade as per IS: 456). The floor of the basin shall be sloped to minimum 1 in 80 towards the sludge drains. The required slope shall be achieved by screed concrete of grade M-15 as per IS:456 having minimum thickness at edge as 25 mm. Drainage arrangement of basin shall be as specified elsewhere in the Technical Specifications. If the cooling tower basin and sludge sump is below ground level, FRP hand railing shall be provided all around the cooling tower basin and sludge sump pit. The bottom 500 mm of hand railing shall also have FRP/PVC wire mesh with opening size of 50mm grid to avoid ingress of leaves, vegetation, and debris into the basin. The basin shall be tested for water tightness as per IS:3370.</p> <p>Bottom of the lowest level beam shall be at least at free board level. In case, the beams are provided into the water, the same shall be designed for un-cracked section as per IS:3370.</p> <p>The outlet channel shall be covered on top with removable precast concrete slabs for about 5m length from cooling tower basin and the entire length of cold water outlet channel shall be provided with 32 NB (Medium) G.I pipes. Hot water duct around cooling towers, if placed below ground shall be encased with min. 500mm thick PCC (M20 grade).</p>
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- a) Foundation of Cooling Tower**
The foundation of the Cooling Tower shall be as detailed out elsewhere in the specifications.
- b) Super Structure of Cooling Tower (applicable in case of RCC cooling tower)**
Columns, beams and other structures like tie beams, slabs etc. shall be of reinforced cement concrete of grade M-30 (minimum) as per IS : 456. Uniform concrete grade shall be used for the entire cast-in-situ reinforced concrete superstructure.

The fan deck slab shall be properly sloped so that rain water does not accumulate over the deck slab. The slope shall be 1 : 120 (min.). The slope shall be provided with screed concrete of grade M-15 (minimum) as per IS : 456.. Fan Deck slab and all other over ground platforms shall be provided with FRP handrailing. Suitable arrangement for drainage of rain water to be provided. However, there is no specific requirement of Rain Water down comers.
- c) Cells, Distribution System and Stack (applicable in case of RCC cooling tower)**
Cooling tower cells shall consist of RCC columns, beams and walls. The spacing of columns shall be minimum 4000 mm c/c. Inclined bracings shall not be provided between the columns. Hot water distribution channel shall also be of RCC. Cell division partition walls shall be of precast solid concrete blocks with provision of pilasters for walls, if required. The peripheral wall shall be Cast-in-Situ RCC wall and shall have two layers of reinforcement on either faces in both directions with minimum dia of reinforcement bars as 8 mm and maximum spacing as 150 mm c/c. Minimum thickness of Cast-in-Situ RCC peripheral walls shall be 200 mm.

Hot water channel shall be covered with suitably designed precast / cast - in - situ concrete slab. Wherever flow control valves are located over hot water basin, these shall be placed over precast concrete covers / concrete slab and designed for specified load. The minimum thickness of RCC fan stack shall be 150 mm. The fanstack shall have two layers of reinforcement on either faces in both directions with minimum dia of reinforcement bars as 8mm and maximum spacing as 200mm c/c.
- d) Stairs**
RCC staircase for approach to fan deck for each cooling tower shall be provided. The stairs shall have 1000 mm clear width and FRP hand railing. The riser shall be maximum 175 mm & treads 250 mm (minimum). Edge protection angle (min 35X35X6, made of aluminum) shall be provided to the treads with the lugs.
- e) Steel Structures**
All mild steel parts of structures used in cooling towers shall be hot dip galvanized or seal spray zinc coated as per BS:5493 (for a very long period of maintenance of more than 20 years). The minimum coating for galvanization shall be 610 gm/sq.m and shall comply with relevant IS Codes. Galvanizing shall be checked and tested in accordance with IS: 2629. All welding shall be done before galvanizing. Any site joints required to be carried out after galvanizing shall be either flanged or screwed joints. Nails, nuts, bolts and all components coming in direct contact with water shall be of stainless steel of SS 316.
- f) Water proofing of structures and construction joints**
For water proofing of underground structures including basin slab and hot water distribution channel, water proofing cum plasticizer compound shall be mixed with the concrete. In addition Chemical injection treatment shall be provided for the construction joints of all underground structures.

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g) Expansion Joints

PVC sealing strips shall be used for all expansion joints where water is retained. The minimum thickness of PVC sealing strip will be 6 mm (minimum) and minimum width 225 mm. The expansion joint shall be as per IS: 3370. At expansion joints, joints filler material with sealing compound on both sides shall be provided throughout the length of the joint.

h) Grade of concrete

All RCC associated with induced draught cooling towers including switchgear and control room, unless specified otherwise, shall be design mix (controlled) concrete of grade M 30 of IS: 456. Water - cement ratio shall not exceed 0.45.

Minimum 75 mm thick PCC of grade M-7.5 as per IS: 456 shall be provided as mud mat below foundation unless specified otherwise. The PCC shall extend 75 mm beyond the outer edge of structural concrete.

For water retaining structure minimum 100 mm thick PCC of grade M-10 as per IS:456 shall be provided as mud mat below the bottom slab / raft. The PCC shall extend 100 mm beyond the outer edge of the structural concrete.

i) Form-Work

Plywood Form-work shall be used for basin, basin walls, outlet channel and super structures.

j) Doors (applicable in case of RCC cooling tower)

FRP door shall be provided in each fan stack at fan deck level. Door height & width as per requirement for equipment movement (clear) shall be provided. However, door size shall be minimum 2100 mm high (clear) & 1200 mm wide (clear). Door shall have locking facility.

k) Coating

All concrete surfaces in direct contact with water/ water spray/moist air shall be applied with Moisture Compatible Corrosion Resistant Coating System or its equivalent as specified in Annexure-G. All concrete surfaces subject to water/ water spray/moist air upto and including Fan Deck slab level including basin slab, inner faces of peripheral walls, all faces of cell partition wall, all faces of columns, all faces of beams (both cast in situ and precast), bottom surface of fan deck slab for counter flow tower and both surface of fandeck slab for cross flow tower, inner face of fanstack, all faces of hot water basin (for cross flow tower), etc as applicable shall receive the said coating after cleaning and drying of the concrete surface. The detailed specification of the coating system on concrete surfaces is given in Annexure-G.

External surfaces of Cooling tower peripheral walls and fanstack shall be painted with two or more coats of waterproof cement paint of approved shade, make and color.

l) Paving

Paving shall be provided for a minimum clear width of 5.0 m from the outer face of the HW pipes all around the cooling tower basin. Paving shall also be provided in between the hot water pipes and space available between HW pipes and CT basin wall spray catcher. The minimum total width of paving around CT basin shall be atleast 8.5 m from outer edge of the spray catcher or basin wall. Paving shall consist of reinforced concrete base slab laid over 75 mm thick PCC of grade M-10 as per IS:456 sub-base and 200 mm thick stone soling. The sub-base shall be laid on the compacted and suitably prepared sub-grade. The degree of compaction of sub-grade shall be as specified elsewhere in the specification. The thickness of the RCC base slab of grade M - 25 shall be suitably designed considering a superimposed load intensity of 5T /

TECHNICAL REQUIREMENTS



Sq.m. However the minimum thickness of base slab shall be not less than 150 mm having double layered reinforcement in both directions both top and bottom. The maximum spacing of the reinforcement bars shall be 150mm c/c and minimum dia of reinforcement bars shall be 8mm.

RCC peripheral drain of minimum cross sectional dimensions 300mm X 300mm to dispose storm water shall be provided around area paving and shall be connected to nearest Owner's storm water drain.

RCC paving all around cooling towers shall be connected to the existing road so as to provide approach to both cooling towers and switchgear & control room building as indicated in tender drawing. The clear width of this approach road shall be 5.5M and top of approach road shall be 350 mm above FGL.

m) Walkways

Permanent walkways at least 1000mm clear width shall be provided at hot water distribution level and at drift eliminator level for counter flow type cooling towers. The clear working height available above these walkways shall be at least 2.0 meters. The walkway and its supporting structure shall be of RCC M - 30 grade. Suitable RCC guards rails 300 mm high shall also be provided on both sides of these walkways. Over the guard rails FRP hand railing shall be provided. The vertical post of handrail shall be 700 mm high and at an interval of 1500mm c/c. There shall be two levels of horizontal pipes for hand railing spaced equally in vertical plane.

Permanent walkways at least 1000 mm clear width shall also be provided for access to fan and around gear box with FRP gratings of clear opening size not more than 50 MM x 50 mm and grating thickness of 50 mm on RCC supports at fan deck Level.

05.17.00.02 Design Criteria

R.C.C. Structures

(a) The design of all liquid retaining/conveying structures like of cooling tower like C.W. basin, sump, hot water distribution channel/basin, sludge drain and pits shall be designed by working stress method as outlined in Clause 4.5 of IS 3370 (Part 2) : 2009. These structures shall be designed for following conditions :-

1. Water filled inside upto the designed level and no earth outside.
2. Earth pressure plus 2.0 T / M² surcharge (Vertical direction) plus ground water table at Finished Graded ground Level (FGL) outside and no water inside.

(b) The design of all structures other than liquid retaining/conveying structures of cooling tower above CW basin slab such as columns, beams, fins, walkways, slabs, cladding/partition wall, fan stack, precast beams etc. as applicable shall be carried out by limit state method as outlined in Clause 4.4 of IS: 3370 (Part 2): 2009. Further, for limiting the crack width, the stress for the reinforcement steel shall be limited to 130 MPa (on all faces) as per clause 4.4.3.1 of IS: 3370 (Part 2): 2009 using the partial safety factor for serviceability condition as per clause 4.4.1.3.

Wherever, the foundation raft of cooling tower is same as CW basin slab, the foundation shall be designed by working stress method as outlined in Clause 4.5 of IS 3370 (Part 2): 2009 (all faces). However, if the cooling tower foundation is not the same as the CW basin slab and a separate foundation for the cooling tower is provided below the CW basin slab due to founding level requirements, the basin slab shall be designed as a structural slab resting on grid of beams taking support from columns or as a flat slab taking support from columns. Arrangement with providing walls between the columns and the periphery to support the structural basin slab is not permitted. The CW basin slab (both faces, including beams at CW basin slab level) shall be designed as structural

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slab by working stress method as outlined in Clause 4.5 of IS 3370 (Part 2): 2009 and the structures below CW basin slab shall be designed as per IS:456 (2000). However, the size of the column below CW basin slab upto foundation shall be maintained same as the size of the columns just above CW basin slab.

- (c) The design of staircase, switchgear building, control room/RIO room, transformer and trestle foundation, storm water drain shall be as per IS: 456 (2000).
- (d) The Cold Water basin shall be checked against uplift for basin empty condition with ground water table at FGL. Stability against uplift shall be ensured both for construction & operating stage with no water inside. The provision of flap valve / pressure release valves is not permitted. The factor of safety against uplift shall be as per IS: 3370.
- (e) Fan deck shall also be designed for rolling loads due to movement of equipment during Installation / maintenance operation.

Minimum Clear cover for all RCC structures/elements of cooling towers to meet durability requirements shall conform to severe exposure condition as per IS: 456 (2000).

Fan Supporting Structures (applicable in case of RCC cooling tower)

Static Analysis & Design

The following load conditions and load combinations shall be considered for the design of the Fan supporting structures.

- (a) Machine Load
- (b) Load case (a) + unbalance load for the balance of the fan corresponding to G16 as per ISO 1940-1: 2003
- (c) Load case (a) + unbalance load corresponding to one blade failure load condition.

The strength design of the Fan supporting structure shall be done for worst loading combinations as stated above.

Dynamic Analysis

- (a) Free vibration analysis

A free vibration analysis of the fan supporting structure including the intermediate supporting structure for motor, gear box and pillow block (if applicable) shall be carried out to calculate the natural frequency of the fan supporting structure and its fundamental natural frequency shall be at least + 20% away from the operating speed of the fan and motor.

- (b) Forced vibration analysis

Forced response analysis shall be carried out on the fan supporting structure including the intermediate structure supporting the motor, gear box and pillow block to calculate the vibration amplitudes for the following unbalance condition: -

1. For unbalance load corresponding to G16 as per ISO 1940-1: 2003
2. For unbalance load corresponding to one blade failure condition.

The amplitude derived shall be within the permissible values as specified by the fan manufacturer or IS: 2974 (Part - IV), whichever is more stringent.

Mid Bearing Supporting Structure

The intermediate supporting structure for motor, gear box and pillow block if provided shall be so arranged that it does not cause any torsional moments on the beams / pedestals on which the intermediate support rests. The intermediate supporting structure shall be

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orthogonal to the grid of beams on which it rests. The motor shall be supported on a base frame. The concrete block supporting the fan/gear reducer shall be connected to immediate lower level of beam column junctions by means of at least four diagonal columns.

Fan Stack

The fan stack shall be made of RCC with minimum 150 mm thickness. With reinforcement provided on both faces in either direction. Design of the fan stack shall be made on the basis of relevant stipulations of IS : 11504 for Natural Draught Cooling Towers. The fanstack shall have two layers of reinforcement on either surfaces in both directions with minimum dia of reinforcement bars as 10mm and maximum spacing as 150mm c/c.

Steel Structure

These structures shall be designed, fabricated and erected as per IS: 800 (latest revision).

All mild steel parts or structural steel works used in the cooling towers shall be hot dip - galvanised as per IS: 4759 with 610gm/sq.m. coating or seal spray zinc coated as per BS:5493 (for a very long period of maintenance of more than 20 years). Nails and all components coming in direct contact with water shall be of stainless steel of SS 316 or equivalent.

For all steel structures, other than hot water pipes, sludge pipes and hot water distribution pipes, which are outside cooling tower painting shall be as specified in corrosion protection clause. However, for painting of hot water pipes, sludge pipes and hot water distribution pipes, relevant clause for painting specified elsewhere in the technical specification shall be referred.

The minimum cement content as specified in subsequent clauses of this specification shall be applicable for all structures of cooling towers.

Test for water tightness

The water tightness of C.W. basin, outlet channel, CW channel and all other water retaining structures shall be tested for water tightness as per the provisions of IS : 3370.

5.17.00.03

Stoplog gates and Trash racks for Cooling Tower

Stoplog gate and trash rack/screen shall be provided in the outlet channel of each cooling tower. The design criteria and material specification for Stoplog gates and Trash racks shall be as specified for Circulating Water Pump House.

5.18.00

CW SYSTEM, RAW WATER SYSTEM CIVIL WORKS

5.18.01

Circulating Water Pump House (CWPH), Raw Water Pump House (RWPH)

5.18.01.01

A circulating water pump house (CWPH) for housing circulating water pumps and Raw water pump house (RWPH) for housing raw water pumps shall be provided. Separate bays shall be provided for each pump by providing intermediate dividing piers of RCC between the pumps.

- a) The pump houses shall be provided with minimum two sets of stop-logs for each opening sizes along with electrically operated hoisting arrangements. Steel embedments required for stop-logs shall be provided for all the bays.
- b) All bays of pump houses shall be provided with a removable trash rack including electrically operated hoisting arrangements and cleaning arrangements. Moreover, one spare trash rack for each opening sizes shall

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	<h2 style="text-align: center;">TECHNICAL REQUIREMENTS</h2>			
<p>5.18.01.02</p> <p>5.18.01.03</p> <p>5.18.01.04</p>	<p>also be supplied. Steel embedments required for trash-racks shall be provided for all the bays.</p> <p>c) Stop-logs, trash-racks and hoists shall be supplied in accordance with the specifications covered elsewhere.</p> <p>d) The steel structure shall be provided to carry EOT crane of the CW and Raw Water pump houses. The over ground portion of Raw Water Pump House and CWPH including maintenance bay shall be framed structure of structural steel work with permanently colour coated metal sheeting at roof and side open. However 4m high steel sheet side cladding shall be provided at the top under the roof for protection against rain. At the ground level, brick cladding of 0.9m height above the finished floor level, plastered on both sides shall be provided for all pump houses.</p> <p>e) The pump house including its forebay shall be of RCC with M-30 grade of concrete conforming to IS 456. The CWPH pump house shall be structurally separated from forebay by providing an expansion joint. The pump house shall be provided with separate maintenance bay</p> <p>f) For Raw Water Pump House (RWPH), connection shall be provided to meet the flow requirement with all necessary arrangement & precautions. Further, associated structure for & including supply of valves/gates are also to be provided for isolation of the connection.</p> <p>Each pump house shall be provided with a separate maintenance bay for maintenance of various equipment. Length of maintenance bay shall be adequate for one pump maintenance or minimum dimension indicated in the tender drawing, whichever is higher. Hand-rail with 32 NB (medium) pipes shall be provided around the operating floor on the forebay side in the stoplog and trash rack area.</p> <p>Sump model study for CWPH</p> <p>Sump model study for circulating water pump house shall be carried out as specified elsewhere in the specification.</p> <p>Design requirement for CWPH, RWPH</p> <p>Design of substructure shall be divided into two parts, namely,</p> <p>(a) Stability analysis, and</p> <p>(b) Structural analysis and design.</p> <p>For the design of substructure, a surcharge load of 2.0 T / Sq.m shall be assumed at the finished ground level for nearby vehicular movement.</p> <p>(a) Stability Analysis</p> <p>The Pump House sub structure shall be analyzed and designed for following load combinations: -</p> <ol style="list-style-type: none"> 1. Under Operation Stages <p>Maximum load from super structure + equipment load + load from sub structure + no water in the pump chambers + earth pressure at rest from outside with surcharge and maximum ground water pressure.</p> 2. Condition (1) + earthquake/ wind 3. Under Construction Stages <p>No load from super structure and deck slab, load from sub structure with no water in the pump chambers, pump units not installed, earth pressure at rest from sides with surcharge and maximum ground water pressure.</p> 	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT</p>	<p>PAGE 51 OF 86</p>
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT</p>	<p>PAGE 51 OF 86</p>	

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4. Condition (3) + earthquake

Following stability checks will be made for the above load combinations:

i) Check for overturning

Factor of safety against overturning, i.e, the ratio of stabilizing moment to overturning moment shall be as per IS: 456.

For the above condition, uplift due to maximum Ground water table (GWT) acting on the base slab and side pressures on the walls due to earth and ground water shall be considered as destabilizing forces. In order to have no tension condition at tip of the base slab, resultant of all the forces acting on the pump house under different conditions of loading as listed above shall fall within middle one third of the base width provided. Maximum compressive stress at other end of the base slab shall be within the safe bearing capacity of soil / rock.

Under earthquake condition, resultant of all the forces including earthquake force shall fall within middle three fourth of the base width provided. An increase of 25% shall be allowed in the safe bearing capacity of soil when earthquake forces are considered.

ii) Check for Sliding

Factor of safety against sliding under static condition, i.e. ratio of horizontal frictional resistance to horizontal sliding force shall be as per IS:456. For this condition, earth pressure at rest and the maximum GWT pressure from sides shall be taken as de - stabilizing forces. Keys shall be provided, if found necessary, to increase the factor of safety against sliding.

To ensure an adequate factor of safety under earthquake condition, the factor of safety against sliding shall not be less than 1.2.

iii) Check for Uplift

Right from construction to operating stage, minimum factor of safety against uplift due to ground water shall be 1.2. Installation of pressure release valves shall not be permitted in the base slab (raft) of the pump houses to counter the uplift due to ground water.

(b) Structural Analysis

1) Base Slab

Base slab of the pump houses shall be designed as a raft foundation supported at locations of piers. Following load cases shall be considered:

- i. Maximum water level in the sumps with maximum GWT.
- ii. No water in the sumps and maximum GWT.
- iii. Alternate bays of sumps filled with water with maximum GWT.
- iv. Same as in (iii) above but with minimum water level.

2) Intermediate Piers

Intermediate piers shall be designed by working stress method as per IS: 456 (latest), with limiting crack width of 0.2mm for the worst combination of maximum water pressure on one side and no water in the adjacent sump. These shall be designed as RC walls fixed at base and supported (hinged) at top by the deck slab. Since a breast wall may be provided for stop logs and back wall is provided connecting all the piers at the rear end, additional restraints for the pier due to breast walls and back wall may also be accounted for.

Intermediate piers are also to be checked for the combined action of direct load due to

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superstructure and bending due to water pressure from one side.

3) End Piers

Design of end piers will be similar to the intermediate piers. The end piers shall be designed for the following conditions:

- I. Soil pressure + maximum GWT + surcharge of 2 Ton / Sq.m. at FGL from outside or design surcharge load at floor level with no water in the sumps.
- II. Only maximum water level in the sump.

End piers shall be designed by working stress method as per IS: 456 (latest), with limited crack width of 0.2mm on water face and the outside, i.e., earth side shall be designed as cracked section as per IS : 456. Since end piers are fixed at base and supported (hinged) at top by deck slab, there will be negligible yielding of the wall at top. This will give rise to earth pressure at rest and therefore an earth pressure at rest, $K_0 = (1 - \sin \phi)$ is considered where ϕ = angle of internal friction of soil.

End piers shall also be checked for the combined action of direct load due to super structure and bending due to earth pressure with surcharge and ground water pressure.

4) Back Wall

Back walls shall be designed as fixed at bottom of the base slab and on two vertical sides by the piers and supported at top by the deck slab. Since back walls are also of the unyielding type, earth pressure at rest, K_0 , shall be considered for design.

Back walls shall be designed by working stress method as per IS: 456, with crack width limited to 0.2 mm on water face and as cracked section on outer face as cracked section as per IS : 456.

Following load combinations shall be considered:

- i. Soil pressure + maximum GWT + surcharge of 2 T / sq.m. at FGL from outside with no water inside the sump.
- ii. Only maximum water level inside the sump.

5) Operating Floor Slab

Operating floor slab or deck slab shall be designed for loads of the pumps and other equipment, which may be placed on it. A live load of 1.5 ton / Sq.m. shall be considered on the deck slab. The deck / slab shall have monolithic construction with the piers and shall be designed as a continuous RC slab supported on piers. Design of bottom face shall be by working stress method as per IS: 456, with crack width limited to be 0.2 mm. Floor slab of maintenance bay may be designed as slabs on grade. A live load of 3 T / Sq. m. may be considered for the maintenance bay floor slab. Dynamic analysis shall be carried out to ensure proper separation of natural frequency of the structure and pump operating frequency

5.18.01.05

C.W. Ducts

CW ducts shall be concrete encased steel lined ducts. The concrete encasement shall be of minimum 500mm thick with square shape outside. Generally, M20 grade PCC encasement shall be provided. At locations of duct crossing road, rail in transformer yard or any other facility, RCC encasement of grade M25 shall be provided. Minimum two layers of reinforcement (On both faces) of 12 mm diameter bars @ 200 mm c/c shall be provided for RCC encasement of CW Duct. Top of CW duct encasement shall be minimum 1.5 m below finished ground level.

The minimum thickness of steel pipes shall be as follows including corrosion tolerance of 2 mm:

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- | | | | |
|----|---|---|-------|
| a. | For pipes above 1800 mm upto and including 2300 mm dia. | - | 12 mm |
| b. | For pipes above 2300 mm upto and including 3200 mm dia. | - | 14 mm |
| c. | For pipes above 3200 mm upto and including 3750 mm dia. | - | 16 mm |
| d. | For pipes above 3750 mm upto and including 4000 mm dia. | - | 20 mm |

However, for ducts running below rail line in transformer yard/road, minimum thickness of CW liner shall be 20 mm.

Suitable tap-offs shall be provided in the duct to connect CW blow down, ACW tapping etc. Based on the transient analysis, sufficient number of stub connection shall be provided in the duct to fix air release valves.

All duct installation & jointing shall be strictly in accordance with the stipulation given elsewhere in the specification for structural steel work. All the joints of liners shall be butt welded joints. The circular deformation of liner shall be less than 1% of diameter of liner while handling, transportation, erection & construction. If required, temporary bracings may be provided, during handling, transportation & concreting to reduce the deformation.

The completed duct shall be tested for water tightness, for the pressure equal to twice the working pressure or 1.5 times the design pressure whichever is higher and shall be generally water tight to Engineer's satisfaction. The testing pressure shall be held for minimum period of 30 minutes without any signs of leakage or failure of weld. Any in flow / leakage of water from the duct shall be sealed / repaired at Contractor's cost. However, tests in part of length of duct may be permitted with prior approval only.

Wherever required anchor / thrust blocks shall be provided with RCC M25 grade concrete. Suitable RCC chambers shall be provided with precast covers to install flow measurement devices and valves in the duct.

Manholes of minimum 1000mm clear opening shall be provided in each CW duct at a spacing of 200M (approx.) to facilitate maintenance / dewatering of CW ducts. At least one manhole shall be provided at the deepest point for both intake & discharge duct.

Following shall be considered for design of C.W. ducts:

- | | |
|----|--|
| a. | Maximum design water pressure |
| b. | Surge or water hammer pressure of 5.0 Kg / Sq.cm. |
| c. | Expected vacuum conditions as arrived from transient analysis |
| d. | Soil overburden |
| e. | Surcharge Pressure of 2T/Sq.m |
| f. | The effect of concrete encasement shall not be considered in the design of CW duct |

Painting as per Cl. 6.04.03 shall be carried out on machined faces, flanges and external exposed surfaces of CW ducts. For external surfaces of CW ducts encased in concrete, painting shall be as specified in Cl. 6.04.02(a).

5.18.01.06

CW Channel

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The channel shall be of RCC section with vertical wall projecting minimum 300mm above finished ground level. Hand rails with 32 NB (medium) pipe shall be provided on both walls of the channel where height of channel wall is less than 1200 mm above finished ground level.

The channel shall be designed to carry the required discharge with minimum water level in cooling tower basin and considering minimum value of rugosity coefficient (n) of 0.018 for concrete surface. However, the maximum velocity in CW channel shall be restricted to 1.8m/sec.

The channel shall be designed by working stress method with crack width limited to 0.2 mm on water face and as cracked section on outer face as per IS: 456 considering (i) no water inside the channel, with earth pressure of soil upto FGL, ground water table upto FGL and surcharge load of 2.0 ton / Sq.m from outside, and (ii) with water inside the channel upto maximum level in the forebay / channel and no earth pressure, ground water pressure and surcharge load from outside. Right from construction to operating stage, minimum factor of safety against uplift due to ground water shall be 1.2. The channel shall be checked against uplift due to 50% of the total water head considering ground water table upto FGL. In addition pressure relief valves with under drainage arrangement in the channel shall be provided to prevent uplift of the channel as per relevant IS Codes. Minimum wall thickness shall be 250 mm.

Forebay Structure

Forebay consists of retaining wall and forebay slab. The walls shall be analysed as a retaining wall for stability against overturning and sliding, similar to end piers of the pump house. Pressure relief valves and under drainage arrangements shall be provided below the forebay slab to prevent uplift of the forebay slab. Size and spacing of pressure relief valves shall be designed by the Bidder to take care of the uplift due to ground water table. However, centre to centre spacing of PRV shall not exceed 5000mm. The forebay slab shall be designed against uplift due to 50% of the total water head considering ground water table upto FGL. The forebay slab shall be minimum 250 mm thick. The forebay slab shall be structurally separated from the retaining walls and water stops shall be provided at the junction of slab and retaining wall. Minimum thickness of retaining wall at top shall be 250 mm. Hand rails with 32NB (medium) pipe shall be provided on both walls of the forebay.

5.18.01.07

DELETED.

5.18.01.08

Stop-logs and Trash Racks for CWPH, RWPH

5.18.01.08.01

Stop-log gates

Clear size of the stop logs shall be equal to the clear opening size of water inlet opening below breast wall. Number of segments of the stop log shall be decided to match the capacity of the electrically operated monorail hoist provided to handle it. Structural design of stop log shall conform to IS: 5620 and IS: 4622. Maximum water level for designing the stop logs shall be taken as maximum water level of the forebay. Top and bottom unit of stop log gates shall be designed for their respective water head, whereas the remaining interchangeable units shall be designed for the water head corresponding to the lower most interchangeable unit. The stop logs shall be operated under balanced water head and they are not to be designed for operating under flowing water. Filling valves shall be provided in the stop logs to balance the water pressure before lifting the stop log. These stop logs are used only during maintenance / inspection of pumps. The stop logs shall be operated by means of an electrically operated hoist. Suitable lifting beam shall be provided to operate the stop logs.

5.18.01.08.02

Trash Racks

Bar screen trash rack is to be provided at inlet of the sump of the pump house in order to prevent ingress of timber & other floating particles which could damage the Pumps.

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Each bay of pump sump shall be provided with Type - 1 trash rack (removable section rack), conforming to IS: 11388. Centre to centre spacing of trash rack bars shall be 100mm (max). The trash racks shall be provided with number of interchangeable segments, to facilitate easier handling by means of a lifting beam and electrically operated hoist. Trash rack bars shall be designed for a differential water head of 2.0m. and other structural members shall be designed for a differential water head of 1.0m. Minimum thickness of trash rack bars shall be 10mm. Suitable size of horizontal members and end members shall be provided as per design requirements, for efficient operation of trash rack.

All trash racks should be capable of being lowered in the associated stop log groove to enable drawal of clean water while a particular trash rack is raised for cleaning purpose.

Suitable arrangement for storing all the stop logs and stand by trash rack shall be provided by the Bidder, to keep them in good working condition.

5.18.01.08.03 Lifting Beams

Separate lifting beams (automatic) shall be designed & fabricated with guide shoes, hooks, links and counter weights etc. complete for automatic operation to engage and disengage the stop logs and trash racks in the required position.

5.18.01.08.04 Leakage Tests of Stop logs

Leakage tests shall be carried out with the stop logs lowered onto the sill. Before observation for leakage, the stop log shall be raised and lowered about one meter several times in order to dislodge any debris that might have lodged in the side and bottom seals, The leakage shall then be measured and it should not be more than 5 litres / minute / meter of length of seal under maximum head.

5.18.01.08.05 Material Specifications of Stop logs & Trash racks

All material used in the fabrication of stop log or trash rack shall be of high grade, free from defects and imperfections and shall be of the highest standard commercial quality suitable for the intended use. Radiographic examination or magnetic particle testing or other comparable tests shall be carried out for determining the soundness of steel castings and shall be conducted by the Bidder, if asked for by the Employer.

5.18.01.08.06 Materials for the various components of Stop logs

Sl. No.	Component Parts	Recommended materials	Reference
1.	Stop log Leaf	Structural steel	IS 2062
2.	Stop log Frames, 1 st stage embedded parts and structural steel members	Structural steel	IS 2062
3.	2nd stage embedment	Stainless steel	SS316L or IS:1570 (part-5)
4.	Wheels (the hardness of wheel track surface shall be kept 50 points higher than that of wheel tread)	Cast steel	IS : 1030
5.	Wheel axles, wheel track	Corrosion resistant steel.	IS 1570
6.	Seals	Rubber	IS 11855

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<p>5.18.01.08.07</p>	<table border="1"> <thead> <tr> <th>SI. No.</th> <th>Component Parts</th> <th>Recommended materials</th> <th>Reference</th> </tr> </thead> <tbody> <tr> <td>7.</td> <td>Bearings</td> <td>SKF or equivalent</td> <td>04Cr19Ni</td> </tr> <tr> <td>8.</td> <td>Seal seats</td> <td>Stainless steel</td> <td>SS316L or IS 1570 (part-5)</td> </tr> <tr> <td>9.</td> <td>Lifting pin</td> <td>Stainless steel</td> <td>SS316L or IS 1570 (part-5)</td> </tr> <tr> <td>10.</td> <td>Guide</td> <td>Corrosion resistant steel</td> <td>IS 6603</td> </tr> <tr> <td>11.</td> <td>Guide shoe</td> <td>Structural steel</td> <td>IS 2062</td> </tr> </tbody> </table>	SI. No.	Component Parts	Recommended materials	Reference	7.	Bearings	SKF or equivalent	04Cr19Ni	8.	Seal seats	Stainless steel	SS316L or IS 1570 (part-5)	9.	Lifting pin	Stainless steel	SS316L or IS 1570 (part-5)	10.	Guide	Corrosion resistant steel	IS 6603	11.	Guide shoe	Structural steel	IS 2062			
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<p>Materials for various components of Trash Rack:</p> <table border="1"> <thead> <tr> <th>SI. No.</th> <th>Component Parts</th> <th>Recommended</th> <th>Reference Materials</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Trash rack and 1st stage embedded parts</td> <td>Structural steel</td> <td>IS 2062</td> </tr> <tr> <td>2.</td> <td>2nd stage embedment</td> <td>Stainless steel</td> <td>SS 316L or IS 1570 (Part-5)</td> </tr> <tr> <td>3.</td> <td>Slide Block</td> <td>Structural steel with bronze padding</td> <td>IS 2062 & IS 305</td> </tr> <tr> <td>4.</td> <td>Track base</td> <td>Stainless steel</td> <td>SS 316L or IS 1570 (Part-5)</td> </tr> <tr> <td>5.</td> <td>Track</td> <td>Stainless steel</td> <td>SS 316L or IS 1570 (Part-5)</td> </tr> <tr> <td>6.</td> <td>Guides</td> <td>Corrosion resistant steel.</td> <td>IS 6603</td> </tr> </tbody> </table>	SI. No.	Component Parts	Recommended	Reference Materials	1.	Trash rack and 1st stage embedded parts	Structural steel	IS 2062	2.	2nd stage embedment	Stainless steel	SS 316L or IS 1570 (Part-5)	3.	Slide Block	Structural steel with bronze padding	IS 2062 & IS 305	4.	Track base	Stainless steel	SS 316L or IS 1570 (Part-5)	5.	Track	Stainless steel	SS 316L or IS 1570 (Part-5)	6.	Guides	Corrosion resistant steel.	IS 6603
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<p>5.18.01.08.08</p>	<p>Painting Specification for Structural Steel parts for Stoplog Gates and Trash Racks</p> <p>(i) All structural steel surfaces shall be cleaned by shot blasting.</p> <p>(ii) All MS structural parts shall be galvanised to minimum coating of Sealed Zinc spray (250 Micron) as per BS 5493.</p> <p>(iii) Over zinc coating one coat of zinc Phosphate Epoxy primer having minimum 30 micron DFT and three coats of coal tar Epoxy paint having minimum 75 micron DFT / coat shall be provided. Total DFT of epoxy paint including primer shall be minimum 250 microns.</p>																											
<p>5.18.01.09</p>	<p>CONSTRUCTION REQUIREMENT AND ACCESS TO WORK AREAS</p> <p>Contractor shall notify to the Engineer before start of work well in advance about the method of construction for crossing road, pipeline, cable, railway, canals, utility lines and other existing obstacles.</p> <p>Contractor shall not commence work on such crossings before having obtained approval from the authorities and land owners concerned to the satisfaction of the Engineer. The work at crossings shall meet at all times requirements and conditions of the permit issued by the authorities concerned. In the absence of any specific requirements by authorities, Bidder shall comply with Engineers' instructions.</p>																											
<p align="center">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p align="center">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p align="center">SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT</p>	<p align="center">PAGE 57 OF 86</p>																									

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5.18.01.10	<p>Where the work areas come within the area of influence of high voltage electrical installations, contractor shall propose and provide adequate safety measures for all personnel working. He shall obtain necessary permission/permit from the concern authority. No work is allowed in such areas without Engineer's prior approval.</p> <p>Switch Gear / Control Room/ Remote IO room for CWPH, RWPH and MUWPH</p> <p>It shall be single storied building, framed RCC structure with beams, columns, floor and roof. It shall have non-load bearing brick wall cladding. It shall house the switch gear and MCC of respective Pump house & associated cable trenches. The architectural features shall be as specified elsewhere in the specification.</p> <p>Bio Toilet shall be opted for make up water facility area outside the plant boundary. Specifications of same shall be as mentioned elsewhere in technical specifications.</p>		
5.18.02.00	DELETED		
5.19.00	WATER TREATMENT PLANT-DM Plant, PT Plant, ETP and CW Chemical Treatment Civil Works, CSSP etc		
5.19.01.00	<p>Design Concepts for Buildings/ Shed</p> <ol style="list-style-type: none"> i. All buildings shall have framed super structure. ii. Equipment/facilities with shed shall have structural steel superstructure with permanently colour coated metal sheeting at roof and side open. However, kerb wall shall be provided all around the plinth/ floor area above the Finished Floor Level (FFL). For other buildings brick wall cladding on exterior face shall be provided. iii. Unless specified, the wall cladding for buildings shall be with minimum one brick thick on exterior face. However, brick wall for buildings adjacent to transformers shall be minimum 345mm thick. 		
5.19.01.02	Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.		
5.19.01.03	The load and load combinations and design criteria shall be as specified elsewhere in the specification.		
5.19.01.04	<p>All liquid retaining structures shall be designed for following load conditions.</p> <p>Underground structures:</p> <ol style="list-style-type: none"> a. Water filled inside up to design level and no earth outside. b. Earth pressure with surcharge of 2.0 T/m² and ground water table up to FGL outside and no water inside. c. Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure. d. The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table. <p>For design of over - ground liquid retaining structures appropriate load cases shall be considered.</p>		
5.19.01.05	All liquid retaining and conveying structures shall be designed by working stress method as given in clause 4.5 of IS 3370(Part2):2009.		
5.19.01.06	In the wall of liquid retaining structures with cylindrical shape such as clarifiers, vertical reinforcement shall be checked assuming the walls were fully fixed at the base, and the		
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- horizontal reinforcement shall be provided to resist horizontal (hoop) tension assuming hinged condition at the junction of the base slab & wall.
- 5.19.01.07** Wherever sandwich slabs are provided in liquid retaining structures to take care of stability against uplift, only well graded sand of approved quality shall be used as fill material. The sand compaction shall be done with plate / disc compactors in such a manner that the bottom slab is not structurally damaged.
- 5.19.01.08** Clear free board of at least 300 mm above design (total) water level shall be provided in all liquid retaining / conveying structures.
- 5.19.01.09** Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.
- 5.19.01.10** The minimum grade of concrete for all RCC structures associated with DM plant, PT plant, ETP and CW chemical treatment and CSSP shall be of grade M30. The minimum concrete clear cover to reinforcement bars in all RCC structures shall be as per IS:456(2000) and IS:3370(Part II) for water retaining structures. Durability of concrete shall conform to moderate exposure conditions as per Table-3 of IS 456 except noted specifically otherwise.
- 5.19.01.11** Factor of safety against overturning and sliding
The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.
- 5.19.01.12** For detailing of Reinforcement IS 5525, IS 13920, IS 4326 and SP 34 shall be followed.
- 5.19.01.13** Two layers of reinforcement (on both faces) shall be provided for RCC sections having thickness of 150 mm and above.
- 5.19.01.14** Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows:
- | Sl. No. | Structural Element | Main Reinforcement | Distribution Reinforcement / Stirrups/ ties/ Anchor Bars |
|---------|--------------------|--------------------|--|
| a) | Foundation | 12 mm | 12 mm |
| b) | Beams | 12 mm | 8 mm |
| c) | Columns | 12 mm | 8mm |
- 5.19.01.15** Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.
- 5.19.01.16** Suitable shrinkage reinforcement shall be provided at top face of foundations. Minimum shrinkage reinforcement shall be 10 mm dia. @ 200mm c / c.
- 5.19.01.17** Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area distributed equally over top and bottom faces.
- 5.19.01.18** Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.
- 5.19.01.19** Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.

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<p>5.19.01.20</p> <p>5.19.01.21</p> <p>5.19.01.22</p> <p>5.19.01.23</p> <p>5.19.02.00</p> <p>5.19.02.01</p>	<p>Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm. Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.</p> <p>All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter. Edge protection angles shall be provided as specified elsewhere.</p> <p>All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.</p> <p>2.0m wide walkway with concrete paving shall be provided connecting all structures, buildings and facilities. The top of walkway shall be minimum 200mm above FGL.</p> <p>Architectural Concepts and Finishing Schedule</p> <p>Architectural concepts and finishing schedule shall be as specified elsewhere in architectural specification.</p> <p>Acid / Alkali Resistant Treatment:</p> <p>Acid / alkali resistant lining treatment shall be provided in different areas as follows:</p> <p>Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick A.R. bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable pilasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification.</p> <p>The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R.bricks layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted.</p> <p>The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).</p> <p>Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 1.0M high with above treatment shall also be provided if applicable in case of walls nearby.</p> <p>Alum/Lime Storage area and first floor of Chemical House : One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing.</p> <p>Alum solution preparation tank: The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing.</p> <p>The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer.</p> <p>Basket of Alum Solution Preparation tank: 5mm thick epoxy lining over a coat of epoxy primer.</p> <p>Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks.</p>		
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Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.

Lime tank: Two coats of bitumen paint conforming to IS : 9862, with total DFT 150 microns.

Guarantee

The Contractor shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later.

The Contractor shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.

5.19.02.02 DM Tank Foundation**5.19.02.02.01 General Requirements**

The tank foundation shall be as per IS:803 and as specified in relevent clause of foundation chapter.

5.19.02.02.02 Sub Grade Preparation

The surface of natural soil shall be thoroughly compacted by rolling or other means, as directed by Engineer, to obtain 95% of max. laboratory dry density for the soil, as per IS:2720 (Part-VII).

5.19.02.02.03 Anti Corrosive Layer

Anti-corrosive layer shall consist of dscreened coarse sand, mixed with 80/100 bitumen or equivalent 8% to 10% by volume.

Bitumen shall be heated to a temperature 175⁰ C to 190⁰ C, with 3% kerosene, if required. Sand shall be thoroughly mixed with it in a mixing drum to obtain uniform mixture and shall be laid over the compacted surface, laid in line, grade and levels and as directed by the Engineer. Bitumen shall not be heated beyond the temperature limits given above.

The premix carpet shall be laid in two layers of 3 cm and 2 cm respectively. After compacting and laying the first layer of 3cm, a tack coat of hot bitumen at the rate of 1 Kg. per Sq.m. shall be uniformly applied to the surface, by means of Sprayer and the Second layer of 2cm thick shall be laid, tamped and compacted to the satisfaction of the Engineer.

Sand shall be spread on the final surface at the rate of 0.5 Cu. m per 100Sq.m.

5.19.02.02.04 Premix Materials**Sand**

Sand shall be clean, dry, coarse, hard angular, free from coatings of clay, dust and mix of vegetable and organic matters and shall conform to IS 383 (Grade -III).

Stone Chippings

Stone chippings shall be hard black trap or granite or approved locally available stone and shall conform to IS 383. The grading shall be of normally 12mm down size and 6mm down size, in the ratio of 3:2 respectively.

Bitumen

Bitumen required for the work shall be 80/100 grade or its equivalent quality.

Laying

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<p>5.20.00</p> <p>5.20.01</p> <p>5.20.02</p> <p>5.20.02.01</p> <p>5.20.02.02</p>	<p>Areas on which the premix is to be laid shall be thoroughly cleaned of all dust and loose materials. On the cleaned surface, a tack coat at the rate of 1.0 Kg. per Sq.M. of hot Bitumen shall be uniformly applied by Sprayers. The applied Binder shall be evenly brushed.</p> <p>The Binder bitumen 80/100 shall be heated to the temperature of about 190⁰ C with 3% kerosene, if required and mixed with stone chippings of size, as mentioned above, at the rate of 400 KG, with Six (6) Cu. M. of stone chips, for 100 Sq.M. of surface. The total mixed quantity, as mentioned above, is the quantity required for the total 50mm thick for 100 Sq. m. of area. Mixing shall continue until the aggregate is well coated.</p> <p>Switchyard Civil Works</p> <p>Civil works for switchyard includes:</p> <ol style="list-style-type: none"> a. Towers, girders, lightning masts and equipment supporting structures including proto type assembly etc., b. Foundations and supporting pedestals for towers, lightning masts, equipment supporting structures etc., c. Control room/Auxiliary building as required for switchyard, foundation for AC Kiosks etc. d. Foundations for transformers and reactors including oil pit, stone filling, laying and fixing of rails for movement of Transformers / reactors, rail track, jacking pad and fire walls as required, arrangement for cabling etc. all complete e. Earthing mat, single lane roads and R.C.C. drains in switchyard area including road/drain/trench crossings etc., f. All necessary embedments, inserts, supporting structures & supporting members as required etc. g. Cable trenches in switchyard and inside Control room/Auxiliary building including civil works for panel fixing etc. <p>Design Criteria</p> <p>Gantry structure, which consists of open web towers connected by girders, shall be made of structural steel conforming to IS 2062 and duly galvanized conforming to IS: 2629 and IS 4759. All joints shall be bolted connections. All bolts for connections shall be of 16mm dia conforming to IS 12427 and of property class 5.6 as per IS 1367 (Part 3). Nuts shall conform to IS 1363 (Part 3) of property class 5. Foundation bolts shall conform to IS 5624 and property class shall be 4.6 as per IS 1367 (Part-3). Butt splice shall be used for splicing the main members and splice shall be located away from the node point. IS 802 "Code of practice for use of structural steel in overhead transmission line towers" shall be followed for design of structures. Height & type of towers shall be established based on electrical requirements. A provision of ± 30 degree angle of deviation of line in horizontal plane and ± 20 degree deviation in vertical plane is considered and the resulting worst combination of forces shall be considered for design. For all outgoing and incoming feeders, the conductor span shall be taken as 200m for design purpose.</p> <p>The analysis of towers and gantries shall be carried out with combined model of critical configurations of towers and gantries using any established structural analysis software like STAAD Pro. etc.</p> <p>Switchyard structures shall be designed for the worst combination following loads:</p> <ol style="list-style-type: none"> 1) Dead loads (load of wires/conductors, insulator, electrical equipment and structural members), 2) Live loads, 3) Wind loads
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- a. Switchyard gantries, towers, equipment supporting structures and lightning mast shall be designed as per IS 802. The wind load calculations shall be made as per IS: 802 except the parameters basic wind speed (Vb) and terrain category as stipulated in "Criteria for wind resistant design of structures and equipment".
- b. All other structures shall be designed as per IS 456 / IS 800. The wind load calculations to be made as per IS: 875 shall be with the parameters as stipulated in "Criteria for wind resistant design of structures and equipment".
- 4) Seismic loads,
- 5) Loads due to deviation of conductor (gantries shall be checked for ± 30 deg. deviation in horizontal plane and ± 20 degree deviation in vertical plane),
- 6) Loads due to unbalanced tension in conductor/wire,
- 7) Torsional load due to unbalanced vertical and horizontal forces,
- 8) Erection loads,
- 9) Short circuit forces including snap in case of bundled conductors, etc.

Note:

- i. The occurrence of earthquake and maximum wind pressure is unlikely to take place at the same time. The structure shall be designed for either of the two. However, temperature stresses can be ignored, as these towers are freestanding structure in open space.
- ii. Short Circuit forces and Wind pressure shall be considered to act together for design of switchyard structures
- iii. Direction of wind shall be assumed such as to produce maximum stresses in any member for the combination of wind load with conductor tensions. The wind acting perpendicular and parallel to bus conductor and shield wire shall be considered separately.
- iv. The conductor tension shall be assumed as acting on only one side of the gantry for the analysis and design of switchyard gantries.
- v. The distance between terminal and dead end gantry shall be taken as 200 meters.

5.20.02.03

Factor of safety:

The factor of safety for the design of members shall be considered as 2.0 for normal condition and broken wire condition, 1.5 for combined short circuit and broken wire condition. Foundation shall be designed for a factor of safety of 2.2 for normal and broken wire condition and 1.65 for combined short circuit and broken wire condition.

5.20.02.04

Design consideration for switchyard equipment support:

The supporting structure for B.P.I., LA, CVT & Isolator equipment's shall be comprised of GI (ERW) pipe of grade YST:210 or of higher grade conforming to IS: 1161 & shall be designed as per IS 806 "Code of Practice for use of steel tubes in general building construction".

Minimum diameter of the pipe type support for 765kV structure shall be 300NB, 400kV structure shall be 250NB, for 220kV & 132kV structures shall be 200NB and that for 66kV & 33kV shall be 150 NB.

The supporting structure for CT, CSE & Wave Trap equipment shall be comprised of lattice structural steel conforming to IS 2062 and shall be designed as per IS: 802.

Common raft foundation shall be provided for each pole of isolator.

5.20.02.05

Special design consideration for lightning Mast:

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<p>5.20.02.06</p>	<p>Diagonal wind condition shall be considered for lightning masts. Diagonal wind shall be taken as 1.2 times the wind calculated on Longitudinal/Transverse side. Lightning mast shall be provided with minimum two nos. of platforms as per requirement and an ladder for climbing purpose shall be provided up to platform at top level. Top of platform shall have grating, railing and toe guard plates. The minimum width of platform shall be 900mm. Live load of 300kg/m² above platforms shall be considered for design of Lightning Mast.</p> <p>Design Criteria for structures not covered under Cl. 5.20.02.01 to Cl. 5.20.02.05</p> <p>The Switchyard Control Room building shall have RCC framed super structure with one brick thick wall cladding on exterior face. The Control room building shall consist of rooms/facilities/ equipment/ monorail as per system requirement. An open space of one meter width (minimum) shall be provided on the periphery of the panel rows and equipment to allow easy operator movement and access for maintenance purposes.</p> <p>The design of RCC structures shall generally be carried out using limit state method of design as per IS 456. The minimum grade of concrete shall be of RCC M25 as per IS 456.</p>		
<p>5.20.03</p>	<p>The architectural features including roof water proofing, rain water down comers and RCC parapet walls etc. shall be as specified elsewhere in the specifications.</p>		
<p>5.20.04</p>	<p>The fabrication and erection of the switchyard works shall be carried out generally in accordance with IS 802 and IS 800. All materials shall be completely shop fabricated and galvanised.</p>		
<p>5.20.05</p>	<p>All structural steel members including stub members, bolts, nuts, spring washers, etc., shall be hot dip galvanised after fabrication. Minimum section thickness should not be less than 4 mm. Weight of zinc coating shall be at least 0.610 kg/m² and foundation bolts shall have heavier zinc coating at least 0.80 kg/m².</p>		
<p>5.20.06</p>	<p>Cable Trenches</p> <p>Cable trenches shall be provided for routing of cables as required and shall be of adequate size. The trenches located within switchyard shall project at least 300 mm above the finished formation level so that no storm water shall enter into the trench. The bottom of trench shall be provided with a longitudinal slope of 1:500. The downstream end of cable trenches shall be connected to sump pits. The precast covers shall not be more than 300mm in width and shall not be more than 65 kg. Lifting hooks shall be provided in the precast covers. Trenches shall be given a slope of 1:250 in the direction perpendicular to the run of the trenches. Angle of size 50x50x6 mm (minimum) with lugs shall be provided in the edges of RCC cable trenches and any other place where breakage of corners of concrete is expected. All cable trenches shall be provided with suitable insert plates for fixing support angles of cable trays. All internal cable trenches shall have minimum 6mm thick (o/p) chequered plate covers while external cable trenches shall have pre - cast RCC covers. However, the portion of the cable trench behind and sides of control panel / MCC shall be provided with suitable chequered plate covers as directed by the Engineer. Cable trenches inside switchyard, having depth more than 500mm, shall have wall thickness of minimum 150mm with two layer reinforcement.</p>		
<p>5.20.07</p>	<p>PCC Layer & Gravel Filling:</p> <p>PCC Layer and Gravel filling shall be provided as specified elsewhere in the specifications. Before laying of PCC layer, the subgrade shall be properly compacted and the top layer of the soil shall be treated for anti-weed considering the type of weeds found in the vicinity. The anti-weed - soil sterilization details such as manufacturer's name, their specification, test certificate, etc. shall be furnished for Owner's approval. Any modification if required in the proposed anti-weed treatment chemical shall have to be done by the contractor at no extra cost to the Owner. The contractor shall be required to furnish a performance guarantee of three years for the anti-weed treatment. This guarantee shall be commenced from the date of completion of work or date of handing over, whichever is later. Stone/gravel shall be chemically inert, hard, strong durable against weathering, of limited porosity and free from deleterious materials. It shall be properly graded and shall meet the requirements of IS: 383.</p>		
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Transformer/reactor foundations

Foundations of transformers/reactors shall be designed for seismic and wind loads in addition to other applicable loads. Solid RCC block foundation shall be provided for the main transformer/reactor block. Alternatively, transformer shall be supported on a RCC foundation comprising of common raft for rail supporting walls up to rail-cum-road along with pedestals for jacking pad, roller lock etc. Tie beams connecting roller lock pedestals at rail level shall also be provided. Common raft/solid RCC block shall be supported on soil or pile based on requirement specified elsewhere in the specification. Oil soak pit / oil water separation pit for transformer/reactor shall be provided as envisaged elsewhere in the specification. The oil soak pit shall be provided for each transformer and shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store one-third (1/3) of the oil volume of transformer/reactor considering only 40% of the volume as available voids between gravel filling. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. The Oil-water Separation pit shall be designed for an effective capacity of complete oil of one transformer having highest volume of oil along with 10 minutes of firewater. For calculating effective capacity of oil-water separation pit, effective depth excluding 200 mm freeboard below invert level of inlet pipe shall be considered. Plan area and depth of oil-water separation pit shall be decided based on above consideration. Oil-water Separation pit shall be provided with five separate chambers interconnected by pipes. First chamber shall be for collecting oil-water mix from transformers' soak pits in case of fire. After entering into first chamber, oil being the lighter in density floats above the water. The water from lower elevation flows in to subsequent chambers interconnected through galvanized MS pipes. The accumulated oil in the first chamber to be pumped out for subsequent usage or disposal. Water collected in the last chamber to be pumped out for subsequent disposal after treatment. Invert level of inlet Hume pipes (of NP-3 grade and adequate capacity), carrying oil and water from transformers soak pits, shall be designed for gravity flow. Freeboard of 200 mm shall be provided below the invert level of inlet pipes. Invert levels of interconnecting pipes of subsequent chambers shall be decided accordingly.

Arrangement for moving the transformer into place using rail cum road, jacking pads and pulling blocks including inserts, as required, shall be provided along with the transformer/reactor foundations.

RCC Firewall shall also be provided between the transformers wherever required.

300 mm thick PCC M20 encasement all around the Pylon supports inside soak pit for fire fighting system shall be provided up to top of Stone filling. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.

5.20.09

The switchyard roads, drains, fencing and gate shall be as specified elsewhere in the specification.

5.21.00

FIRE WATER PUMP HOUSE, FIRE WATER BOOSTER PUMP HOUSE & FOAM SYSTEM

Salient Features:

The scope of the Bidder shall be design and construction of Civil, Structural, Architectural, Water Supply, Plumbing and Sanitary Works of Fire Water Pump House, Fire Water Booster Pump House and Foam system including supply of all materials.

The fire water Pump House shall be single storeyed and single bay RCC superstructure provision for a structural steel monorail. MCC /switchgear rooms, control room etc. shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding. The building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans.

The Fire Water Booster Pump House shall be structural Steel Shed superstructure with provision for a structural steel monorail. Control room shall have RCC framed structure with

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cast-in-situ RCC roof slabs with brick cladding. . The shed and building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans.

Steel shed with roof covering with provision for a structural steel monorail shall be provided for foam system including associated civil works for foam bladder tank foundations, grade slab, pipe pedestals etc. Control room shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding. The shed and building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans. Fire water storage tank foundation shall be provided as detailed elsewhere.

Fire water pipes shall be provided with either RCC trench or buried underground as per requirement. Tender drawings shall also be referred.

Fire water trenches shall be open RCC type trench with removable RCC cover.

Interlocking concrete block paving shall be provided over the buried fire water pipes as specified elsewhere in the specification.

At road/rail/ drain crossings of fire water pipes, the fire water pipes shall be provided with minimum 200mm thick PCC encasement all around the pipe.

5.22.00**DELETED****5.23.00****COAL, BIO MASS & GYPSUM HANDLING SYSTEM****5.23.01****Track Hopper, Reclaim Hopper, Underground TP's & Tunnel**

Track Hopper, Underground portion of TP's and Underground Tunnel shall be of RCC. Structural steel Shed shall be provided over Track Hopper.

The vertical and inclined portion of coal hopper and beams in reclaim hoppers shall be provided with 50 mm thick guniting (shotcreting). Details of shotcreting have been given elsewhere in this specification.

Expansion joints shall also be provided at locations wherever tunnel connects with Underground TP's, penthouse etc. width of 600mm water stop fabricated with 22G copper plate with bitumen board fillers and polysulphide sealing compound as specified elsewhere shall be used as expansion joint material. Reinforcement detailings at the expansion joint shall be done in such a way that there is no obstruction to copper plate installation.

Track hopper, machinery hatches shall consist of underground portion, which shall be of RCC, and above ground portion, which shall be of structural steel shed covered with permanently Colour coated profiled steel sheets.

The structural arrangement to be adopted for the design and construction of underground portion of track hopper and machinery hatches shall be as shown in tender drawing. It essentially consists of RCC frames spaced at approx. 3.0M centers with RCC wall panels on the sides and RCC raft/ raft and beam arrangement at the bottom, fixed to the frames. The top beam of the RCC frame supports the rail supporting beams and the coal hopper. Minimum thickness of RCC raft at bottom shall be 600 mm. Minimum thickness of RCC side walls shall be 600 mm at bottom and 300 mm at top.

No columns shall be provided inside the Machinery Hatches.

Foundation of all underground structures like underground TP's & tunnels shall be of solid RCC raft. Raft cum beam/sandwich slab arrangement shall not be acceptable.

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The vertical and inclined portion of coal hopper, the beams and top of coal tray in the track hopper structure as shown in the tender drawing shall be provided with 50 mm thick guniting (shotcreting). Details of shotcreting have been given elsewhere in this specification.

Expansion joints shall be provided in track hopper at a maximum distance of 40m unless otherwise shown in the tender 600 mm wide water stop fabricated with 22G copper plate with bitumen board fillers and polysulphide sealing compound as specified elsewhere shall be used as expansion joint material. Detailing of expansion joints and the reinforcement shall be coherent.

Floor shall be provided with cross slope not flatter than 1 in 50 towards side drains. Side drains shall be sloped towards sump where sump pumps as specified elsewhere, shall be provided. The slope of side drains shall not be flatter than 1 in 400. Side drains and sump shall have removable type steel grating cover. Gratings shall be galvanized to grade 610 gm/m².

Water proofing / Damp proofing of underground portion of Track Hopper, reclaim hoppers, tunnels, underground (i. e. basement) portion of transfer houses shall be done by providing the following treatments:

- (A) Chemical injection grouting for inner faces (details as specified elsewhere)
- (B) Polymer modified cementitious coating on earth side face as per the following :

- (1.) On the outer surface of walls, frames and roof slabs coming in contact with earth, polymer modified cementitious coating in two layers as specified and as per manufacturer's specifications shall be provided directly on the concrete surface.
- (2.) 50 mm thick PCC (1 : 2 : 4 with 10 mm nominal size stone aggregates) shall be provided under the raft i.e. over the lean concrete, followed by polymer modified cementitious coating in two layers (slurry mix application) as per manufacturer's specification. 50 mm thick PCC (1 : 2 : 4) with 10 mm nominal size stone aggregates shall then be laid over the polymer modified cementitious coating before laying the raft.

Steel gratings of mesh size 300 mm x 320 mm for track hopper shall be provided. The grating shall be built of min. 200mm x 28mm thick flats in main direction and min. 100mm x 20mm thick in secondary direction. The hopper and gratings shall be designed for movement of front end loader/ bulldozer over them. Bull-dozer weight shall be considered as about 35T. No painting/galvanization shall be provided in gratings. However, two coats of Red oxide Primer to be provided immediately after fabrication.

Earth pressure to be considered for design shall be due to earth pressure at rest (K_0) condition only. Earth pressure due to surcharge intensity of Railway Loads (where applicable) or Uniformly Distributed Load (U. D. L) of intensity 2 T / Sq. M. whichever is critical, shall be considered in the design.

A minimum safety factor of 1.2 against uplift of wagon tippler/track hopper, transfer points (underground or with basement) and tunnels, due to ground water shall be ensured during execution and after execution, considering dead weight of the structure to be 0.9 times only, ground water table at adjoining formation level and soil wedge angle of not more than 15 degrees.

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5.23.02

Also, FOS against uplift, to be taken as 1.0, considering the dead wt. of structure and soil resting on side projections if any in the vertical plane. Inclined wedge action of soil shall not be considered in this case.

Wherever, slope of tunnel exceeds 10°, RCC steps shall be provided for the entire width of each walkway.

Overhead / Ground Conveyor Galleries and Trestles

Overhead conveyors for trough belt conveyor shall be located in a suitably enclosed gallery of structural steel. The overhead gallery shall consist of two vertical latticed girders having rigid jointed portal frame at both ends. Cross beams at floor level supporting conveyor stringer beams shall be made of single rolled steel beam or single channel section (ISMB or ISMC) or plate girder. Horizontal bracings are to be provided at top & bottom plan of the gallery (latticed girders shall be braced together in plan at the top and bottom). Common end portal frame shall not be used for adjacent conveyor spans. Roof truss shall be provided at upper node points of latticed girders to form an enclosure.

The maximum span of overhead gallery shall be limited to 25 meter unless higher span is required due to site conditions, which shall be subject to approval of the Engineer. The gallery should as far as possible be erected as a box section keeping all the vertical and horizontal bracing tied in proper position. The gallery should be checked for all erection stresses that are likely to develop during handling and erection and if required, temporary strengthening of gallery members during erection shall be made. Contractor can also use tubular steel sections for roof truss of conveyor galleries only. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS:1161 and rectangular/square steel sections shall conform to IS:4923. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – “Code of Practice for use of steel tubes in general building construction.” and EN 1993-1-8:2005.

Seal plates under the conveyor galleries shall be provided in such a way that complete gallery bottom shall form a leak proof floor.

Grade slab with brick toe wall and plinth protection along with drains shall be provided throughout the length of the ground conveyors. Top of pedestal for ground conveyor portals shall be 300mm above FFL. Bottom of the base plate of the columns of the trestles in Main Plant Block Area shall be kept 1.2m below the finished floor level of ground floor of Main Power House.

For double stream conveyor gallery, two side and one central walkway of minimum width 800 mm and 1100 mm respectively shall be provided. The minimum width of two side walkways for single stream conveyor gallery shall be 800 mm and 1100 mm respectively. Both sides of central and side walkways shall be provided with pipe handrails all along the conveyor gallery. Hand railing should not be supported on conveyor supporting stringers. The walkways shall be chequered plate construction with anti - skid arrangement. The anti - skid arrangement will consist of welding of 10 mm square steel bars at a maximum spacing of 500 mm along the length of the gallery. Where the slope of walkway is more than 10°, chequered plate steps with nosing and toe guard shall be provided. The floor of conveyor gallery all along the gallery length, shall be provided with minimum 12 gauge thick seal plates (suitably stiffened) and other drainage arrangements as specified elsewhere.

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Trough belt conveyor gallery shall have permanently colour coated steel sheet covers on roof and both sides. However, in roof, a panel of minimum 1.5 m x 1.5 m area at about 6.0 m center alternatively on both slopes, shall be provided with translucent sheets of polycarbonate material for natural lighting. A continuous slit opening of 500 mm shall be provided on both sides just below the roof sheeting. Adequate provision of windows shall be kept on both sides of conveyor gallery as appended in Mechanical Section (Belt conveyor system). Windows shall be provided with wire mesh as specified elsewhere in this specification.

Cross - over with chequered plate platform and ladder for crossing over the conveyors shall be provided at approximately every 90m intervals of conveyor. Crossover shall preferably be located over four-legged rigid trestle location.

For railway tracks passing below overhead conveyor gallery and along conveyors, the railway clearances both underground as well as over ground shall have to be adhered to for design, execution and erection of foundations, trestles, galleries etc., so that movement of locomotives and wagons is not hampered in any way during execution and afterwards. However, at the location where the overhead conveyor gallery crosses road / rail line, minimum clearance of 8.5m above the road crest / rail top shall be provided.

For calculation of material load on moving conveyor, a multiplication factor 1.6 shall be used to take care of inertia force, casual over burden and impact factor etc.

Thus material load per unit length of each moving conveyor shall be

$$1.6 \times \frac{\text{Rated Capacity of Conveyor system}}{\text{Conveyor Belt Speed}} \times F$$

Where, F = 1100/800 for coal, 800/600 for Biomass & 1250/900 for gypsum

It should be noted that for structural design, unit weight of lime shall be considered as 1700 kg/cu. m; unit weight of gypsum shall be considered as 1250 kg/cu. m.

It should be noted that for structural design, unit weight of coal shall be assumed as 1100 kg/cu. m.

Conveyor Gallery structure shall be designed considering both conveyors operating simultaneously.

Conveyor gallery and supporting trestles located between transfer houses / buildings shall be arranged in any one of the following ways.

- a) All gallery supporting trestles shall be four legged type only. One end of each gallery span shall be hinged to the supporting trestle and the other end shall be slide type. Slide type support shall be with PTFE bearings to allow both rotation & longitudinal movements.

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OR

- b) In between transfer houses / buildings, four legged trestles shall be placed at a maximum interval of 90 metres. The arrangement shall be such so as to ensure that force in the longitudinal direction (i. e. along the conveyor length) of conveyor gallery of length not more than 90 m is transferred to any four legged trestle. In the space between each successive four legged trestles, two legged trestles shall be provided at regular intervals. The end supports resting on the four-legged trestle can have either ends hinged or one hinge and the other on slide type depending on the arrangements. Slide type support shall be with PTFE bearings to allow both rotation & longitudinal movements.

End of conveyor gallery which will be supported over transfer house, shall be so detailed that only vertical reaction is transferred from conveyor gallery and no horizontal force in longitudinal direction is transferred from conveyor gallery to transfer house structure and vice - versa.

5.23.03

For trestles and trestle foundations for conveyor galleries located adjacent to existing structures, over ground and underground facilities, location and details of these trestles and foundations shall have to be decided such that there is no interference both underground as well as over ground with existing structures and facilities. Base plates of trestle columns shall be kept 300 mm above the finished ground level.

5.23.04

Transfer Houses

The over ground portion of all transfer houses shall be framed structure of structural steel work with permanently colour coated profiled steel sheet side cladding (from lowest working floor level till top) and RCC floors comprising of RCC slab over profiled metal deck sheets (to be used as permanent shuttering without considering any composite action effect of metal deck sheet) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. However, the lower portion of side cladding, at ground, for a minimum height of 0.9 m above the finished floor level shall be one brick thick wall plastered on both side. In some areas like MCC floors etc., one brick thick wall cladding shall be provided. Brick wall cladding shall be supported on encased wall beams and suitably anchored to adjoining columns and beams. Vertical bracings shall be provided only on four sides along the periphery. Grade slab with brick cladding of 0.9 m height, plastered on both sides shall be provided for all transfer houses. Bottom of the base plate of the columns of the transfer houses in Main Plant Block Area shall be kept 1.2m below the finished floor level of ground floor of Main Power House.

Adequate steel doors and windows for proper natural lighting and ventilation shall be provided. In addition to steel windows, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting.

The roof of Transfer points shall be provided with pre-fabricated insulated metal sandwich panels. Pre-Fabricated Insulated Metal Sandwich Panel for Roofing shall be laid to specified slope. Composition of Insulated Metal Sandwich Panels shall be as described in relevant section of Technical Specification. Adequate slope shall be provided for quick drainage of rain water.

5.23.05

Crusher Houses

The crusher house shall be framed structure of structural steel work with permanently colour

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coated profiled steel sheet side cladding. However, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting. The lower portion of side cladding, at ground, for a height of minimum 0.9m above the finished floor level shall be of one brick thick wall plastered on both faces. Floors shall be of RCC comprising of RCC slab over profiled metal deck sheets (to be used as permanent shuttering without considering any composite action effect of metal deck sheet) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. Within this building, cubicles for resting room of operators shall be constructed with one brick thick brickwork having both sides plastered and roof slab. Adequate steel doors and windows for natural lighting and ventilation shall be provided. Vertical bracings shall be provided only on four sides along the periphery.

The roof of crusher house shall be provided with pre-fabricated insulated metal sandwich panels. Pre-Fabricated Insulated Metal Sandwich Panel for Roofing shall be laid to specified slope. Composition of Insulated Metal Sandwich Panels shall be as described in relevant section of Technical Specification. Adequate slope shall be provided for quick drainage of rain water.

Crushers shall be supported on RCC deck, which in turn will rest on suitable vibration isolation system consisting of springs and dampers. This RCC deck shall be isolated from the floor. However, the vibration isolation system consisting of springs and dampers may rest on main building framework. Detailed specification of vibration isolation system including the unbalanced force, frequency and amplitude criteria and other design requirements are appended elsewhere in this specification.

5.23.06 Stacker Reclaimer Foundation

Stacker – Reclaimer (S/R) foundation shall be in RCC and shall be designed as RCC framed structures (in longitudinal & transverse direction). Lateral tie beams between two rail supporting elements shall be provided at a regular interval of approx. 3.0 m center. Conveyor short posts shall be supported on RCC beams at grade level. The foundation shall be designed for the most critical combination of loads as furnished by the equipment supplier. RCC retaining wall on both sides of the S/R foundation shall be provided as shown in the Annexure.

The portion between the two rails and between rail and retaining wall on both sides shall be paved in concrete as per specification for grade slab of ground level specified elsewhere. However no metallic hardener finish over RCC slabs is to be provided. Drains shall be provided along the rails for drainage of rain / dust suppression / floor washing water. Drains shall be routed on both sides of the foundation along the rail as shown in Tender Drawing. Drains shall be connected to the network drainage system for finally discharge into coal settling tank. RCC drains shall be provided in Coal stockyard area with precast RCC covers.

5.23.07 Control building, M. C. C. Buildings

These shall be steel or RCC framed building with RCC roof and floor. For steel framed building roof/floor comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams. Shear anchor studs shall be provided through metal

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5.23.08	<p>deck at regular interval on all top flange/flange plate of structural beams. Cladding shall be of brickwork/concrete block work with plastering on both sides. Bidder has also the option to supply and construct pre-engineered buildings. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification. Suitable arrangement shall be provided so as to prevent ingress of water into the cable trenches inside the building from cable entry locations.</p> <p>All air - conditioned areas, shall be provided with the false ceiling system(details specified elsewhere) with under deck insulation.</p> <p>Adequate aluminium doors and windows shall be provided for natural lighting, ventilation and view. All windows in air conditioned rooms shall have hermetically sealed double glazing.</p> <p>Pump Houses</p> <p>These shall be framed structure of structural steel work with permanently colour coated profiled steel sheet roof, grade slab and RCC foundations etc. Roof shall be provided with troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water. Brick wall cladding (1m height above FFL) shall be provided all around the periphery of pump houses</p>		
5.23.09	<p>Pent House</p> <p>These shall be of RCC framed structures with columns, beams, slabs and foundations etc. Cladding shall be of brickwork with plastering on both sides. Roof shall be provided with roof water proofing treatment as specified elsewhere. Adequate nos. of steel doors and windows shall be provided for natural lighting and ventilation.</p>		
5.23.10	<p>Gypsum Storage Shed</p> <p>The Gypsum storage shed shall be RCC framed structure with RCC wall (upto Tripper floor) and structural steel shed with permanently colour coated profiled steel sheet roof and side cladding (above Tripper floor). Roof shall be provided with troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water. At grade level Heavy duty paving as detailed elsewhere in the specification shall be provided inside the shed.</p> <p>Finished floor level of Gypsum storage shed shall be kept at least 500mm above the finished ground level. The building shall be provided with 750 mm wide plinth protection all around as detailed elsewhere in the specification.</p>		
5.23.11	<p>Toilets</p> <p>Toilet with potable water line facilities shall be provided in each of the following locations:</p> <p>(A) Crusher House (Ground Floor) – (Gents Toilet – 1 No for each.)</p> <p>(B) In CHP/LHP/GHP Control Room building – (Gents and Ladies Toilets-1 No. each)</p>		
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Each Gents toilet shall have brick enclosure, and the following fittings.

- | | | |
|-------|--|-------|
| i) | Wall mounted glazed vitreous china European water closet with low flush having flow rate of 6.0 litres and 3.0 litres of water per flush, dual flush adopters for standard flushing for solid waste and a modified smaller flush for liquid waste flushing valves shall be provided. | 1 no. |
| ii) | White glazed vitreous china flat back lipped urinal 390x375x610 mm (approx.) fitted with photovoltaic controls for flushing system and all requisite fittings. | 1 no. |
| iii) | Wash Basin 450x550 mm (approx.) mounted over 18 mm thk granite beveled edge counter fitted with photovoltaic control system for water controls, bottle trap with two taps and all requisite items. | 1 no. |
| iv) | Mirror 600x900x6mm thk. with beveled edges (Superior sheet glass) mounted with teak wood beading and minimum 12 mm thk. plywood backing. | 1 no. |
| v) | C.P. Brass Towel Rod 600 x 20 mm | 1 no. |
| vi) | Liquid Soap Container | 1 no. |
| vii) | Washing Tap (CP Brass) | 1 no. |
| viii) | Overhead Polyethylene water tank (min. 500 litres capacity) | 1 no. |
| ix) | Suitable provision for installation of drinking water cooler. | 1 no. |
| x) | Space for Janitor room | 1 no. |

Ladies toilet shall be similar to gent's toilet as detailed above, except item at s.no. ii and ix (urinal and provision for drinking water cooler). Package type STP shall be to be provided.

No other facilities shall be provided below toilet block except toilet. Toilet facilities shall be provided at control room floor level.

5.23.12

Staircases

All floors of transfer houses/crusher houses and roof/floors of all multistoried MCC/Control room buildings shall be accessible through staircase and mumty of staircase of mcc/control room shall be accessible through cage ladder. Cage ladders (min. 450mm wide) shall be provided for access to roof of penthouses & MCC/control room (with only ground floor).

All stairs of over ground portion of transfer houses & crusher house shall be of steel (minimum 1200 mm wide) and maximum rise should not be more than 180 mm and minimum tread width 275 mm. Stringers shall be of rolled steel channel (minimum ISMC 250) and tread shall be of electro forged steel gratings. Stairs shall be provided with 32 mm dia nominal bore medium duty M. S. pipe hand rail.

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Handrails (for staircases, around openings, in walkways etc.) shall be of standard weight steel pipe of flush welded constructions, ground smooth using 32 mm nominal bore medium class pipe provided with double rail, top rail about 1.0 metre, minimum above platform level (upto height of 12m the height handrail shall be 1.0 m and above 12m height the height of handrail on staircase landing and around cutouts and openings shall be 1.2 m) and pipe posts spaced not more than 1.5 metres apart. Angle handrail post may be provided when specifically called for in drawings approved by Engineering. Toe guard of size 100mm x 6mm shall be provided along the railing for all steel platforms/landings and RCC staircases.

Smooth uniform curves and bends shall be provided at stair returns and also where so ever required. Posts connected to curb plates shall have a neat closure at the bottom and a 6 mm thick plate neatly welded to posts for attachment to curb plate. All necessary fittings including inner dowels at splices, brackets, belts, bends, flanges and chains, where required shall be plugged and welded. A minimum radius of 3 times the pipe diameter shall be provided at all points of direction changes in the handrail.

Treads and landing shall be suitable for the prescribed loading. The maximum width of openings in gratings shall not exceed 40 mm. The minimum size of main bars shall be 25 x 6 mm and cross bar shall be 6mm. The usual span of grating will not generally exceed 1.5 meters. Stair case gratings shall be galvanized to grade 610g/m². All gratings shall be electro forged types.

Outside stairs to transfer points shall be open type. However, sheeting shall be provided at the top.

Stairs of MCC/control room, wagon tippers/track hopper and underground TP's shall be of RCC construction. The minimum width of stairs for MCC/Control room, wagon tippler/Track hopper, reclaim hopper/underground TP's shall be 1200 mm. Maximum rise should not be more than 180 mm and minimum tread with 250 mm. Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection for treads of stairs in Track hopper/wagon tippler/underground TP's.

Numbers and arrangement (including enclosures etc.) of stair cases shall be such as to meet the fire safety requirement as per guide lines of statutory regulatory bodies. External fire escape staircase along with internal staircase shall be provided for crusher house and multi-storied MCC cum control room building. Minimum headroom in all staircases and all levels shall be 2200mm from floor finish level.

5.23.13

Trenches

All trenches for cables or any other underground facility as detailed out elsewhere shall be of RCC Cable trenches shall be provided with pre - cast RCC covers / chequered plate cover. Cable trenches as well as pre - cast covers shall be provided with edge protection angles. Lifting hooks shall be provided for all pre - cast RCC covers. All embedments / block outs as required and specified elsewhere in these specifications shall be provided. Trench pre - cast cover weight shall not be more than 65 Kgs. At road crossings & entry locations, RCC trench covers designed for 10 T wheel load at centre shall be provided. Pre - cast covers shall be designed for central point load of 75 Kgs. RCC cable trenches shall be filled with sand after erection of cables, up to top level and covered with pre - cast RCC covers. For cable trenches outside buildings, top level shall be 200 mm above G.L and sand filling shall be overlaid with 50 thk. PCC.

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5.23.14	<p>Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection all around cut outs / openings in floor slabs, edges of drains supporting grating/precast RCC covers, edges of RCC trenches supporting pre - cast covers, supported edges of pre - cast cover.</p> <p>Cable gallery/trestles</p> <p>Cable galleries/trestles shall be made of structural steel. The contractor can use either rolled sections or tubular steel sections. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS:1161 and rectangular/square steel sections shall confirm to IS:4923. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – “Code of Practice for use of steel tubes in general building construction.” and EN 1993-1-8. Galvanised gratings shall be provided for walkways as per approved electrical drawings. Ladders shall be provided for access from ground to cable galleries at maximum 100m intervals.</p>		
5.23.15	<p>WIND BARRIER</p> <p>Wind barrier need to be provided all around the stock pile area. Its foundation and super structure need to be design considering 100% blockage condition of mesh.</p>		
5.23.16	<p>Biomass Storage Silo</p> <p>The supporting structure for silo shall be of structural steel. Enclosure with side metal cladding is to be provided above biomass Storage Silos for biomass handling equipment. Side metal cladding is also to be provided for outgoing conveyors below biomass storage silos. Stored biomass load shall be treated as dead load for analysis and design of silo supporting structure.</p>		
5.23.17	<p>Drainage & Water Supply Works</p>		
5.23.17.01	<p>Drainage System:-</p> <p>The drainage arrangements shall be so planned so as to ensure quick disposal of drainage water without stagnation and / or overflow. It is envisaged to clean the conveyor galleries, transfer points, crusher building, penthouse etc. with water periodically.</p> <p>Minimum 4 nos. down comers shall be provided in each transfer house / crusher house. In case of conveyor galleries, the down comer shall be provided at every trestle location.</p> <p>Drainage of the complete coal stock pile, area around stacker reclaimer rails etc. shall be discharged into the coal slurry settling pond.</p> <p>For all coal Conveyors, each down comer shall lead the water / coal slurry to RCC pit (of 2 Cu.M capacity) to allow settling of coal. The water from the pit shall overflow into contractor’s R.C.C drain, which will lead the discharge finally into coal slurry settling pond.</p> <p>For Crusher House, pent house, transfer house each down comer shall lead the water / coal slurry into the peripheral drains (Brick drains with steel gratings provided around the building) which will lead the water / coal slurry to water / coal slurry to RCC pit (of 2 Cu.M capacity) to allow settling of coal. The water from the pit shall overflow into contractor’s R.C.C drain, which will lead the discharge finally to the coal slurry settling pond.</p>		
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5.23.18

For Track hopper/Wagon Tippler & transfer houses peripheral drains (Brick drains with steel gratings provided around the building) shall lead the water / coal slurry to a local RCC pit (of 2 Cu. M. capacity) near each facility to allow settling of coal. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge to a coal slurry settling pit.

In case of Control rooms and MCC buildings, Pump houses, etc water / coal slurry coming from down comers shall discharge into peripheral drains (Brick drains with steel gratings provided around the building) which will lead the water / coal slurry into contractor's RCC drain, which will lead the discharge finally into coal slurry settling pond.

Suitable kick plates/Curb beams shall be provided around the floor openings, stair case landings, in the transfer points, crusher house and other buildings.

Contractor's scope shall also include construction of necessary culverts under the rail lines / roads as per railway / IRC standards and approval of Railway culverts from concern Railway authorities.

Internal and external water supply, drainage etc.:-

The scope for potable water supply includes all distribution systems, tanks, pipes, fittings etc. as required and as described here or elsewhere in these specifications.

The scope for service water supply and dust control water supply shall be as described elsewhere in these specifications.

For water supply, medium class galvanized mild steel pipes conforming to IS: 1239 shall be used.

The scope for drainage of surface water shall include design, layout and construction of drains for and from buildings and drains required for coal stockyard area, drainage up to main coal slurry settling tank including connection with the tank. Drainage system shall be designed for maximum intensity of rainfall as 75 mm/hr and 60 % runoff coefficient. Moreover, the drainage system shall also comply to detail mentioned in project information chapter. All buildings (including transfer houses, crusher house, MCC rooms, pump house etc.) shall be provided with open surface brick drains of minimum size of 300 mm width and 300 mm depth with removable steel gratings all around the periphery. All drains excepting the peripheral drains around the transfer points, crusher house, control / MCC. buildings, pumps house etc., shall be of RCC construction. All open RCC drains shall have removable steel gratings designed for loads as specified under loading clause. Minimum size of main bar of steel grating (Galvanised to 610 gm/m²) shall be 25 mm x 5mm and cross bars 6mm. At all entry or road/rail crossing point's RCC box/pipe culvert shall be provided. The opening size of grating shall not be more than 90 mm x 35 mm. All drains as well as pre - cast covers shall be provided with edge protection angles and lifting hooks.

However, drains in coal stockyard area shall have pre cast RCC covers. RCC pre - cast cover weight shall not be more than 65 Kgs. RCC pre-cast covers near entry or at road crossings shall be designed for 10 T wheel load at centre. RCC pre - cast covers shall be designed for central point load of 75 Kgs.

The scope for foul water from toilets shall include layout and laying of sewers for sewerage system together with all fittings and fixtures and inclusive of ancillary works such as

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connections, manholes and inspection chambers within the building and from the building to the terminal point.

For rain water down comer and those to be used for conveying water / coal slurry generated from cleaning of walkways/floors, Galvanized MS pipes conforming to IS: 1239 (for 150 mm NB Medium grade pipes) with welded joints shall be provided for MCC buildings, penthouse, control rooms and Galvanized steel ERW pipes (273mm OD, 4mm thk) of steel grade Fe330 conforming to IS: 3589 with welded joints shall be provided for all TP's, Crusher house, and Conveyor galleries.

Galvanizing shall be as per IS: 4736. The minimum mass of zinc coating shall not be less than **360** gms/sq.m. as per IS:6745. The zinc coating shall be smooth and shall be subjected to testing as per IS: 2633, for uniformity of coating. The zinc coating shall be free from all defects as per IS: 2629.

All rain water down comers shall be provided with roof drain heads and complete with shoes bends, junctions, sockets, adapters, brackets and finished with anti-corrosive painting over a coat or primer.

For design of building drainage system IS: 1742 shall be followed.

For sanitary / sewerage pipes above ground, sand cast iron pipes conforming to IS : 1729 with leak proof lead joints.

For underground drain pipes, minimum class NP - 2 pipes conforming to IS: 458. At road crossings, concrete pipes of class NP 3 conforming to IS: 458 and at rail crossing RCC box culvert to be provided.

For sewerage below ground stoneware pipes conforming to IS: 651 with concrete bedding and haunch.

5.23.19

Roof Details

Roof slabs for CHP and GHP buildings shall be minimum 150 mm thick (in case of metal decking thickness shall be measured from crest top) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom.

1000 mm high and minimum 100 mm thick RCC parapet wall shall be provided over roofs of all buildings. However, for mummy, 600mm high parapet wall shall be provided. Parapet wall shall have suitable coping. External face of parapet wall of the buildings provided with metal cladding shall also be finished with metal cladding of design and colour as per approved architectural drawings.

Junction of roof and parapet shall be provided with 150 x 150 mm size concrete fillet.

Drain level shall be provided with 45 x 45 cm size khurras having minimum thickness of 30 mm of M-15 concrete over PVC sheet of 1 m x 1m x 400 micron and finished with 12 mm 1 : 3 cement : sand plaster.

Roofs of all M. C. C./control rooms, crusher house and TP(if applicable), penthouse etc., shall have roof water proofing treatment. Roof water proofing treatment shall be as mentioned else where in specification.

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<p>5.23.20</p> <p>5.23.20.1</p> <p>5.23.20.2</p>	<p>Roof of pump house shall be provided with single skin troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water.</p> <p>Floors and Grade level details</p> <p>DELETED</p> <p>The floor slabs shall be minimum 150 mm thick (in case of metal decking thickness shall be measured from creast top) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. The RCC slab shall be designed without considering any composite action effect of metal deck sheet (ie the structural strength of metal deck sheet shall not be considered for RCC slab design).</p> <p>Floors of transfer points shall have cross slope of not flatter than 1: 80, towards the floor washing drainage outlets, for efficient drainage. For ground conveyor & crusher house slope shall be 1:100.</p> <p>Chequered plates (used for floors, walkways etc.) shall be minimum 6 mm thick o/p or as indicated on drawings. The chequered plate pattern shall be approved by Employer / Engineer. Mild steel flats/angles of suitable size shall be welded to the bottom portion of chequered plates at a designed spacing to stiffen chequered plates to restrict deflection within span/200. Chequered plates shall be fixed by staggered welding of suitable size.</p> <p>Toe guard of size 100 x 6 mm shall be provided at various openings provided in floors e.g. around stair case openings, chute openings and other similar cutouts. For conveyor walkways, angle runner to act as toe guard shall be provided.</p> <p>All along the periphery of RCC floors (where no brick masonry walls are provided) 100 mm thick 300 mm high RCC wall and 900 mm high steel hand rails all around over this RCC wall shall be provided.</p> <p>The grade slab shall consists of 230 mm thick rubble soling (63 mm downgraded hard stone aggregate as per IRC specification, watering and compaction to minimum of 90% Standard Proctor density, including filling the interstices of stone aggregates with sand), over well compacted earth, overlaid by 75 mm thick P. C. C. M-7.5 and 100 mm thick RCC of grade M-25 with minimum 8 mm dia bars placed at 200 mm C / C in either direction respectively. There will be minimum 50 mm thick metallic hardener finish over the RCC slab.</p> <p>All buildings (including Wagon Tippler/track hopper and machinery hatches, truck hopper, penthouse, MCC rooms, pump houses, transfer houses and crusher house) and ground conveyors shall be provided with 750 mm wide plinth protection all around. It consists of 50 mm thick P.C.C. M-25 grade with 12 mm maximum size aggregate over 200 mm thick stone soling using 40 mm nominal size rammed, consolidated and grouted with fine sand.</p> <p>An area of 5 m width all round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tippler area, lime storage silo shall be paved. This paving will be in addition to plinth protection. The paving construction shall be as per specifications for the grade slab at ground level. However, 50 mm thick metallic hardener finish is not required to be provided in paved area. Paving shall also be provided in HGTU and VGTU area.</p> <p>Heavy duty paving shall be provided inside the building (Gypsum storage shed) if any vehichular movement is envisaged.</p> <p>Finished Floor level of all buildings shall be kept at least 500 mm above the finished grade / formation level.</p>			
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Brickwork cladding for various structures shall be so provided that there is a clear gap of 40 mm between inside face of external brick wall and outside face of column flange. Structural steel wall beams supporting brickwork shall be provided at a maximum spacing of 3m and suitably encased with plaster or 1:2: 4 concrete as the case may be. In case of box type steel beam, encasement shall be done with cement sand plaster in specified thickness and proportions over G. I. wire netting of 0.9 mm thickness.

50 mm thick Damp proof course shall be provided at plinth level for all brick wall.

5.23.22**CONCRETE**

Refer General Specification.

5.23.23**De-watering of Deep Excavations**

For deep underground structures like wagon tippler/track hopper, tunnels and underground transfer houses, requiring open excavation with extensive de - watering, completely dry working conditions during excavation, shuttering, placement of reinforcement, concreting, water proofing of structures, backfilling and any other operation shall be maintained by suitable de - watering method of suitable capacity.

5.23.24**Galvanising**

All burrs and irregular edges of the structural steel members to be galvanised shall be ground smooth before galvanising.

Purity of Zinc to be used for galvanising shall be 99.5 % as per IS : 209 (latest edition).

The weight of the zinc coating shall be at least 610 Gms. / m² unless noted otherwise.

5.23.25**CHEMICAL INJECTION GROUTING**

Minimum, 12 mm dia (NB) threaded nozzle of suitable length, shall be provided over the surface and along the construction joint line in a grid pattern at a spacing not exceeding 1.5 m c / c before concreting operation. Adequate precaution shall be taken to keep the nozzles plugged at both ends to prevent them from getting closed by concrete.

For fixing of any nozzle in set concrete suitable size hole shall be drilled, preferably by using repercussive hammer drill electrically operated, in grid pattern and grouting nozzle shall be fixed in these holes.

After the nozzles are fully set, neat cement slurry admixed with water soluble non - shrink polymer / monomer based chemical shall be injected through the net - work of nozzles with low pressure grout pumps at a pressure of about 2.0 Kgs. / cm². Cement slurry shall be prepared by mixing cement with non-shrink polymer/monomer @ 500 gm/50 kg bag of cement and water, ensuring that Water: Cement ratio does not exceed 2 (by weight). Wetter the structure, lesser should be the water cement ratio. The property of the polymer/monomer should be such that when it is mixed with water @0.5% by weight of water, the viscosity of the resultant solution (water and polymer/monomer) should not be more than 1.2 centipoises. Plasticizing agent shall be added wherever required. The grouting shall be started at very low

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pressure and increased gradually to a required pressure. The grouting shall continue, till the hole refuses to take any further grout, even at an increased pressure. Applied pressure shall not be more than the designed strength of the concrete. After completion of grouting operation, the nozzles shall be sealed properly to the satisfaction of the Engineer.

5.23.26 POLYMER MODIFIED CEMENTITIOUS COATING

5.23.26.1 Materials

Modified liquid polymer blend shall be a dispersion containing 100 % acrylic based polymer solids. Polymer shall be mixed in the ratio of 1 cement: 0.5 polymer (for minimum solid content of polymer 30%).

Portland cement based dry powder.

Clean, fine specially prepared quartz sand approximately 0.6 mm size.

5.23.26.2 Mixing

The liquid polymer shall be stirred well and cement based powder shall then be added slowly to make a Slurry Mix. For preparation of Brush Topping Mix, quartz sand shall be added slowly and mixed well till a homogeneous mixture is obtained. The mix shall be used within half an hour of the preparation. Addition of quartz sand may not be necessary, in case dry power contains the same.

5.23.26.3 Properties of Polymer Modified Cementitious Coating

It must adhere to wet surface.

It should develop adequate bond strength, with the concrete surface, not less than 2 N / Sq. mm.

Co - efficient of permeability shall be about 5×10^{-10} Cm / Sec.

Water absorption after continuous soaking shall not be more than 1 %.

The materials shall be permeable under water vapour.

The material shall be resistant to acids and alkalies present in the soil and underground water with normal pH value between 4 and 14.

The co - efficient of thermal expansion of the material shall be close to that of concrete.

5.23.26.4 Application

The concrete surface shall be cleaned and made free from grease, oils or loosely adhered particles. The surface shall be damp without any free water. For exterior underground part, application (b) pertaining to Brush topping Mix shall be followed.

(a) For Slurry Mix

LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	PAGE 80 OF 86
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TECHNICAL REQUIREMENTS



A minimum of 2 coats shall be applied on the surface. The first coat being applied, when the surface is still damp and left to harden for 4 to 6 hours. After 4 to 6 hours of the application of second coat, it shall be finished by rubbing down with a soft dry sponge. The coverage shall not be less than 1 : 1 Kgs. / m² in the 2 coats. A lap of 75 mm shall be provided at the joints.

The coating shall be air dried for 4 to 6 hours and, thereafter, cured for 7 days after the application of last coat.

(b) For Brush Topping Mix

This shall be applied in two coats. A primary coat of slurry mix can also be first applied on the surface as first coat. After the coating has dried up, a coat of Brush Topping Mix shall be applied over it with a push broom or any other similar brush. It shall be left in broom finished condition. The nominal thickness shall be 1.5 mm and minimum thickness shall be 1.0 mm. A lap of 75 mm shall be provided at the joints. It shall be ensured that no pinhole exists and rebrushing shall be done to cover the pinholes, if any.

The Coating shall be air dried for 4 to 6 hours and thereafter cured for 7 days after the application of last coat.

Rate of application of coating shall be established to achieve the required thickness.

5.23.27

Miscellaneous

5.23.27.1

Ordinary form work shall be used in roofs and floor slabs in transfer houses, footings, pedestals, cable trenches, pits etc., Plywood form work shall be used for all over ground exposed work like columns, beams, floors and ceilings in control room and M. C. C. buildings.

5.23.27.1

Monorail girders and fixtures shall be provided for monorails at the locations as required and as described elsewhere in these specifications or drawings. Monorail openings in the walls shall be provided with steel frame doors preferably sliding type or otherwise open able inside, access platforms and ladders.

5.23.27.1

Steel frame around openings in roof and on external walls for mounting of exhaust fans shall be provided.

Ready mix non - shrink cementitious grout of reputed manufacturer as approved by the Employer shall be used for grouting of block outs and foundation bolts, underpinning of base plates and machine bases. Crushing strength of grout shall be one grade higher than the foundation concrete. Minimum crushing strength shall be 30 N / mm² unless higher strength requirement is specified by the equipment supplier or the grout manufacturers.

The bottom of steel in case of cable / pipe galleries and trestles shall be generally 3m above the ground except for rail / road crossing where it shall be 8m above the rail top / road crest/ground. Further in bunker areas it shall be 8 m above the ground.

Polysulphide Sealing Compound shall be two-part polysulphide sealant and shall be from approved manufacturer, conforming to IS : 12118. Materials shall consist of polysulphide polymer and a curing agent. Gun grade material shall be used unless otherwise specified. The application of the sealant shall be strictly followed as per manufacturer's guidelines.

TECHNICAL REQUIREMENTS



5.23.28

SHOTCRETING

General Requirements

Generally, shotcreting shall be done in accordance with IS : 9012.

Reinforcement for shotcreting shall be as detailed below, unless specified otherwise.

- (a.) Reinforcement in one direction consisting of 6 mm M. S. bars at 750 mm c / c shall be connected to the lugs for fastening of the wire fabric. This shall be used in case of 50 mm or above thick shotcreting.
- (b.) Wire fabric conforming to IS : 1566 shall be used as reinforcement and shall consist of wire, 3 mm diameter, spaced 50 mm both ways and shall be electrically cross welded. Wire fabric shall be securely tied to 6 mm bars for 50 mm thickness. Adjacent sheet of wire fabric shall be lapped at least 100 mm and tied.
- (c.) Clear cover to reinforcement mesh shall not be less than 15 mm.

Minimum thickness of shotcreting shall be 50 mm for abrasion resistant work and 25 mm for ordinary surface protection work.

Material

Generally, the materials shall be in accordance with aggregates specification given here under.

Fine aggregate shall consist of natural sand or crushed stone from a known source and shall be strong, hard, coarse, sharp, chemically inert, clean and free from any coating. It shall be free from clay, coal or coal residue, organic or any other impurities that may impair the strength or durability of the concrete and shall conform to IS : 383.

Fine aggregate (Sand) shall be well graded and particles shall range in size within the following limits. The Engineer, may approved the use of any other grading as per requirement or as per IS : 9012.

The fineness modulus shall be preferably between 2.5 and 3.3. Any other value can be used, with prior approval of the Engineer.

Application

After the placement of reinforcement and / or welded mesh and not more than six hours prior to the application of shotcrete, the surface shall be thoroughly cleaned of all loose materials and dirt. The Contractor shall properly prepare the surfaces, reinforcement and / or welded mesh to receive the shotcrete. Cleaned surfaces shall be wetted not more than hour prior to shotcreting.

The mix as placed on surface shall be one part cement to three parts approved sand by mass. Cement and sand shall be dry mixed; not water shall be added after mixing and before using in the gun. The quantity of water when added shall be only that which is sufficient to hydrate the cement. For average atmospheric conditions, the water cement ratio for shotcrete in place shall be between 0.35 and 0.5 by mass. Suitable admixture shall be used wherever required.

A uniform pressure of not less than 3 kg/cm² at the nozzle shall be maintained. Necessary adjustments shall be made to ensure this pressure, taking into account the length of hose and height of the place to be shotcreted, above location of the machine.

TECHNICAL REQUIREMENTS



The application shall proceed in an upward direction. Beams, stiffeners and intermediate walls, if any, shall be wrapped with wire fabric and completely covered with shotcreting. All rebound shall be removed from the area of application as the work progresses and such rebound material shall not be reused.

As soon as the freshly shotcreted surface shows the first dry patches, a fine spray of water shall be applied to keep too moist. After the surface has hardened, it shall be kept continuously moist for minimum seven days. If there is extreme heat, especially when accompanied by hot winds, the shotcreted surface, immediately upon completion, shall be covered with burlap or similar covering, which must be kept continuously moist for 14 days after shotcreting. The temperature of the lining shall not be permitted to exceed 38°C during placing and curing.

5.23.29

VIBRATION ISOLATION SYSTEM

These specifications are meant for the design, supply and erection of vibration isolation system for supporting coal crushers.

Supporting Arrangement

- The crushers shall be supported on vibration isolation system consisting of steel helical springs and viscous dampers. The supporting arrangement for each crusher shall consist of an RCC deck supported on steel helical spring units and viscous damper units which in turn shall be supported on girders. The girders shall be an integral part of the crusher house building.

The part of the structure consisting of the RCC deck, springs and viscous dampers shall hitherto be referred to as "spring supported foundation". The part of the structure, which is below the spring shall hitherto be called "supporting structure".

The Contractor should do the Engineering / design, supply and erection of vibration isolation system consisting of steel helical spring units and viscous dampers supporting the top deck which in turn would support the coal crushers. The vibrations isolation system supplied shall be of a proven make. The Contractor or his sub - contractor who designs and supplies the system should have designed, supplied and installed such systems for not less than five machines of speeds and unbalance forces comparable to the machine proposed by the vendor. The vibration isolation systems installed by the contractor or his sub - contractor in such machines should have been working satisfactorily for atleast five years

5.24.00

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5.25.00

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5.26.00

O&M STORE BUILDING

Salient Features:

The scope of work of the Bidder shall be design & construction of all Civil, Structural and Architectural, water supply, plumbing & sanitary works of the O&M store building including supply of all materials.

The Permanent store Building shall comprise the following:

a) Heavy Material Storage Hall

The Heavy Material storage Hall shall have a Single Bay framed superstructure with RCC/Structural steel columns and structural steel roof truss and purlins supporting pitched roof. The roofing of the Heavy Material store shall be permanently colour coated insulated sandwiched metal sheet. An EOT crane shall be provided with chequered plate walkways

TECHNICAL REQUIREMENTS



at both ends inside the bay of the Heavy Storage Hall. The capacity of the EOT crane shall be 30MT. The clear height up to the bottom of roof truss of the Heavy material storage hall shall be finalized based on equipment/spare to be handled.

b) Light Material Storage Hall

The Light Material Storage Hall with 3 tier Rack system shall have a Single Bay framed superstructure with RCC/Structural steel columns and structural steel roof truss and purlins supporting pitched roof. The roofing of light material store shall be permanently colour coated insulated sandwiched metal sheet. The light material store shall be fully covered with external brick wall of 250mm thickness with provision for doors, windows, rolling shutters as per architectural concept.

c) General Light Material Storage Hall

The GERAL Light Material Store shall be RCC structure with cast in situ RCC beams & slabs. The RCC building shall be two storied and all beam column joints shall be designed and detailed for adequate ductility.

d) Office Complex

Office complex of this store shall be a single storeyed RCC building.

Architectural Features

Total Floor area of the Permanent store building shall be 3000sqm.

The minimum clear floor area of Heavy material storage hall shall be approximately 20% of the total area of the Permanent store with bay width of 15m Heavy material store shall have column free space for easy movement of materials. The Heavy Material storage hall shall be fully covered with external brick wall of 250mm thickness with provisions for doors, windows, rolling shutters as per architectural concept.

The minimum clear floor area of Light Material Storage Hall (with 3 tier storage) shall be approximately 33% of the total floor area of the Permanent Store. The height of the Light Material Storage Hall (with 3 tier rack system) from ground floor slab to bottom of roof truss shall be 10.0m. A part of light material store shall have facility for storing electronic equipment / instruments. This particular area shall be air-conditioned for dust proof environment.

The General Light Material Store shall be two storied building, completely covered with 250mm thick brickwork, doors, windows & rolling shutters. The plan of the building shall be rectangular in shape with minimum floor area of approximately 20% of the total floor area of the Permanent Store.

The area of the office complex building shall be approximately 17% of the total floor area of the Permanent Store, with clear height of 4.0m. The external Wall shall be 250mm thick brick wall with provisions for doors and windows.

The central office shall be provided for management and monitoring the stored materials. Adequate space shall be kept for loading unloading of materials. Office shall space for Supervisor/In-Charge room, general office cum record-documentation area, toilets, pantry, etc. shall be provided as per requirement.

All the above mentioned four buildings shall be interconnected by means of a covered passage 5.0m wide.

External finish shall be of Premium Acrylic Smooth Paint with Silicone additives.

5.27.00

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TECHNICAL REQUIREMENTS



<p>5.28.00</p> <p>5.29.00</p> <p>5.30.00</p> <p>5.31.00</p> <p>5.32.00</p> <p>5.33.00</p> <p>5.34.00</p>	<p>DOZER SHED</p> <p>Architectural Feature</p> <p>This building shall be prefabricated steel framed structure with brick wall up to window sill height & prefabricated insulated double skin metal sheeting cladding above it. Roof of the building shall be prefabricated insulated double skin metal sheeting on steel roof truss. The building shall provide for Dozer shed space, Workshop space, Office Rooms, Stores, Toilet & Pantry as per functional requirement. Minimum size of the dozer shed shall be 500 Sq.m.</p> <p>Metal side cladding shall be composed of different colour shades to match with the other buildings. External finish for brick walls shall be of Premium Acrylic Smooth Paint with Silicone additives</p> <p>DELETED</p> <p>PARKING</p> <p>30 nos. of open car parking and 70 nos. of open scooter parking shall be provided in addition to all other parking requirements specified with buildings.</p> <p>FQA BUILDING</p> <p>FQA building shall be RCC construction of single or double storey. Total area shall be decided based on the requirements based in QA chapter, however, minimum area shall not be less than 800 Sqm. Apart from space required to accommodate and operate all the equipments mentioned in the equipment list, office space for 5 executives, one meeting room, spectroscope room, NDT lab, storage room, welding booth, welding simulator area, platforms for instruments/equipments, ladies and gents toilets, space for water cooler and pantry has to be provided as per specifications mentioned elsewhere in the technical specifications.</p> <p>DELETED</p> <p>Safety Control Room</p> <p>Safety control room shall be a single storyed RCC framed building of minimum area 60sqm to accommodate equipments and personals as mentioned in C&I chapter for 24X7 operation. Additionally, it shall have ladies and gents toilet, space for water cooler and Pantry.</p> <p>BIO TOILET</p> <p>Bio-Toilet shall be provided near all the modular worker's sheds/accommodation, the makeup water pump house building, CHP building outside the plant boundary. Besides these areas, any toilet block provided in area far from plant boundary shall be a Bio-toilet.</p> <p>Bio-toilets shall be made for anaerobic bacterial decomposition of human waste. After decomposition and treatment of the human waste, the residual water from Bio-Toilet shall be: colorless, odorless, devoid of any solid particles and shall have pathogen inactivation by 99%. The water thus obtained shall require no further treatment / waste management and shall be used for irrigation purposes.</p> <p>Bio toilet shall have all fixtures that shall include following fixtures besides the requirements stipulated by DRDO standards.</p> <p>a) One number wall mounted colored (excluding premium colors) glazed vitreous China European water closet and flushing valve system, water faucet, toilet paper holder as per IS:2556</p> <p align="center">OR</p>		
<p align="center">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p align="center">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p align="center">SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT</p>	<p align="center">PAGE 85 OF 86</p>

TECHNICAL REQUIREMENTS



- One number white glazed vitreous China Orissa pan (580 x 440 mm) and flushing valve system, toilet paper holder as per IS:2256
- b) One number colour (excluding premium colors) glazed ceramic oval shaped wash basin 450x 550 mm (approx.) mounted over 20mm thick granite beveled edge counter fitted with photo-voltaic control system for water controls, bottle trap as per IS:2556. For common toilets, number of washbasins shall be as per requirement. However, for Pump Houses the same shall be provided without photo voltaic control system for water control.
 - c) For Male Toilets Urinal as per requirements, with all fittings with photovoltaic control flushing system as per IS: 2556.
 - d) One number looking mirror 600 x 900 x 6 mm, edge mounted with teak beading and minimum 12 mm thick plywood backing, one number stainless towel rail 600 x 20 mm, one number liquid soap dispenser
- Bio toilet/Bio digester shall be comprised of four compartments and a soak pit. The size of the tank shall be as per the number of users. This four-compartment tank shall be constructed underground and shall be made of FRP with required strength as stipulated by DRDO norms. The bio-toilet constructed shall have S-trap and ball valve for ease of operation and maintenance. It shall have all necessary arrangement and fixture for future operation and maintenance as per manufacturer guidelines.

In addition to above sample collection provision (tap/alternate arrangement) to be made before reaching of treated effluent to soak pit. This is to ascertain the quality of effluent at all periods of time and this would also help in the seeding requirement of bacteria.

5.35.00

NON-BIODEGRADABLE BUILDING

The Building shall be as per Tender drawing

5.36.00


WORKER'S ACCOMODATION BUILDINGS

Worker's Accommodation shall be provided as per NBC requirement and Local factory act. The Building design shall be as per Tender Drawing. It shall have Brick wall around the Kitchen, Toilet, bathroom and washing area. It shall have Aerated Concrete panel wall with steel structure having sandwich panel roof sheeting.

5.37.00

OTHER BUILDINGS

For all other buildings mentioned in the scope of work but requirement not furnished in this chapter, the Bidder shall develop the details of such buildings based on the functional and statutory requirements.

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>D-1-6</p> <p>6.01.01</p> <p>6.01.02</p> <p>6.01.03</p> <p>6.02.00</p> <p>6.02.01</p> <p>6.02.02</p>	<p>DESIGN CRITERIA</p> <p>General</p> <p>The design criteria given herein is applicable for all sub-structure, super-structure works/buildings/ facilities and various other works included in the scope of the Bidder.</p> <p>Structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, crane loads, piping loads (static, friction and dynamic), earth pressure & surcharge loads, hydrostatic & hydrodynamic loads, wind loads, seismic loads and temperature loads. In addition, Erection loads, loads and forces developed due to differential settlement shall also be considered.</p> <p>i) All the buildings shall have framed super structure. If the superstructure of building is a steel structure, the framed superstructure shall be moment resisting sway frame in the lateral direction and axially braced in the orthogonal direction. For columns having depth of 1000mm & above, the longitudinal bracings shall comprise a pair of members (spaced) with spacing equal to the column depth. Columns having depth less than 1000mm may have bracing in single plane and at the centerline of column. In both the cases (single bracing or pair of bracing) detailing shall be adequate to restrain the entire column cross-section including both the flanges. Only where axial bracing to one vertical plane is to be waived due to functional requirement, columns in that vertical plane may be allowed to undergo biaxial bending. Beam column joints shall be detailed as per seismic resistant joint with adequate ductility.</p> <p>All 2-legged structural steel trestles shall be completely braced in the vertical plane. All 4-legged structural steel trestles shall be completely braced in all four vertical planes. In addition, specified horizontal planes shall be completely braced to provide stiffness against torsional sway.</p> <p>If the superstructure is RCC structure, the superstructure shall be moment resisting sway frame in both orthogonal direction and all the members shall be designed for biaxial bending. Design of RCC structures shall be done as per IS 456. Detailing for ductility shall be followed as per guidelines of IS13920 to be effective against seismic load. Design of liquid retaining structures shall be done as per IS 3370.</p> <p>ii) The Bunker building, transfer towers, conveyor galleries and trestles, crusher house, boiler, ESP Control Building, ESP supporting structures, including inlet and exhaust duct support structures, Compressor House, Pipe cable Gallery shall have structural steel framed super structure.</p> <p>iii) All other buildings may have either RCC or structural steel framework.</p> <p>iv) All buildings having RCC framing shall have masonry cladding of minimum one masonry unit thickness (not less than 225 mm.) on exterior face.</p> <p>Loading</p> <p>For consideration of loads on structures IS : 875 - 'Code of practice for structural safety of buildings' shall be followed. In addition to the dead load, live load, equipment load (including impact / vibration), Temperature loads etc. various loading conditions arising due to operation and maintenance of equipment shall be considered in the design.</p> <p>Dead loads</p> <p>Dead loads shall include the weight of structure complete with finishes, fixtures and partitions and shall be taken as per IS: 875 (Part-I)</p> <p>Imposed loads</p> <p>Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p>PAGE 1 OF 25</p>
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p>PAGE 1 OF 25</p>	

addition to imposed loads.

For consideration of imposed loads on structures, IS:875 (Part-2) "Code of practice for design loads (other than earthquake) for buildings and structures" shall be followed. The following minimum imposed loads as indicated for some of the important areas shall however be considered for the design. If actual expected load is more than the specified minimum load, then actual load is to be considered.

Sl.No.	Location	Imposed Loads (T/Sq.m.)
A)	Mill and Bunker Bay	
i)	Ground floor	2.5
ii)	Feeder floor	0.50
iii)	Tripper floor	0.50
iv)	Roof	0.15 (Where no equipment are located) 0.50 (Where equipment are located)
		0.075 (For Inaccessible roof)
B)	Turbine Building	
i)	Ground floor (general)	2.50
ii)	Ground floor (heavy equipment storage area)	5.00
iii)	Mezzanine floor	1.00
iv)	Operating floor	
	a) Rotor Removal area	5.00
	b) Equipment lay-down area	3.50
	c) Other areas (corridors, etc.)	1.50
v)	Gratings, chequered floors, walkways, platforms, stairs, etc.,	0.50
vi)	Roof (Where no equipment is located)	0.15
C)	Deaerator and Heater Bay	
i)	H.P/L.P. heater floor	1.00
ii)	Deaerator floor	1.00
iii)	Cable gallery (In addition to this, actual cable load	0.50

	<p>shall be considered)</p> <p>iv) MCC, switchgear and Control building floors 1.00</p> <p>v) Roof (Where no equipment are located) 0.15 (Where equipment are located) 0.5</p> <p>vi) A.H.U Room, Battery Room, Air Washer Room 1.0</p> <p>D) Coal, Bio mass, ,Limestone and Gypsum handling structures</p> <p>i) Roofs 150 kg. / Sq. M. for accessible roofs and 75 kg. / Sq. M. for non - accessible roofs. In addition to this coal dust load (Dead load) of 150 Kg. / sq. m. on flat roofs & 25 kg. / sq. m. on inclined roofs shall also be considered.</p> <p>ii) Conveyor galleries In addition to the live loads, loads due to cable trays, fire fighting / service water pipes shall also be considered @ 125 kg. / m (minimum) on each of the longitudinal girder. Roof-truss members are to be checked for supporting fire fighting pipes/ Service water pipes. Tentative locations and diameter for pipes are shown in Tender Drawing. In addition to this coal dust load (Dead load) of 50 kg. / sq. m. on walkway way shall also be considered.</p> <p>iii) Covers for trenches / channels/ drain Covers for channels & trenches, shall be designed for a live load of 0.4T Sq. M. and loading as mentioned under clause in trenches, whichever is critical.</p> <p>iv) Sumps and tanks and other underground basement type structures/ drain In addition to earth pressure with a surcharge of 2T / Sq. M. (or surcharge due to Railway loading whichever is critical for Railway load bearing structures etc.) and sub - soil water pressure etc. These are also to be designed for the following conditions : i) Water / liquid inside and no earth outside (applicable only to such structures which are liable to be filled up with water or any liquid). ii) Earth with surcharge outside and no water / liquid inside iii) For underground (basement) structures protection against buoyancy during execution and after execution shall</p>
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be ensured without superimposed loadings with minimum factor of safety of 1.2 against buoyancy.

v) Unit weight of bulk materials

- a) For structural design
 - i) Lime stone 1700 kg. / Cu. M.
 - ii) Gypsum 1250 kg. / Cu. M.
 - iii) Coal 1100 kg. / Cu. M.
 - iv) Bio mass 800 kg. / Cu. M.

For sizing calculation

- v) Lime stone 1400 kg. / Cu. M.
- vi) Gypsum 1100 kg. / Cu. M.
- vii) Coal 800 kg. / Cu. M.
- viii) Bio mass 600 kg. / Cu. M.

E) Boiler/ ESP Support Structures

- i. Operating Floors 1.00
- ii. Separator Floor 1.00
- iii. Elevator Machine Room 1.00
- iv. Maintenance Platforms 1.00
- v. Equipment Laydown Loads As per Equipment supplier or 1.00 whichever is more.
- vi. Lift Structure As per Equipment supplier with 100% impact factor

F) Pump Houses
Operating floor 1.50

G) Underground Structures such as Channels, Sumps, Underground Pump House, Tanks, Trenches, Reservoirs, C.W. ducts etc.

In addition to earth pressure and ground water pressure, the surcharge load of 2T/sq.m. shall also be considered for design of all underground structures.

H) Road Culverts/Bridges and its allied structures including RCC Pipe Crossings and Road Crossing of Trenches.


Design for class 'AA' loading (wheeled and tracked both) and checked for class 'A' loading as per IRC Standard.


I) Covers for Channels/trenches 0.40 (General) or central point load of 75 kg whichever is higher
As per IRC Standard (at road crossings for vehicular traffic)


H) Railway Supporting Structures, Rail Culverts As per Railway 'Bridge Rules'





	<p>I) Conveyor Galleries</p> <p>J) General (Unless Specified Otherwise)</p> <p>i) Stairs, Landings and Balconies 0.50</p> <p>ii) Toilets 0.20</p> <p>iii) Chequered plates, grating floors, etc. 0.50</p> <p>iv) RCC floors (General) 0.50</p> <p>v) a) Flat Roofs (where no equipment are located) 0.15</p> <p>b) Flat Roofs (where equipment are located) 0.50</p> <p>c) Inaccessible roof 0.075</p> <p>vi) Inclined Roofs As per IS : 875 (Part-II)</p> <p>vii) Dust load on roof 0.050</p> <p>viii) Walkways (General) 0.50</p> <p>ix) Walkways of conveyor galleries, DM & PT 0.30</p> <p>x) Floor of control room of switchyard control building 1.00</p> <p>xi) Cable and pipe trestles 0.40 for walkway and in addition, friction loads as applicable</p> <p>xii) Grating covers/ Precast RCC covers for drain, trench, sump pit in Ground floor/ paving of BTG area 2.50 As per IRC standard (at road crossings for vehicular traffic)</p> <p>Notes:</p> <p>a) If erection load is higher than the specified imposed loads on any floor or part thereof, then the erection loads are to be considered for the design.</p> <p>b) Additional load for cable, piping/ducting, shall be considered as applicable. For any other structures, the loads specified for those structures elsewhere in the specification shall be followed.</p>	<p>In addition to the live loads, loads due to cable trays, firefighting / service water pipes shall also be considered @125kg/m (minimum) on each of the longitudinal girder.</p> <p>Roof-truss members are to be checked for supporting firefighting pipes/ Service water pipes.</p>
6.02.03	<p>Equipment, piping and associated loads</p> <p>Equipment loads shall be considered over and above the imposed loads. Equipment loads</p>	


CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>6.02.04</p> <p>6.02.05</p> <p>6.02.06</p> <p>6.02.07</p> <p>6.02.08</p> <p>6.02.09</p>	<p>shall be considered as given by equipment supplier.</p> <p>Crane load For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight + trolley weight) shall be considered in the analysis of frame according to the provisions of IS:875. The longitudinal crane surge shall be 5% of the static wheel load. Longitudinal surge and lateral surge shall not be considered to act simultaneously.</p> <p>Seismic load For design of all structures, the site specific seismic design criteria as attached in Annexure-E shall be followed.</p> <p>Wind load For design of all structures, the wind loads shall be taken as per the site specific wind data specified in Annexure–D of this specification.</p> <p>Temperature Load For temperature loading, the total temperature variation shall be considered as 2/3 of the average maximum annual variation in temperature. The average maximum annual variation in temperature for this purpose shall be taken as the difference between the mean of the daily minimum ambient temperature during the coldest month of the year and mean of daily maximum ambient temperature during the hottest month of the year. The structure shall be designed to withstand stresses due to 50% of the total temperature variation. Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns. The maximum distance of the expansion joint shall be as per the provisions of IS 800 and IS 456 for steel and concrete structures respectively.</p> <p>Differential Settlement Loads Structures shall be designed considering an additional load on account of differential settlement of 1 in 1000 between any two adjacent columns, subject to a maximum differential settlement of 8 mm in case of foundations resting on soils & 4mm in case of foundations resting on rock/ pile. These differential settlement loads shall be taken into consideration for design of footings & structures of Boiler & Mill Bunker, ESP supporting structure and Main Power House building. Further, in the analysis of differential settlement loads, adjacent columns interconnected with bracings are preferably to be provided with combined footing. In such cases, where rigid combined foundations are provided below braced columns, differential settlement between those columns needs not be considered. Moreover, when rigid raft is provided, the differential settlement amongst the columns supported on the rigid raft need not be considered. However, the differential settlement between the raft and the adjacent column footing of the same structure are to be considered. In the structural analysis for differential loads, following approach may be considered: All the alternate columns in structure shall be applied downward displacement as described above and analyzed at a time. The resultant forces/ reactions shall be considered with reversible effects for design of structures and footings.</p> <p>Additional Loads Following Minimum additional Loads shall be considered in the design of Steam generator structures, Mill & bunker buildings, Coal handling Transfer points and Trestles (in BTG island) and ESP structure.</p> <p>(a) Cantilever Loads of not less than 2000 kg/m at a distance of 1200 mm from the external face of the columns, on both sides of the ESP, for Cable trays and Walkways.</p>			
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	(b) Cantilever Loads of not less than 500 kg / M at a distance of 1200 mm from the external face of the columns, on both sides of the Steam Generator, for Cable trays and Walkways. (c) Cantilever Loads of not less than 2000 kg / M at a distance of 2500 mm from the external face of the Mill & Bunker Building columns, CHP transfer point columns/ VGTU columns & conveyor gallery trestles (on one side) for Cable trays and Walkways. (d) Dry Fly Ash Piping Loads. (e) Ash Water Piping Loads. (f) Supply Air and Instrument Air Piping. (g) Service Water Piping (h) Loads associated with Coal Handling Plant equipment			
6.03.00	Civil Design Concepts			
6.03.01	Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.,			
6.03.02	The different load combinations shall be taken as per IS: 875 (Part-5) and other relevant IS Codes. a) Wind and seismic forces shall not be considered to act simultaneously. b) For the design of main plant structures during seismic condition, the deaerator feed water tank shall be considered full upto operating level. However, for other load combinations, deaerator feed water tank in flooded condition shall be considered. c) 'Lifted load' of crane shall not be considered during seismic condition. d) In case two cranes are provided and tandem operation is not envisaged, the load shall be taken as one crane fully loaded and second crane without lifted load but standing idle adjacent to first crane all through the building length (lifted load near to A/B Row). e) In case two cranes are provided and tandem operation is envisaged then the crane wheel loads shall be taken as both the cranes fully loaded to capacity and travelling side by side all through the building length. f) Permissible stresses for different load combinations shall be taken as per relevant IS and IRS codes. g) For the design of pipe/cable supporting structure, the soil weight shall be considered as backfilled up to grade level for the condition of pipe running full/cables in position. h) Frictional forces between the pipes and supporting structure in longitudinal direction need not be considered along with seismic or wind forces. i) Paving in crane corridor shall be designed for the maximum load due to movement of crane. j) In TG bay at crane rail level, chequered plate walkway with handrails shall be provided for entire column sectional depth for full length of the building. Walkway width clearance from the face of the column to the edge of the crane shall be as specified elsewhere in the specification. k) For checking against uplift / tension case, 90% of Dead Loads with no Imposed Loads shall be considered along with other Loads. l) The Structures shall be Designed for most unfavourable Combination of Dead Loads, Imposed Loads, Equipment Loads, Piping / Cables / Ducts Loads, Wind / Seismic Loads, Temperature Loads, Ash Loads, and other applicable Loads without exceeding the Permissible Stresses. No reduction in equipment loads, piping loads, ash loads and loads due to other			
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	<p>permanent facilities shall be considered for calculation of seismic weight of the building/structure and for load combinations thereof.</p> <p>m) In all Loading Combinations, the Loads that have reduction effect on design condition shall not be taken into account in the Combination concerned.</p> <p>n) Where wind load is the main load acting on structure, no increase in stresses is to be considered for design of Structure and Foundation bolts. This includes structures like Transfer Points and Conveyor Trestles.</p> <p>o) In all Load Combinations, differential settlement loads (with reversible effects) are to be considered. Limit State Design as per IS 800 2007</p>		
6.03.03	<p>Design of steel structures shall be done by the working stress method. Design shall be as per provisions of IS:800:1984 and other relevant IS standards. For design of coal bins and loading hopper IS:9178 (part I to III) shall be followed.</p>		
6.03.04	<p>Shop connections will be welded type and all field connections will be bolted. Field permanent bolts wherever provided will be high tensile bolts of property class 8.8(min) as per 1367 for all major connections. However, nominal connections in the field like purlins, stairs, wall beams will be done by means of M.S. black bolts of grade 4.6 conforming to IS-1367. The bolted joints will be designed for friction grip or bearing type. For friction grip type connections, bolts will be tightened to develop the required pretension during their installation.</p> <p>For bolted Connection, IS 4000, IS: 3757, IS: 6623 and IS: 6649 shall be followed. IS 814, IS 816, IS: 1024, IS 4353 and IS: 9595 shall be followed for welding of structures.</p>		
6.03.05	<p>All structures close to railway line shall have clearances conforming to Railway norms.</p>		
6.03.06	<p>For calculation of coal load on moving conveyor, a multiplication factor of 1.6 shall be used to take care of inertia force, casual over burden and impact factor, etc. Thus coal load per unit length of each moving conveyor shall be</p> $\frac{1.6 \times (\text{rated capacity of conveyor system})}{\text{Conveyor speed}} \times \frac{1100}{800}$		
6.03.07	<p>a) Conveyor gallery structure and trestles shall be designed considering both conveyors operating simultaneously</p> <p>b) Dynamic analysis of conveyor galleries and conveyor supporting system shall be carried out for spans greater than 25 m.</p> <p>c) All structures close to railway line shall have clearances conforming to Railway norms.</p>		
6.03.08	<p>Coal, Biomass, Limestone and Gypsum handling structures:</p> <p>The loads for all railway load bearing structures e. g. wagon tippler, tunnel, culverts and under ground transfer houses etc. and the analysis and the design of these structures shall be made strictly in accordance with the provisions of Indian Railway Bridge rules (latest edition), and Indian Railway Codes of practice (latest edition) with all amendments up to the date of opening of bids. The axle load for analysis and design shall be considered as “DFC loading (32.5t axle load)” of Heavy mineral loading as per Indian railway standard. Coal heap of 1.2m height shall be considered above hopper top for design of hopper and supporting elements of wagon tippler. The analysis, design and detailed drawing for tunnel, under ground transfer houses, culverts etc. coming directly below the railway track shall be got approved by the contractor from the concerned railway authorities before taking up construction. All necessary payment for the above work shall be made by the bidder to the railway authority.</p> <p>The steel structures shall be designed and fabricated as per ‘code of practice for use of structural steel in general building construction’, IS : 800 and other relevant IS Standards. Minimum size of the angle section to be used as structural members shall be 50 X 50 X 6.</p>		
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	<p>Minimum weld size shall be 6 mm. The steel structures using tubular sections shall be designed and fabricated as per IS:806-“code of practice for use of steel tubes in general building construction.” and EN 1993-1-8:2005. Minimum grade of steel & thickness of Tubular/Hollow sections shall be Yst 240 Mpa & 4.0mm respectively. Minimum thickness for rolled/ built up section shall be 6mm.</p> <p>Slotted holes shall not be assumed to act as expansion joint for relieving of stresses and suitable bearings shall be provided at the supports.</p> <p>All gallery supporting trestles shall be so proportioned that the transverse deflection of gallery due to wind / seismic load should not exceed trestle height / 1000 as stipulated in IS: 11592. Peak wind speed method shall be considered for checking the transverse deflection. Longitudinal deflection for all conveyor trestles (along the conveyor direction) shall be Height/500 for peak wind speed.</p> <p>Vertical & horizontal deflection of conveyor gallery shall be restricted to span/500.</p> <p>The crusher and transfer house structures shall be so designed that transverse deflection at places where conveyor galleries meet, should be equal to the respective transverse deflection of conveyor supporting trestles.</p> <p>For transfer house and crusher houses monorail loads of two floors having highest capacity of monorails shall be considered in addition to other gravity loads along with wind/seismic load. Wind load/seismic load shall be considered along with Running belt tension for the analysis of transfer house and crusher house, however monorail load may not be considered.</p> <p>Stresses for all CHP structures shall be checked for the higher of the forces obtained from gust factor method and the peak wind speed method.</p> <p>The permissible vertical deflection for beams supporting drive machinery shall be restricted to span / 500 and for other beams it shall be within span / 325.</p> <p>Horizontal bracing system shall be provided at floor levels around the openings for plan area greater than 2 sqm.</p> <p>Shear force in steel columns shall be transferred to the pedestals / foundations exclusively either through foundation bolts or the shear key arrangement.</p> <p>Contractor can also use tubular steel sections for roof truss of conveyor galleries/cable trestle only.</p> <p>For design of liquid retaining structures, IS : 3370 (Part - I to IV) (latest) shall be followed. Face of the structure in contact with liquid shall be designed as un - cracked section. For design of RCC pipes for culverts, latest editions of IS: 458, IS: 783 should be followed.</p> <p>For design of all underground structures / foundations, ground water table shall be assumed at the formation level (i. e. the adjoining ground level).For all underground structures like wagon tippler/track hopper, tunnels and underground transfer points crack width shall be restricted to 0.2 mm.</p> <p>Design of Hopper walls shall be done for both Static & Dynamic flow condition using Walker's theory.</p>		
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<p>6.03.08.01</p> <p>6.03.08.02</p> <p>6.03.08.03</p> <p>6.03.08.04</p> <p>6.03.08.05</p> <p>6.03.08.06</p> <p>6.03.08.07</p> <p>6.03.08.08</p> <p>6.03.08.09</p>	<p>For foundations of transfer points, crusher house & trestles, pedestals of isolated footings/pile caps shall necessarily be tied with RCC beams. For all RCC buildings, tie beams shall be provided at lintel level. Design of masonry walls shall be made as per IS : 1905.</p> <p>For metal roofing and side cladding, the spacing of purlins/runners shall be such that the deflection of metal sheet used is limited to span/250 under adverse loading condition.</p> <p>Minimum reinforcement (0.12% of total coss sectional area in each direction) shall be provided at the top face of the footing, even if, no reinforcements are required as per design</p> <p>All liquid retaining structures shall be designed for following load conditions.</p> <p>Underground structures:</p> <ol style="list-style-type: none"> a. Water filled inside up to design level and no earth outside. b. Earth pressure with surcharge of 2.0 T/m² and ground water table up to FGL outside and no water inside. c. Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure. d. The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table. <p>For design of over - ground liquid retaining structures appropriate load cases shall be considered.</p> <p>All liquid retaining structures shall be designed by working stress method as given in clause 4.5 of IS 3370(Part2).</p> <p>In the wall of liquid retaining structures with cylindrical shape such as clarifiers, vertical reinforcement shall be checked assuming the walls were fully fixed at the base, and the horizontal reinforcement shall be provided to resist horizontal (hoop) tension assuming hinged condition at the junction of the base slab & wall.</p> <p>Wherever sandwich slabs are provided in liquid retaining structures to take care of stability against uplift, only well graded sand of approved quality shall be used as fill material. The sand compaction shall be done with plate / disc compactors in such a manner that the bottom slab is not structurally damaged.</p> <p>Clear free board of at least 300 mm above design (total) water level shall be provided in all liquid retaining / conveying structures.</p> <p>Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.</p> <p>The minimum concrete clear cover to reinforcement bars in all RCC structures shall be as per IS:456 and IS:3370(Part II) for water retaining structures. Durability of concrete shall conform to moderate exposure conditions as per Table-3 of IS 456 except noted specifically otherwise.</p> <p>Factor of safety against overturning and sliding</p> <p>The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.</p> <p>For detailing of Reinforcement IS 5525, IS 13920, IS 4326 and SP 34 shall be followed.</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p style="text-align: center;">PAGE 10 OF 25</p>
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6.03.08.10	Two layers of reinforcement (on both faces) shall be provided for RCC sections having thickness of 150 mm and above.			
6.03.08.11	Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows:			
	Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Stirrups/ ties/ Anchor Bars
	a)	Foundation	12 mm	10 mm
	b)	Beams	12 mm	8 mm
	c)	Columns	12 mm	8mm
6.03.08.12	Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.			
6.03.08.13	Buildings shall also comply to IS 4326 requirement-			
6.03.08.14	Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area.			
6.03.08.15	The sizing of foundation, design criteria & clear cover shall conform to IS:1904, IS:456 and other relevant Indian codes. However, minimum 0.12% of reinforcement shall be provided on the top face of the foundation concrete on either direction and minimum percentage of reinforcement at bottom face of foundation shall be same as that stipulated for beam as per IS:456.			
6.03.08.16	Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.			
6.03.08.17	Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains & launders) shall be 200mm. Effluent drains (depth more than 500mm) and launders shall have minimum element thickness of 150mm.			
6.03.08.18	All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter or 6mm flats. Edge protection angles shall be provided as specified elsewhere.			
6.03.08.19	All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.			
6.03.08.20	2.0m wide walkway with concrete paving shall be provided connecting all structures, buildings and facilities. The top of walkway shall be minimum 200mm above FGL.			
6.03.08.21	Design Requirements for Crusher Foundation			
6.03.08.21.2	Dynamic Analysis			
	Detailed dynamic analysis shall be done for the top deck together with springs and dampers and the natural frequencies and amplitudes of vibration shall be determined. A mathematical model of the top deck shall be formulated with three - dimensional beam / plate finite elements for the purpose of analysis with the spring idealised with vertical and horizontal stiffnesses. The mass of the machine together with that of the top deck shall be considered for the analysis.			
	Natural frequencies upto at least 10 % above the operating speed shall be determined and these frequencies shall be checked against the design criteria.			
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	<p>Forced response dynamic analysis shall be carried out for the operating condition unbalance forces using a sinusoidal forcing function. Unbalance forces as given by this specifications shall be used for his purpose. The amplitudes shall be checked against the design criteria. The dynamic forces from this analysis shall be used for structural design with a suitable fatigue factor.</p> <p>Isolation Efficiency</p> <p>The vibration isolation system shall be designed for about 90 % isolation efficiency.</p> <p>De-coupling</p> <p>A ratio of the least 10 (ten) shall be ensured between the stiffness of the supporting structure and the stiffness of the spring system in the vertical direction to achieve de-coupling between the two (the stiffness of the spring system being lower). This ensures that dynamic analysis of the supporting structure need not be carried out.</p> <p>Frequency Criteria</p> <p>The frequency criterion has already been laid down implicitly by the isolation efficiency criteria and de-coupling required.</p> <p>The first bending mode frequency of the top deck shall be at least 20 % above the operating speed.</p> <p>Unbalance Forces</p> <p>Unbalance forces arising out of all the following cases shall be considered for checking the design and amplitudes.</p> <ol style="list-style-type: none"> I. Balance quality grade G 16 as per IS/ISO:21940-11. II. One hammer broken condition. The missing hammer shall be assumed to be closest to the crusher non - drive end of the crusher. III. Three hammers broken condition. All the three hammers broken shall be assumed to be from the same suspension bar and located at the non - drive end of the crusher. <p>Amplitude Criteria</p> <p>The calculated amplitudes (mean to peak values) shall not exceed following limits under the specified conditions.</p> <p>Operating speed of 750 RPM</p> <ol style="list-style-type: none"> I. 150 microns for an unbalance force arising out of balance quality grade G 16 as per IS/ISO:21940-11-2016. II. 300 microns in case of a one hammer broken condition. 		
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6.03.09	<p>III. Amplitudes need not be checked for a three hammer broken condition.</p> <p>Operating speed of 450 RPM</p> <p>I. 200 microns for an imbalance force arising out of balance quality grade G 16 as per IS/ISO:21940-11.</p> <p>II. 400 microns in case of a one hammers broken condition.</p> <p>III. Amplitude need not be checked for a three hammer broken condition.</p> <p>For intermediate operating speed between 450 to 750 RPM the amplitude limits can be linearly interpolated.</p> <p>The amplitude limits mentioned above are in both vertical and horizontal directions. The amplitudes shall be calculated at critical points on the top surface of the RCC deck. The amplitudes shall be checked for the most unfavorable superposition of modes in any direction. However, phase difference between the maximum amplitude occurring in different directions due to the rotating vector may be considered while superimposing the modes.</p> <p>Transient Resonance</p> <p>Transient resonance, which may occur during the start - up or coasting down condition of the crusher, shall be checked, and the amplitudes in such a condition should not exceed one - and - half times those at operating speed for each design condition.</p> <p>Strength Criteria</p> <p>The following criteria shall apply for the design of top deck :</p> <p>a) Dead loads, live loads, Seismic loads and dynamic loads shall be considered for the design. The most unfavorable combination shall considered for design.</p> <p>b) Seismic loads shall be assumed to act together with dynamic loads for a one millimeter eccentricity in the rotor. However, seismic loads and dynamic loads arising out of hammer breakage need not be considered together</p> <p>c) Fatigue shall be considered while designing for dynamic forces. A fatigue factor of 2.0 shall be used on all dynamic forces to arrive at the equivalent static force for the purpose of design.</p> <p>d) Working stress method shall be used for the design of RCC deck. In survival condition, 10 % overstressing may be permitted.</p> <p>e) The RCC top deck shall be at least of M35 grade of concrete as per IS : 456.</p> <p>f) Fatigue need not be considered for the three hammer broken condition.</p> <p>g) For calculating unbalance forces, the heaviest hammer (plain or toothed) shall be considered.</p> <p>Horizontal Deflection criteria</p>			
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The maximum Horizontal Deflection for various structures shall not exceed and be limited to the following:


Sl. No.	Description	Maximum value of
1.	For Trestles and transfer points (Transverse deflection at Conveyor gallery supporting level)	Height/1000 (For Wind load by Peak Wind Speed Method / Seismic Load)
2.	For ESP Control Building, Compressor House, and all other steel buildings envisaged in this specification	Height /325
3.	Vertical Metal Sheeting in Cladding	Span/250


However, the maximum deflection of Grating / Chequered Plate Shall be limited to 6mm.


Note: Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.

Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than "5" and/or if the fundamental frequency of the structure is less than 1 Hz.

- 6.03.10 a) Dispersion of load in any direction through soil shall be as per IS 8009 (relevant part).
- b) Dispersion of load through concrete shall be considered at an angle of 45 degrees with horizontal from the edge of contact area.
- 6.03.11 a) Permissible deflection (unless specified otherwise in this specification) for latticed framework and beams of floors other than drive floor shall be span/325.
- b) The allowable deflection for beams directly supporting drive machinery and equipment shall be restricted to span/500 unless specified otherwise in this specification.
- c) The deflection for manually operated cranes & monorail supporting beams shall not exceed span/500.
For electric overhead cranes :
 - 1) upto 50 Tonne capacity : span/750
 - 2) over 50 Tonne capacity : span/1000
- d) The vertical deflection of beams supporting LP Heater, HP Heater and Deaerator shall be limited to Span/500.
- e) The vertical deflection of metal deck sheet for floor shall be limited to span/250.
- f) Permissible deflection for all purlins, cladding runners, roofing/cladding sheets and grating / chequered plates shall be span/250. However, the maximum vertical deflection of Grating/ Chequered plate shall be limited to 6 mm.
- 6.03.12 Transverse coal pressure on Bunker/Silo/Hopper walls shall be calculated as per IS: 9178. The Coal Bunker/Silo/Hopper shall be designed for the following conditions
 - i) The Bunker/Silo/Hopper is full up to its full capacity with top surface nearly horizontal.
 - ii) The Bunker/Silo/Hopper is partially empty with the top surface of coal at an angle of


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6.03.13	<p style="text-align: center;">repose of 37 degrees.</p> <p>Design criteria for ash silo</p> <ol style="list-style-type: none"> 1. The pressure due to ash filling on the side wall and the bottom portion of ash bins/silos shall be taken as the maximum of (a) static pressure determined in accordance with the Jansen's formula multiplied by an impact factor of 1.4 and (b) pressure determined as per Walker's formula for static as well as dynamic conditions. The silo shall be designed for the following conditions: <ol style="list-style-type: none"> (a) The silo is full up to its full height / capacity (b) The silo is partially empty with top surface of ash, at an angle of repose less than 30 degrees. 2. The following loads are to be considered for design. <ol style="list-style-type: none"> a) Density of bottom ash to be considered for volume calculation shall be 650 kg./cum. b) Density of bottom ash to be considered for load calculation shall be 1600 kg/cum. c) Density of fly ash to be considered for volume calculation shall be 750 kg/cum. d) Density of fly ash to be considered for load calculation shall be 1600 kg./cum. e) Density of dry fly ash, to be considered for the design of supporting structures for dry fly ash conveying pipes, shall be taken as 1000 kg/cum. The pipe shall be considered full with dry fly ash. 3. Other requirements are as follows: <ol style="list-style-type: none"> a) Independent supporting structure shall be provided for each silo. b) The joint between the wall and roof of the silo shall be properly sealed by welding or by any other approved means. c) Operating platform covering total plan area wise in silo structure made of grating shall be provided below the hopper outlet. d) The bracing system shall be provided in such a way that the trucks and closed tankers can have a clear passage to approach the underside of the silos for unloading dry ash from the silos. 4. Trestles supporting ash pipes shall be so proportioned that the transverse deflection of trestles due to wind/seismic load shall not exceed trestle height/325. 5. The corrosion allowance for design of Silo, Buffer Hopper, Bottom ash hopper, tanks etc. shall be considered as per IS9178 considering structure exposed to atmosphere. The corrosion allowance shall be provided in addition to the requirement of minimum thickness of steel plate as per IS9178. 			
6.03.14	<p>Coal Bunker (inside Mill Bunker Building) shall be of MS while the hopper shall be of MS with stainless steel (grade SS 304) lining. The minimum thickness of MS plate and SS lining in hopper portion shall be as per the design concept of Mill Bunker Building specified elsewhere in the specification. Pre-formed flexible open ended bellow strap of neoprene is to be provided between top of bunker and bottom of tripper floor to avoid coal dust leakage / escape. The bellow strap shall be of minimum 200 mm wide under un-stretched condition and shall be of minimum 2mm thick.</p> <p>The hopper angle with the horizontal plane be as specified elsewhere in the specification.</p>			
6.03.15	<p>The live storage capacity of each coal bunker shall be greater of the following:</p> <ol style="list-style-type: none"> a) Total 10 hours biomass blended coal requirement of the boiler for BMCR duty with 			
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA	PAGE 15 OF 25	


CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>6.03.16</p> <p>6.03.16</p> <p>6.03.17</p>	<p>worst coal firing, equally distributed over the number of bunkers (i.e. the coal mills) required in service for this duty condition as specified elsewhere.</p> <p>b) Total 10 hours biomass blended coal requirement of the boiler for BMCR duty with design coal firing, equally distributed over the number of bunkers (i.e. the coal mills) required in service for this duty condition as specified elsewhere.</p> <p>c) Total 10 hours biomass blended coal requirement of the boiler for TMCR duty with worst coal firing, equally distributed over the number of bunkers (i.e. the coal mills) required to be in service for this duty condition as specified elsewhere.</p> <p>For all capacity (volume) calculation and structural design (load calculation) unit weight of biomass blended coal shall be assumed as 760 kg/cum. and 1100 kg/cum respectively.</p> <p>a) The design and construction of RCC structures shall be carried out as per IS: 456. Working stress method shall be adopted for the design wherever specifically mentioned in this specification.</p> <p>b) For design and construction of steel-concrete composite members, IS: 11384 shall be followed.</p> <p>c) For reinforcement detailing, IS 5525 and SP 34 shall be followed.</p> <p>d) Two layers of reinforcement (on both inner and outer faces) shall be provided for RCC wall sections having thickness 150 mm or more.</p> <p>a) Design of Foundation for Coal Mills and Fans</p> <p>Structural Arrangement of foundations for various machine foundations like TG, TDBFP, MDBFP, Coal Mills and Fans shall be as specified elsewhere in the specification.</p> <p>Analysis for the foundation</p> <p>For the foundations of the all equipment, details static and dynamic analysis shall be done. The static analysis shall include all operating condition, load cases and abnormal loads like short circuit, loss of blades & unbalance and seismic forces as per IS1893. The dynamic analysis shall consist of free vibration analysis and forced vibration analysis. A minimum fatigue factor of 2.0 shall be considered for dynamic forces.</p> <p>The vibration amplitudes shall be calculated at the machine bearing locations and at any other points of interest by a forced response analysis. The unbalance forces used for this analysis shall correspond to the balance quality grade of the machine as per ISO 1940 /IS:11723 or the unbalance forces as provided by the machine manufacturer whichever is higher. It shall be ensured that the calculated amplitudes do not exceed the limits specified by the machine manufacturer and relevant Standards such as ISO 10816/IS:14817.</p> <p>Bidder to consider the acceleration at the top of the deck for the design of supporting / fixing arrangement of machine.</p> <p>Design criteria for steel helical springs and viscous dampers</p> <p>The isolation efficiency for steel helical springs and viscous dampers shall be at least 90%. The ratio of actual spring supported weight to the nominal spring capacity shall not exceed 0.80. At least 5% to 10% of critical damping shall be provided in the form of viscous dampers.</p> <p>Reinforcement Design</p> <p>Working stress method as per IS 456 shall be used for reinforcement design. The design shall be done for the worst load combination. Minimum reinforcement shall be provided as per IS 456 and IS2974 (Part-III), if the calculated reinforcement is less than the minimum.</p> <p>For TG Raft/ Pilecap, minimum percentage of reinforcement at top and bottom faces of foundation shall be same as that stipulated for beam as per IS456.</p> <p>c) Block Foundations:</p>			
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p>PAGE 16 OF 25</p>	


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6.03.18	<p>Block foundation resting on soil shall be analyzed using elastic half space theory. In case the foundation is supported over piles, Novak's approximation shall be used for determining the spring constant and damping ratio of pile groups. The mass of the RCC block shall be at least three times the mass of machine. Free vibration analysis of the foundation shall be carried out to evaluate the natural frequencies. The fundamental natural frequency shall be kept at least 20% away from the operating frequency (speed). Forced vibration analysis shall be carried out if the dynamic forces are made available by the machine supplier in which case the amplitude limits stipulated by the machine supplier and ISO 10816, whichever is lower, shall be satisfied.</p> <p>Reinforcement design shall be done by working stress method as per IS 456 and IS 2974 (Part-IV).</p> <p>For the foundations supporting minor rotating equipment weighing less than one ton or if the mass of the rotating parts is less than one hundredth of the mass of the foundation, no dynamic analysis is necessary. However, if such minor equipment is to be supported on building structure, floors, etc., suitable vibration isolation shall be provided by means of springs, neoprene pads, etc., and such vibration isolation system shall be designed suitably.</p> <p>If RCC floor/roof is assumed to act as diaphragm, transmitting lateral loads to braced bays, it shall be provided with shear connectors.</p> <p>The spacing of shear anchor studs on structural beams shall be minimum of the spacing required for</p> <ul style="list-style-type: none"> i) Restraining the compression flanges of beams and ii) Transfer of the horizontal shear at floor/roof to the supporting beams. <p>However, whenever large / more number of cut-outs are provided in the floor slab, horizontal floor bracings shall be provided below slab to transfer horizontal force to columns without considering diaphragm action from slab.</p>		
6.03.19	<p>All roads shall be rigid pavements specified elsewhere in this specification. The design traffic load shall be a minimum 4 million cumulative standard axle. The design of concrete pavement shall be carried out as per IRC-58.</p>		
6.03.20	<ul style="list-style-type: none"> a) No cable/pipe trench is envisaged in the plant area. However, if required, pipe/cable trench can be provided inside the buildings and inside switchyard or some other localised areas. b) All pipes and cable shall generally be routed above ground. c) A minimum clearance (clear headroom) of 8m shall be kept for all over-ground pipe/cable trestles for all road/rail crossings. For other areas, the requirement of trestle height is specified elsewhere in the specifications. All trestles shall be provided with continuous walkway of minimum 600mm width with hand-rails and toe-guards all along the length of the trestle along with approach ladders near roads, passageways, etc. Before and after the road/rail crossings, a barrier of suitable height shall be constructed so as to prevent the approach of cranes (having height more than 8 m) etc., upto the pipe/cable racks/trestles. d) Within AB bay in Main plant area, generally grating shall be provided for Mezzanine floor except for valve room area, cable spreader floor, air washer units, feed water heaters, equipment foundations, miscellaneous skids, etc. where the floor shall be of RCC. Oil equipment room shall also have RCC floor below the grating floor. 		
6.03.21	<p>The maximum velocity for pipe drains and open drains shall be limited to 2.4m/sec and 1.8 m/sec. respectively. However, minimum velocity of 0.6m/sec. for self-cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. The open drains shall be open rectangular drains of RCC unless required otherwise due to functional requirement. RC box culverts shall be provided at rail, road or other crossings.</p>		
6.03.22	<p>Sewers shall be designed for a minimum self-cleansing velocity of 0.75m/sec and the maximum velocity shall not exceed 2.4m/sec.</p>		
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<p>6.03.22</p> <p>6.03.23</p> <p>6.03.24</p> <p>6.03.24</p> <p>6.03.25</p>	<p>Manual on sewerage and sewage treatment (published by Central Public Health Environment Engineering Organisation, Government of India) shall be followed for design purpose.</p> <p>Foundations for all tanks shall be designed for as per IS: 803.</p> <p>Footings shall be so proportioned to as to minimise the differential settlement.</p> <p>Plinth level of all buildings shall be kept at least 500 mm above the finished grade/formation level.</p> <p>Boiler/ ESP support structures shall be designed for:</p> <ol style="list-style-type: none"> a. Dead load b. Live/Imposed loads c. Static and dynamic loads of piping, movable equipment and maintenance parts. d. Loads from cable trays and walkways supported on columns. e. Ash water piping supported on the outermost row of boiler columns. f. All ESP hoppers filled up with ash upto the top of the hoppers or the bottom of electrodes (whichever is more) using a bulk density of not less than 1350 kg/cu.m. for the ash, along with additional ash build-up from the end of the third field up to the inlet duct bottom level at a natural repose angle (not less than 30 degree to horizontal in any case). g. Ash load at bottom ash hopper and pent house of the boiler shall be as mentioned in the mechanical chapter of the specifications. h. Seismic and wind loads as specified elsewhere in the specifications. i. Temperature Loads. j. Temperature variations under ESP operating condition. k. The loads listed above indicate the minimum requirements. l. For the Design of ESP Supporting Structures for Seismic, Ash Load in Hoppers filled upto to the top of the Hoppers or bottom of the electrode (whichever is higher) shall be considered as permanent Loads along with other applicable Loads. m. Following Ash density shall be considered for the Design : <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sl. No.</th> <th style="text-align: left;">Description</th> <th style="text-align: left;">Density (kg/Cu. M.)</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Bottom Ash for volume calculations</td> <td>650</td> </tr> <tr> <td>b)</td> <td>Bottom Ash for Load calculations</td> <td>1600</td> </tr> <tr> <td>c)</td> <td>Fly Ash for volume calculations (For Boiler)</td> <td>750</td> </tr> <tr> <td>d)</td> <td>Fly Ash for volume calculations (For ESP)</td> <td>650</td> </tr> <tr> <td>e)</td> <td>Fly Ash for Load calculations</td> <td>1350</td> </tr> <tr> <td>f)</td> <td>Dry Fly Ash for dry fly ash Pipeline supporting Structures (Pipe to be considered full)</td> <td>1000</td> </tr> </tbody> </table>	Sl. No.	Description	Density (kg/Cu. M.)	a)	Bottom Ash for volume calculations	650	b)	Bottom Ash for Load calculations	1600	c)	Fly Ash for volume calculations (For Boiler)	750	d)	Fly Ash for volume calculations (For ESP)	650	e)	Fly Ash for Load calculations	1350	f)	Dry Fly Ash for dry fly ash Pipeline supporting Structures (Pipe to be considered full)	1000
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	Boiler supporting structures shall be so configured that the temperature of steel does not																					

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<p>6.03.26</p> <p>6.03.27</p> <p>6.03.28</p> <p>6.03.29</p> <p>6.03.30</p>	<p>exceed 60 °C unless specified otherwise. Brackets shall be provided on both sides of the outermost row of columns of both the boiler and ESP for supporting cable trays and walkways, at a height not exceeding 10.0 m. The exact levels shall, however, be decided during detailed engineering. Each ESP hopper shall be supported at four corners by providing four columns from the ground.</p> <p>The bracings in boiler structure shall be provided such that under no circumstance normal/convenient access to all points in the boiler is blocked or obstructed.</p> <p>In design of boiler/ ESP support structures, dynamic piping loads need not be considered acting simultaneously with wind or seismic loads. Increase in permissible stresses shall be allowed in load combinations where dynamic piping loads are considered and shall be as permitted under seismic load conditions.</p> <p>Design Criteria for foundations and some other facilities/areas are covered separately in this specification.</p> <p>Plinth level of all buildings shall be kept at least 500 mm above the finished grade/formation level.</p> <p>Finished floor level of boiler area paving shall be kept about 200 mm lower than the finished floor level of Main Plant buildings.</p> <p>6.03.30 Joints/Connections in steel structures:</p> <p>Steel structures shall be detailed and connection and joints provided as per the provisions of IS 800, IS 816, IS 9595, IS 1367, and IS 9178 and as per following requirements.</p> <p>a) Connection of vertical bracings with connection members and diagonals of truss members shall be designed for full tensile capacity of the bracings unless actual loads are indicated on the drawings.</p> <p>b) Size of fillet weld for flange to web connection for built up section shall be as follows:</p> <p>i) For box section weld size shall be designed for full shear capacity or actual shear whichever is more. Where fillet weld is not possible, full penetration butt weld shall be provided.</p> <p>ii) For built up I section, weld size shall be designed for 80% of full shear capacity or actual shear, (if indicated, in drawings) whichever is more. However, weld size shall not be less than 0.5 times the web thickness. Weld shall be double fillet.</p> <p>iii) All welds shall be continuous unless otherwise specifically approved. The minimum size of the fillet weld shall be 6mm.</p> <p>c) Shear connections shall be designed for 60% of section strength for rolled sections and 80% of section strength for built up section or rolled section with cover plates. However, if load is more than above, the connection shall be designed for actual load.</p> <p>d) Moment connections between beam and column shall be designed for 100% of moment capacity of the beam section.</p> <p>e) All butt welds shall be full penetration butt welds.</p> <p>f) The connection between top flange and web of crane girder shall be full penetration butt weld. Bottom flange, connection with web can be fillet weld or butt weld as directed by Engineer.</p> <p>g) Connection of base plate and associated stiffeners with the columns shall be designed considering the total load transferred through welds. However, minimum weld size (double fillet) shall not be less than 0.6 times the thickness of stiffeners.</p> <p>h) Splicing: All work shall be full strength. Field splicing shall be done with web and flange cover plates for full strength. Shop splicing for all sections other than rolled shall be</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p style="text-align: center;">PAGE 19 OF 25</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
6.03.31	<p>carried out by full penetration butt welds with no cover plates. Splicing for all rolled sections shall be carried out using web and flange cover plate.</p> <p>Pipe Pedestals, pipe supports and other structures for Ash handling system:</p> <p>a) The design of Pipe Pedestal and pipe supports shall be carried out considering Dead load, live load & seismic load / wind load. In addition to above, longitudinal forces equal to product of Co - efficient of friction (between contact surface of pipe and pedestal) with the load coming on each pedestal shall also be considered for the design of pedestal. In bends, suitable thrust block shall be provided to withstand the thrusts transferred from the pipelines.</p> <p>b) All RCC pipes carrying water under gravity shall be designed for earth pressure, water and surcharge. Minimum grade of pipe shall be of NP - 2 class or heavier required as per design / specification.</p> <p>c) The design and construction of RCC structures shall be carried out as per IS: 456. In general, limit state theory shall be followed for the design of RCC structures, however, working stress method shall be adopted for the design, wherever specifically mentioned in this specification.</p> <p>d) Two layers of reinforcement (on inner and outer face) shall be provided for RCC wall sections having thickness 150mm and above.</p>		
6.03.32	<p>Design Criteria of RCC Floors</p> <p>a) For Mill Bunker Building, Main Power House, ESP Control Building, Transfer Houses, and other structural steel framed buildings:</p> <p>These buildings being steel framed structure, all RCC floors shall comprise RCC slab supported on troughed, profiled metal deck sheet (to be used as permanent shuttering). The RCC slab shall be minimum 150mm thick above the top surface (crest) of the metal deck sheet. The spacing of structural steel secondary beams shall be based on the bending capacity of the metal deck sheet for self-weight of green concrete and additional construction load of 100 kg/m².</p> <p>The permanent metal deck sheets shall be fixed to the top flange of secondary beams by means of drawn arc welding of headed shear anchor studs directly through the metal sheet. The details of shear anchor studs are specified elsewhere in this specification.</p> <p>The RCC slab shall be designed without considering any composite action effect of metal deck sheet (i.e. the structural strength of metal deck sheet shall not be considered for RCC slab design).</p> <p>(b) For other RCC buildings.</p> <p>These buildings being complete RCC framed structures, conventional RCC slabs of minimum thickness 150 mm shall be provided. The RCC slabs shall be monolithic with RCC beams and RCC columns</p>		
6.03.33	<p>Design Criteria of RCC roofs</p> <p>a) For Main Power House, Compressor House, ESP Control Building and Other Steel framed Buildings:</p> <p>The roof system shall comprise minimum 40mm thick RCC slab on top of profiled permanent metal deck sheet. The permanent metal deck sheets shall be fixed to the top flange of secondary beams by means of arc welding of headed shear anchor studs to the purlins directly through the metal sheet. The details of shear anchor studs are specified elsewhere in this specification. Water proofing treatment to roof slab shall be provided as per details specified elsewhere in this specification).</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p style="text-align: center;">PAGE 20 OF 25</p>

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6.03.34	<p>The RCC slab shall be designed without considering any composite action effect of metal deck sheet (i.e. the structural strength of metal deck sheet shall not be considered for RCC slab design.</p> <p>b) For Mill Bunker Building, Transfer Houses.</p> <p>Insulated sandwiched metal sheet for roofing shall be provided comprising troughed permanently colour coated sheet at top and plain permanently colour coated sheet at bottom with 50mm thick insulation sandwiched between the two sheets, the details of which are specified elsewhere in this specification.</p> <p>c) Roofing system for Ash Handling Plant Pump Houses and Buildings shall be as specified in relevant clauses</p> <p>d) Other RCC Buildings.</p> <p>Cast-in-Situ RCC slab shall be provided using removable plywood shuttering. Water proofing treatment to roof slab shall be provided as per details specified elsewhere in this specification).</p> <p>Design Criteria for Foundation</p> <p>The founding depth / cut off level of piles shall be decided based on functional requirement.</p> <p>Where structural steel columns are envisaged, the bottom of the base plate shall be kept suitably below the paving level such that the top level of the gusset plate and foundation bolt remain at least 200 mm below the top level of paving except for Boiler Structure, Bunker Building Columns, TP & Trestle Columns, ESP Control Building Columns for which the requirement of levels for bottom of base plates is specified elsewhere in this specification. Further the gusset plate and foundation bolts are to be encased in concrete up to the top of the paving level. For outdoor structural steel columns, about 300 mm height of steel columns above the top of paving level shall be provided with at least 125 mm thick encasement with minimum reinforcement to prevent corrosion of the steel columns from surface water</p> <p>a) OPEN Foundations</p> <p>For foundations, the minimum founding depth and the minimum size of foundation shall be as per foundation system and geotechnical data specified in the foundation chapter include hereafter in this specification.</p> <p>For open foundations, the total permissible settlement shall be as per the criteria furnished under the foundation system specified elsewhere in this specification.</p> <p>The sizing of foundation, design criteria & clear cover shall conform to IS:1904, IS:456 and other relevant Indian codes. However minimum 0.12% of reinforcement shall be provided on the top face of the foundation concrete on either direction and minimum percentage of reinforcement both in case of bottom face and also for tension face of foundation shall be same as that stipulated for beam as per IS:456.</p> <p>b) PILE Foundations</p> <p>Minimum centre to centre spacing of the piles shall be as per IS: 2911. Incase single piles are used, these piles are to be interconnected with tie beams along both orthogonal directions perpendicular to each other.</p> <p>Minimum penetration of piles into Pilecap shall be 75 mm and clear cover to the main reinforcement at the bottom face of the pile cap shall be 100 mm. Structural design of pile cap and reinforcement shall conform to IS:2911 and IS:456. However minimum 0.12% of cross section of the pile cap shall be provided on the top face of the pile cap along two orthogonal directions and minimum percentage of reinforcement at bottom face of pile cap shall be same as that stipulated for beam as per IS:456.</p> <p>Detailed requirement of pile foundation have been presented in the foundation chapter specified hereafter in this specification.</p>			
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6.04.00

CORROSION PROTECTION

6.04.01

General

(a) All Steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of Corrosivity category (as mentioned in Part A IID Civil Works for the project as per ISO 12944).

Painting system for steel surfaces embedded in Concrete is given separately.

(b) All Painting shall be done as per Technical Specification Painting scheme shall submitted by the Bidder.

(c) All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. Minimum thickness of metal for any structural steel elements shall be not less than 6 mm where steel is fully accessible for cleaning and repainting and where it is feasible to follow design criteria given in ISO 12944 part 3. However, where steel surfaces are inaccessible for cleaning and repainting or where it is not feasible to follow design criteria given in ISO 12944 part 3, corrosion allowance of 1.5 mm shall be kept in thickness (over the design thickness or 6mm, whichever is more).

Minimum thickness of tubular/ hollow steel sections conforming to IS 4923 shall be 4.0 mm, provided the ends of such steel sections are effectively sealed unless higher thickness is specified elsewhere for specific structure.

6.04.02

Painting of Steel Surfaces Embedded In Concrete

a) For the portion of Steel surfaces embedded in Concrete, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT).

b) All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, sleeves, etc. shall be coated with temporary rust preventive fluid and during execution of civil works, the dried film of coating shall be removed using organic solvents.

6.04.03

Painting of Steel Surfaces (Other Than Those Embedded In Concrete)

CORROSSIVITY CATEGORY	PRIMER COAT	INERMEDIATE COAT	FINAL COAT
C3	All steel surfaces shall be provided with two component moisture curing zinc (ethyl) silicate primer coat (having minimum 80% of metallic Zinc content in dry film, solid by volume minimum 60% ±2%) of minimum 70 micron DFT to be applied over blast cleaned surface conforming to Sa 2 ½ finish of ISO 8501-1 with surface profile 40-60	Primer coat shall be followed with the application of Intermediate coat of two component polyamide cured epoxy with MIO Content (containing lamellar MIO minimum 30% on pigment, solid by volume minimum 80% ±2%) of minimum 100 micron DFT. This coat shall be applied in shop after an interval of minimum 24 hours (from the application	Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0


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		<p>Micron. The primer coat shall be applied in shop immediately after blast cleaning by airless spray technique. Zinc dust composition and properties shall be Type-II as per ASTM D520-00.</p>	<p>of primer coat) by airless spray technique.</p>	<p>ΔE) and minimum 70 micron DFT. This coat shall be applied shop after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer.</p>
<p>C5</p>		<p>All steel surfaces shall be provided with two component moisture curing zinc (ethyl) silicate primer coat (having minimum 80% of metallic Zinc content in dry film, solid by volume minimum 60% ±2%) of minimum 70 micron DFT to be applied over blast cleaned surface conforming to Sa 2 ½ finish of ISO 8501-1 with surface profile 40-60 Micron. The primer coat shall be applied in shop immediately after blast cleaning by airless spray technique. Zinc dust composition and properties shall be Type-II as per ASTM D520-00.</p>	<p>Primer coat shall be followed with the application of Intermediate coat of two component polyamide cured epoxy with MIO Content (containing lamellar MIO minimum 30% on pigment, solid by volume minimum 80% ±2%) of minimum 180 micron DFT. This coat shall be applied in shop after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.</p>	<p>Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied shop after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer.</p>

Notes:

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	<ol style="list-style-type: none"> 1. For Primer, high quality surface preparation is necessary and good amount of moisture is required for proper curing. Below 70 % relative humidity, curing time may go up to 7 days or more. In such a case additional water sprinkling may be ensured for completion of curing. Additionally Inorganic zinc silicate cannot be recoated; even with itself. Typically it should be used when coating bare steel surface for first time. 2. The most frequent problem associated when top coating Primer is bubbling/pinholing especially with non-weathered zinc silicate coatings. To a great extent, this bubbling of finish paint can be eliminated by applying a mist coat of intermediate/topcoat as the first pass of the product, allow the bubbles to subside and then apply a full coat, as required. 3. In case top coating of zinc silicate with epoxy/polyurethane coatings, is expected to be delayed, it is advisable to use a suitable tie coat to avoid formation of white rust. However, if white rust forms then clean the surface with high pressure water, dry and apply the subsequent coats as required. 4. Touch up paintings on damaged areas: Surface preparation by manual tools, wire brush/emery paper etc. Minimum 6 inches peripheral area, adjoining to damaged area to be covered. If metal surface is exposed, it is to be painted with Zinc rich epoxy (70 micron) or suitable primer with existing paint scheme. If primer is intact, intermediate & top coat to be done with specified DFT in scheme. 			
6.04.04	<p>Coating for Mild Steel parts in contact with Water.</p> <ol style="list-style-type: none"> a) All mild Steel parts coming in contact with water or water vapour shall be hot dip galvanised. The Minimum Coating of Zinc shall be 610 g/ Sq.m. for galvanised Structures and shall comply with IS: 4759 and other relevant Codes. Galvanising shall be checked and tested in accordance with IS: 2629. b) The galvanising shall be followed by the application of an etching Primer and dipping in black bitumen in accordance with BS: 3416, unless otherwise specified. 			
6.04.05	<p>Gratings</p> <p>All gratings shall be blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 and shall be hot dip galvanized at the rate of 610 gm/sqm.</p>			
6.04.06	<p>Hand Railings and Ladders</p> <p>All Mild steel (MS) handrails and ladders in outdoor locations and in pump valve pits shall be galvanised at the rate of 610 gm/sqm as per IS 4736. All other MS handrails shall be painted as specified in clause 6.04.03 above. However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.00.00.</p>			
6.04.07	<p>Sea Worthiness</p> <p>All Steel Sections and fabricated Structures, which are required to be transported on sea, shall be provided with anti-corrosive Paint before shipment to take care of sea worthiness.</p>			
6.04.08	DELETED			
6.04.09	<p>For reinforced concrete work.</p> <ol style="list-style-type: none"> i) The protection for concrete sub-structure shall be provided based on aggressiveness of the soil, chemical analysis of soil/sub-soil water and presence of harmful chemicals/salts. ii) The protection to super structure shall depend on exposure condition and degree of atmospheric corrosion. <p>This shall require use of dense and durable concrete, control of water cement ratio, increase in clear cover, use of special type of cement and reinforcement, etc., coating of concrete surface, etc.,</p>			
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA	PAGE 24 OF 25

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
6.04.10	<p>Bidder shall furnish the details of corrosion protection measures.</p> <p>Chequered Plate</p> <p>Chequered Plate shall receive same corrosion protection measures as structural steel unless specified otherwise.</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA</p>	<p style="text-align: center;">PAGE 25 OF 25</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS						
<p>D-1-7</p> <p>7.00.0</p> <p>7.00.01</p> <p>7.00.02</p> <p>7.00.03</p>	<p>FOUNDATION SYSTEM AND GEOTECHNICAL DATE</p> <p>Soil Data</p> <p>Owner has carried out geotechnical investigation in the proposed area. Available bore logs of the area along with laboratory test results are enclosed at Annexure-C for Bidder's reference. The geotechnical investigation report of proposed area will be made available for the Bidder's study at the Owner's office, if required.</p> <p>Bidder may carry out his own geotechnical investigation at site before bidding for his information at no extra cost and time to owner. Such data collected by bidder is only for the purpose of bidding and it shall not be a part of technical documents related to this package. However, final design shall be based upon the detailed geotechnical investigation, which is to be conducted by successful bidder as per the clause 7.07.00 after placement of award. The Bidder should note that nothing extra whatsoever on account of variation between the foundation system assumed by bidder before bidding and that finalized based on the detailed geotechnical investigation after award, shall be payable. No time extension in the bidding time will be given to bidder for carrying out geotechnical investigation. Bidder may refer topographical survey drawing for variation in existing ground level (EGL) and General layout plan (GLP) for FGL. Onus of correct assessment/ interpretation and understanding of the existing subsoil conditions is on the Bidder.</p> <p>Successful bidder shall carryout his own detailed soil investigation for facilities under this package and shall be as per the scheme approved by owner. The scheme for geotechnical investigation shall be as given at Clause 7.07.00 and shall be approved by owner before execution. Geotechnical investigation work shall got executed by the Contractor through the agencies as mentioned in Clause No. 7.07.03. However, no time extension shall be given on account of soil investigation carried out by the Bidder. The geotechnical investigation report shall be prepared with detailed recommendations regarding type of foundation and allowable bearing pressure for various structures/ facilities and other soil parameters. Net allowable bearing pressure shall be limited to Table-1 of Clause No 7.02.02. The report shall be submitted for Owner's approval prior to commencement of design of foundation.</p> <p>The furnished borelog details are specific to the co-ordinates where the boreholes have been carried out and are provided for bidder's information only. Soil profile in the proposed area may vary with respect to the borelogs enclosed for bidder's information. Bidder has to consider all such variations in his estimation, over the extent of the work to be carried out. The Bidder should note that nothing extra whatsoever on account of variation between soil data collected by Owner and that found by the Bidder during geotechnical investigation before bidding and after bidding by him or during execution of works, shall be Payable.</p> <p>Tank Foundations</p> <ol style="list-style-type: none"> The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any. Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to III. Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%. 			<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 1</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS			
7.02.00	<p>d) Other requirements of tank foundations shall be as per IS 803 and as specified elsewhere in the specifications.</p> <p>Foundation System</p> <p>The requirements for the foundation system to be adopted are as given in subsequent clauses. Depending upon the depth of competent strata/stratum, type of structures, functional requirement of facility, extent of cutting / filling, suitable foundation, open or pile shall be adopted with approval of owner.</p>			
7.02.01	<p>General Requirements</p> <ul style="list-style-type: none"> a) All structures/equipment shall be supported either on suitable open foundations (isolated, combined, raft) or pile foundations depending on type of structures/facilities, sub-strata, topography etc. b) The roads, ground floor slabs, trenches, pipe pedestals except thrust blocks, channels/drains and staircase foundation with foundation loading intensity less than 4 T / M² may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil. c) No other foundation (other than as mentioned in (b) above & i) below) shall rest on the filled up ground / soil. d) No foundation shall rest on the black cotton soil. e) Before execution of work the bidder shall ensure that there is no obstruction to underground/overground facilities like sewer lines, pipe lines etc. Any such damage and remedial/ rectification measures shall be at the contractors cost. f) Bidder shall also ensure that there is no damage to existing nearby foundations and the foundations pertaining to this package are not placed at shallower depth than the nearby foundations. If required depth of foundation is deeper than the existing foundations, proper protection shall be provided to existing foundations. g) All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards. h) The water table for design purpose shall be considered at Finished Ground Level. i) A combination of open and pile foundations shall not be permitted under the same equipment / structure / building. j) Foundation for equipments on ground floor <p>For equipments of static weight upto 1.5 T, the equipment may be supported on the ground floor slab by locally thickening the slab. Thickening of the ground floor slab shall be done upto an extent of about 0.6 m beyond the plan area of the equipment on all the sides. Further, the load intensity below the equipment shall be limited to 4T/m². Other requirements of floor slab and compaction below the floor slab shall be adhered, as specified elsewhere in the specifications.</p> <p>For equipment's of static weight between 1.5 T and 20 T, the equipment may be supported on compacted sand filling from Natural Ground Level (NGL) or excavation level of nearby footing whichever is deeper with the load intensity below the equipment limited to 4T/m². The minimum depth of foundation is 1.0m below FFL. Other requirements of sand compaction below the foundation shall be adhered, as specified elsewhere in the specifications.</p> <p>For equipment of static weight more than 20 T, the equipment foundation shall be taken to the founding level or shall be built up with PCC from the level as mentioned in the Table 1. The pedestal of equipment foundation or the foundation Block shall be isolated from the adjoining floor slab by providing bitumen impregnated fiber board of</p>			
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM	PAGE 2	



7.02.02

Open Foundations

minimum 50 mm thick, conforming to IS: 1838 all around the equipment pedestal for the full depth of the floor slab.

In case open foundations are adopted, following shall be adhered to.

- a) The minimum width of foundation shall be 1.0 m.
- b) Minimum depth of foundation shall be 1.0m below Ground Level.
- c) It shall be ensured that all foundations of a particular structure/ buildings/ facility shall rest on one bearing stratum.
- d) Wherever the intended bearing sub-strata is virgin soil stratum but the actual stratum encountered during foundation excavation consists of filled up soil at founding level, under such cases either the foundation shall be lowered completely into the virgin stratum or the filled up soil upto the virgin layers shall be removed and built up through PCC (1:4:8) up to designed foundation level.
- e) Wherever the intended bearing stratum is weathered rock, but the actual strata encountered during excavation consists of both overburden soil and weathered rock at founding level, under such cases, the overburden upto the weathered rock level including 0.5 m into the weathered rock shall be removed and built up through PCC (1:3:6) upto the designed founding level. Thus, maintaining the same founding level for all the footings of a structure.
- f) The last layer of about 300 mm before reaching the founding level shall be excavated carefully by such equipment so that soil / rock at the required level will be left in its natural condition.
- g) During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-1.

Table-1

Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m ²		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
In case of Soil			
1.0m below NGL	8	10	12
2.0m below NGL	10	13	15
3.0m below NGL	15	18	20
4.0m below NGL	20	22	25



5.0m and below NGL	25	28	30
In case of rocky strata			
0.60m Embedment in highly weathered rock	30	30	30
1.0m Embedment in highly weathered rock	40	40	40
2.0m and more embedment in highly weathered rock	50	50	50

For NGL & FGL of the proposed area may be derived from GLP along with topographical survey drawing & borelog data. In case any loose/soft pockets in rocky strata is encountered at founding level, the same shall be removed completely upto the hard strata and filled up with PCC (1:4:8).

g) For open foundations, the total permissible settlement shall be governed by IS: 1904 / IS: 13063 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:

Isolated & Raft (Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	25 mm
Isolated & Strip (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	40 mm
Raft (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	75 mm
Foundations in Weathered rock / rock	12 mm

7.02.03

Pile Foundations –

In case piles are adopted, following shall be adhered to :


- i) The pile foundation shall be of RCC, Cast-in-situ bored piles as per IS:2911. Pile boring shall be done using Rotary Hydraulic Rigs. Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the Employer. If required, temporary or permanent MS liner may be provided for piling.
- ii) The minimum diameter of pile shall be 600 mm. The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be least of the three values i.e. as per approved geotechnical report, as per the values furnished in following table and pile capacity achieved in pile load tests.


Pile	Dia. (mm)	Vertical compression capacity (T)
Bored cast-in-situ	600	140
	760	250


The pile shall be socketed into rocky strata with minimum socket length of 5m into rock.


The uplift and lateral load capacity shall be respectively restricted to 35% and 5% of the allowable load capacity in vertical compression.


However, the pile capacities to be adopted shall be the least of the estimated design values and that obtained from the initial pile load tests.

CLAUSE NO.	TECHNICAL REQUIREMENTS 		
	<p>iii) Only straight shaft piles shall be used. Minimum cast length of pile above cutoff level shall be 1.0 m.</p> <p>iv) The contractor shall furnish design of piles (in terms of rated capacity, length, diameter, termination criteria to locate the founding level for construction of pile in terms of measurable parameter, reinforcement for job as well as test piles, pile load test arrangement, locations of initial test piles etc.) for Engineer's approval.</p> <p>v) The piling work shall be carried out in accordance with IS:2911 (Relevant part) and accepted construction methodology. The construction methodology shall be submitted by the Contractor for Engineer's approval.</p> <p>vi) Number of initial load tests to be performed for each diameter and rated capacity of pile shall be subject to minimum as under.</p> <p style="padding-left: 20px;">Vertical</p> <p style="padding-left: 40px;">Lateral Minimum of 2 Nos. in each mode.</p> <p style="padding-left: 20px;">Uplift</p> <p>vii) The initial pile load test shall be conducted with test load upto three times the pile capacity mentioned in (ii) above. In case of vertical compression test (initial test) the method of loading shall be cyclic as per IS:2911 (relevant part).</p> <p>viii) Load test shall be conducted at pile Cut-off Level (COL). If the water table is above the COL the test pit shall be kept dry throughout the test period by suitable de-watering methods. Alternatively the vertical load test may be conducted at a level higher than COL. In such a case, an annular space shall be created to remove the effect of skin friction above COL by providing an outer casing of suitable diameter larger than the pile diameter.</p> <p>ix) Number of routine pile load tests to be performed for each diameter/allowable capacity of pile shall be as under :</p> <p style="padding-left: 20px;">i) Vertical : 0.5% of the total number of piles provided.</p> <p style="padding-left: 20px;">ii) Lateral : 0.5% of the total number of piles provided.</p> <p>x) The routine tests on piles shall be conducted upto test load of one and half times the allowable pile capacity. Piles for routine load tests shall be approved by the Employer.</p> <p>xi) In case, routine pile load test shows that the pile has not achieved the desired capacity or pile(s) have been rejected due to any other reason, then the Contractor shall install additional pile(s) as required and the pile cap design shall accordingly be reviewed and modified, if required.</p> <p>xii) Testing of piles and interpretation of pile load test results shall be carried out as per IS:2911 (Part-4). Contractor shall ensure that all the measuring equipment and instruments are properly calibrated at a reputed laboratory / institute prior to their use. Settlement / movement of the pile top shall be made by Linear Variable Differential Transducers (LVDT) having a least count of 0.01mm.</p> <p>xiii) The test load on initial test piles and job piles shall be applied by means of kentledge with concrete blocks / reaction from anchor piles / rock anchors alone or combination of anchor piles / rock anchors and kentledge with concrete blocks.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM	PAGE 5

CLAUSE NO.	TECHNICAL REQUIREMENTS 		
	<p>xiv) Low Strain Pile Integrity test shall be conducted on all test piles and job piles. This test shall be used to identify the routine load test and not intended to replace the use of static load test. This test is limited to assess the imperfection of the pile shaft and shall be undertaken by an independent specialist agency to be approved by Engineering department of Owner. The test equipment shall be of TNO or PDI make or equivalent. The process shall confirm to ASTM.</p> <p>xv) High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. The procedure to carry out the test shall be submitted to the Engineer. The test and equipment shall conform to ASTM D4945-00. The test shall be conducted by an experienced independent test agency approved by the owner. Field data shall be submitted to the site engineer and shall include force velocity curves, pile capacity, simulated static load test curve, net and total pile displacement, pile integrity. A (Case pile wave analysis) CAPWAP or equivalent software analysis shall be conducted on the field data for correct capacity estimation and to evaluate end bearing and skin friction components of the pile.</p> <p>xvi) From load considerations, single pile may be used under a column/tower. In that case, pile shall be connected with tie beams at pile cut off level in both directions.</p> <p>xvii) Contribution of frictional resistance of filled up soil if any, shall not be considered for computation of frictional resistance of piles.</p> <p>xviii) Reinforcement for job piles shall be designed as following: (a) Compression + bending piles: For these piles, the allowable safe pile capacities in compression and bending shall be considered. (b) Tension + bending piles: For these piles, the actual pile forces to be considered. However, maximum 3 types of combinations for varying percentage of tension capacity + bending case may be designed & adopted by contractor for the entire scope of work under this package.</p> <p>7.03.00 Special Requirements</p> <p>7.03.01 Details of treatment for foundations / underground structures required to counteract soil / water chemical environment shall be as per detailed geotechnical investigation to be carried out by contractor. Contractor shall carry out chemical analysis during detailed geotechnical investigation and required treatment shall be provided accordingly.</p> <p>7.04.00 Excavation, Filling and Dewatering</p> <p>7.04.01 For excavation works, comprehensive dewatering with well point or deep wells arrangement, if required, shall be adopted. Scheme for dewatering and design with all computations and</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM	PAGE 6

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
<p>7.04.02</p> <p>7.04.03</p> <p>7.04.04</p> <p>7.04.05</p> <p>7.04.06</p>	<p>back up data for dewatering shall be submitted for the owner's information. The water table shall be maintained at 0.5m below the founding depth.</p> <p>Excavation for shallow foundations shall be covered with PCC immediately after reaching the founding level. In case of any local loosening of soil or any loose pockets are encountered at founding level during excavation the same shall be removed and compensated by PCC M7.5. The final layer of about 300 mm thickness above the founding level shall be excavated by suitable means, so as to avoid disturbance to founding stratum.</p> <p>Backfilling in Main Power House & Boiler Area</p> <p>This clause is applicable in the following areas:</p> <p>a) Main Power House Building foundations including Auxiliary column foundations, TG foundations, BFP foundations, CW pit, CEP Pit. b) Common control room building foundations (between the Main Power House Buildings) c) Boiler foundations including Mill Bunker building foundations, Coal Mill foundations.</p> <p>After construction of foundations for above mentioned buildings/ facilities, excavated earth between the excavation profile and the foundations, wherever backfilling is required, shall be backfilled with sand from founding level till finished ground level in the excavated profile.</p> <p>In case block excavation is carried out for the above mentioned areas, after construction of foundations, whole area shall be backfilled with sand from founding level till finished ground level.</p> <p>Sand used for filling shall be natural sand/manufactured sand, and clean & well graded conforming to IS 383 with grading Zone I to III. Backfilling with sand shall be carried out in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density.</p> <p>Backfilling in other area</p> <p>Backfilling around foundations, pipes, trenches, sumps, pits, plinths, etc. shall be carried out with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non cohesive soils. In any case, black cotton soil shall not be used in back filling without providing cushion of 1m of non expansive cohesive soil/moorum around the footings. In case of roads in the area of black cotton soil, minimum 0.4m moorum shall be provided.</p> <p>Rock pieces having size less than 150 mm and interstices filled with soil may be used for backfilling around foundation, plinths etc. and shall be compacted to minimum of 85% of original stack of material after filling the interstices.</p> <p>Founding level for trenches/channels shall be decided as per functional requirement. The bottom of excavation shall be properly compacted prior to casting of bottom slab of trenches / channels.</p> <p>CBR tests for pavement/road design shall be carried out by the Contractor after earth filling (if applicable) has been completed upto the formation level.</p> <p>The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding of material or article from any bank or side of such excavation which is more than one and a half meter above the footing by providing adequate piling, shoring, bracing etc. against such bank or sides.</p>		
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 7</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 				
<p>7.05.00</p> <p>7.05.01</p> <p>7.05.02</p> <p>7.06.00</p> <p>7.07.00</p> <p>7.07.01.00</p> <p>7.07.02.01</p>	<p>Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.</p> <p>EXCAVATION IN ROCK</p> <p>Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.</p> <p>Controlled blasting shall be done by a specialised agency duly approved by Engineer. All controlled blasting shall be done by using time delay detonators (i.e. excel type).</p> <p>a) Contractor shall engage an agency expert in blasting such as, NIRM (National Institute of Rock Mechanics), CMPDIL, Central Institute of Mining and Fuel Research Dhanbad, Dept. of Mining of Govt. Institutions etc. to design detailed blasting scheme and get the same approved from Engineer before carrying out the blasting operation. All blasting shall be done as per the approved blasting scheme & initial blasting operations shall be done under the supervision & guidance of the representative of the blasting expert.</p> <p>b) All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards, etc. pertaining to the acquisition, transport, storage, handling and use of explosives, etc. shall be strictly followed.</p> <p>c) The Contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as per explosives act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive Materials.</p> <p>d) The Contractor shall be responsible and liable for any accident and injury / damage which may occur to any person or property of the project or public on account of any operations connected with the storage, transportation, handling or use of explosive and blasting operations.</p> <p>Sheeting & Shoring</p> <p>The contractor shall ascertain for himself the nature of materials to be excavated and difficulties, if any, likely to be encountered in excavation while executing the work. Sheet piling, sheeting and shoring, bracing and maintaining suitable slopes, drainage, etc. shall be provided and installed by the Contractor, to the satisfaction of the Engineer.</p> <p>Geotechnical Investigation</p> <p>The Contractor shall carry out detailed geotechnical investigation in the areas under his scope for establishing the sub-surface conditions and to decide type of foundations for the structures envisaged, construction methods, any special requirements/treatment called for remedial measures for sub-soil/ foundations etc. in view of soft sub-soils, aggressive sub-soils and water, expansive/swelling soils etc. prior to commencement of detailed design/drawings. The Contractor shall obtain the approval for the field testing scheme proposed by him from the Owner before undertaking the geotechnical investigation work.</p> <p>Scheme of geotechnical Investigation</p> <p>Field test shall include but not be limited to the following:</p>	<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 8</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS 				
<p>7.07.02.02</p> <p>7.07.02.03</p> <p>7.07.02.04</p> <p>7.07.02.05</p> <p>7.07.03</p>	<p>Boreholes, Standard Penetration Test (SPT), Dynamic Cone Penetration Test (DCPT), collection of disturbed samples (DS) and undisturbed soil samples (UDS), Trial Pits (TP), Plate Load Tests (PLT), Electrical Resistivity Test (ERT), In situ field permeability tests, collection of water samples, etc.</p> <p>The diameter of borehole shall be minimum 150 mm in soil and 76 mm in rock. The diameter of UDS sampler shall be 100 mm minimum. Core drilling in rock shall be done by using hydraulically feed rotary drill & double tube core barrel with diamond bit.</p> <p>The minimum tests are indicated in Clause No. 7.08.00. Adequate number of tests shall be conducted up to sufficient depth for complete determination of subsoil conditions. The depth of boreholes shall be as specified in Appendix A. SPT shall be carried out in all types of soil deposits and in all rock formations with core recovery up to 20%, met within a borehole. This test shall be conducted at every 3.0 m interval or at change of strata, up to the final depth. SPT 'N' of 100 and above shall be referred as refusal. UDS shall be collected at every 3.0 m interval or at change of strata up to depth of borehole. UDS may be replaced by additional SPT, if SPT'N' value in the strata is above 50.</p> <p>Laboratory tests shall be done as per relevant IS codes. The laboratory tests, not be limited to the following shall be conducted on disturbed and undisturbed soil samples, rock samples & water samples collected during field investigations in sufficient numbers.</p> <p>Laboratory Tests on Soil Samples</p> <p>Laboratory tests shall be carried out on disturbed and undisturbed soil samples for Grain Size Analysis, Hydrometer Analysis, Atterberg Limits, Triaxial Shear Tests (UU), Natural Moisture Content, Specific Gravity and Bulk Unit Weight, Consolidation Tests, Unconfined Compression Test, Free swell Index, Shrinkage Limit, Swell Pressure Test, Chemical Analysis test on soil and water samples to determine the carbonates, sulphates, chlorides, nitrates, pH, organic matter and any other chemicals harmful to concrete and reinforcement/ steel.</p> <p>Laboratory Tests on Rock Samples</p> <p>Moisture content, porosity & density, Specific Gravity, Hardness, Soundness, Slake durability index, Unconfined compression test (Both at saturated and in-situ water content), Point load strength index and deformability test (Both at saturated and in-situ water content) shall be carried out on rock samples.</p> <p>Geotechnical investigation (field & laboratory) shall be carried out in accordance with the provisions of relevant Indian Standards.</p> <p>On completion of all field & laboratory work, geotechnical investigation report shall be submitted for Owner's review/approval. The Geotechnical investigation report shall contain geological information of the region, procedure adopted for investigation, field & laboratory observations/ data/ records, analysis of results & recommendations on type of foundation for different type of structures envisaged for all areas of work with supporting calculations. Recommendations on treatment for soil, foundation, based on subsoil characteristics, soft soils, aggressive chemicals, expansive soils, etc.</p> <p>Recommendations on foundation system and the net allowable bearing pressures and pile capacity shall be based on the conservative values of geotechnical investigation data.</p> <p>Geotechnical investigation work may be got executed by the Contractor through the following suggested agencies</p>	<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-7 CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 9</p>



7.08.00

1. C.E.TESTING COMPANY Pvt. Ltd, Kolkata
2. Cengrs Geotechnica Pvt. Ltd, New Delhi
3. KCT Consultancy Services, Ahemdabad
4. M.K. Soil Testing Laboratory, Ahemdabad
5. Secon Private Limited, Banglore
6. Soil Engineering Consultants, New Delhi
7. CEG Test House and Research Centre Private Limited, Jaipur
8. Geomarine Consultants Pvt Ltd., Chennai
9. Soiltech India Private Limited, Pune

Geotechnical Investigation Scheme

a) **Boreholes (Minimum)**

S.No	Structure	Spacing/Number of borehole	Depth of borehole	Remarks
1	Main Plant structures (Transformer Yard, Main power house, Boiler, ESP, Chimney, Mills, Fans etc)	About 40-50 m along the rows of main power house columns. Minimum 3 boreholes under each Boiler, Mill & Bunker, ESP structure and 3 boreholes under Chimney, Minimum 2 boreholes under each TG, ESP Control Room, TPs. 4 boreholes in Transformer yard	Depth of boreholes shall be 25 to 35m.	Depth of boreholes shall be as mentioned in column "Depth of Borehole" or 5m continuous in rock with RQD > 50% whichever is
2	Switchgear room, control room and transformer foundation	Minimum 6 no of boreholes	25 to 30 m	
3	Raw water Pump house, forebay, Switchgear room, control room and transformer foundation plant area	Minimum 4 no of boreholes	20 to 25m	

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4	Cooling Tower	Minimum 3 no of borehole in each CT	25 to 35 m	earlier.
5	FGD systems	Minimum 20 boreholes	25 to 35 m	
6	Coal Handling Plant structures	Minimum one borehole under each TP and one under crusher and one borehole under each structure. Minimum 10 no of under each stockpile area, 3 in Track Hopper, 2 in crusher house	25 to 35 m	
7	Ash Handling & AWRS Structures	Minimum 8 boreholes	25 to 30 m	
8	FOPH and Other Off site structure /Facility	Minimum Two boreholes under each area / facility	20 to 25 m	
9	Water treatment plant structures	Minimum 8 no of borehole	20 to 25 m	
10	Switchyard Structures	Minimum 8 no of borehole	20 to 25 m	
11	Reservoir	Minimum 20 nos	15 to 20 m	
12	Gypsum and Lime storage area	Minimum 10 Nos.	20 to 25 m	
13	Other Structure/Facility	Minimum 2 Nos. boreholes under each area / facility	15 to 20 m	


b) Other Field Tests (Minimum)


1	Plate Load Test (PLT)	1 no each in ESP, transformer yard area, Ash handling, switchyard and other area, where open foundations are feasible.	Test Depth from 2 to 4 m	
2	Cyclic Plate Load Test (CPLT)	1 no in each TG, Mill, FGD and ID fans	Test Depth from 2 to 4 m	
3	Trial Pit (TP)	About 25 Nos.	Depth upto 4 m	

4	In Situ Permeability Test In Boreholes	In minimum 8 Nos. of boreholes	Tests shall be conducted at depths of 1.0m, 3.0m, 5.0m, 8.0m and 12.0m.
5	ERT	2 Nos. each in Transformer yard, TG, Boiler, Chimney, Ash handling area, ESP Control Room, coal handling area, ash handling area, 1 No near each Pump House other than mentioned above	
6	CROSS HOLE	1No. in each TG, 1No. in each Mill & bunker and 2 Nos in ID Fan, 1 no in each FGD	Depths covering from 1.0 m to 20.0 m
7	PMT	40 no of tests in main power house area covering power house to chimney, TPs.	Depths covering from 1.0 m to 20.0 m

- Depth and location of Boreholes and other field tests (PLT, CPLT, CROSS HOLE TEST, PMT, TP, ERT, field permeability tests etc.) shall be approved by Owner before execution of geotechnical investigation work.
- Investigation in any other building / structure / facilities / trestles which are not mentioned above shall also be carried out, if required, by the bidder for the facilities under his scope.

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<p>D-1-8 8.01.00 8.01.01</p>	<p>GENERAL SPECIFICATION</p> <p>GENERAL REQUIREMENTS</p> <p>JOINTS IN CONCRETE STRUCTURES</p> <p>Construction Joints</p> <p>All horizontal construction joints shall be provided with a groove (shear key) for transfer of shear force.</p> <p>For construction joint in concrete wall, the maximum height of any lift should not exceed 2 meters. However, the time interval between the successive lifts should be as small as possible and the wall should be built to its full height in the least possible time.</p> <p>Expansion joints for all underground structures shall be made watertight by using ribbed PVC water stops with central bulb or of kicker type. The thickness and width of PVC water stops shall be as per the requirement of design. However, the minimum thickness and width shall be 6mm and 225mm respectively.</p> <p>Expansions Joints</p> <p>In case of expansion joints, preformed bitumen impregnated fibre board conforming to IS 1838 shall be used as joint filler. The joints shall be sealed with bitumen sealing compound conforming to IS 1834, however in case of liquid retaining/carrying structures, two parts polysulphide sealant conforming to IS 12118 or silicon sealing compound shall be used.</p> <p>IS 3414 shall be followed for details of joints in buildings. 3 mm thick stainless steel strip in matt or buff finish shall be provided over building expansion joints.</p> <p>Miscellaneous General Requirements</p> <p>8.01.02.1 All steel sections and fabricated structures, which are required to be transported on sea, shall be provided with anti-corrosive paint before shipment to take care of sea worthiness.</p> <p>8.01.02.2 Monorails, monorail girders and fixtures shall be provided, wherever required to facilitate erection / maintenance of equipment.</p> <p>8.01.02.3 Wherever possible all floor openings shall be provided with 100 mm thick 150 mm high RCC kerb all around.</p> <p>8.01.02.4 Angles 75 x 75 x 6 mm (minimum) with 8mm diameter and 150mm long MS lugs @ 150 c/c shall be provided for edge protection all around cut outs/openings in floor slabs. Angles 50 x 50 x 6mm with effective anchor lugs shall be provided for edges of concrete drains supporting grating/covers, edges of RCC cable / pipe trenches supporting covers/chequered plates/ grating, edges of manholes supporting covers, supporting edges of precast RCC covers and any other place where breakage of corners of concrete is expected.</p> <p>8.01.02.5 Floor of switchgear room shall be provided with embedded M.S. channel suitable for easy movement of breaker panels.</p> <p>8.01.02.6 Anti-termite constructional measures and chemical treatment measures shall be given to all vulnerable areas susceptible to termite including column pits, wall trenches, foundations of buildings, filling below the floors, etc., as per IS 6313 and other relevant Indian Standards.</p> <p>8.01.02.7 All cable & pipe routing shall be done as per system requirement and as stipulated elsewhere in the specification and shall run above ground on elevated trestles or other supporting structures except in some localized area (as approved by Employer) where the same can run in trenches. In case, pipes are to be routed on RCC pedestals, the height should not be less than 500mm above formation level/paving level. All trenches shall be of RCC with removable RCC covers.</p>			
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<p>8.01.02.8</p> <p>8.01.02.9</p> <p>8.01.02.10</p> <p>8.01.02.11</p> <p>8.01.02.12</p> <p>8.01.02.13</p> <p>8.01.02.14</p> <p>8.01.02.15</p> <p>8.01.02.16</p>	<p>All cable trenches located inside buildings shall have minimum 6mm thick (o/p) chequered plate covers.</p> <p>Cable trenches, where allowed, located outside the buildings shall project at least 200mm above the finished formation level unless noted otherwise elsewhere in this specification so that no storm water shall enter the trench. The bottom of the trench shall be provided with a longitudinal slope of 1:500. The downstream end of trenches shall be connected through pipe drains to the nearby RCC manholes (to convey water from trenches) of storm water drainage system, but avoiding back flow of storm water. In general, the precast covers shall not be more than 300 mm in width and shall not weigh more than 65 kg. Lifting hooks shall be provided in the precast covers.</p> <p>All cable trenches, wherever required, shall be provided with suitable insert plates for fixing support angles of cable trays.</p> <p>In Main plant area wherever fire water pipe trenches are envisaged, these trenches shall be of RCC and provided with precast RCC cover flush with finished level of paving in that area.</p> <p>R. C. C. cable slits shall be filled with sand after erection of cables, up to top level and covered with 75mm thick PCC cover of minimum M15 grade.</p> <p>All steel platforms above grade shall be provided with 100 x 6 thick kick plates at edge of platform.</p> <p>Duct banks consisting of PVC conduits conforming to IS 4985 for cables shall be provided with proper sealing arrangement consisting of fire retardant sealing compound.</p> <p>Independent network of lines for sewerage and drainage shall be provided. Plant effluent shall not be mixed with either storm water or sewage.</p> <p>The sub-grade for the roads and embankment filling shall be compacted to minimum 95% of the Standard Proctor density at Optimum moisture content (OMC.)</p> <p>Detailed scheme for dewatering shall be prepared, wherever required, before starting of deep excavation work. IS 9758 shall be followed as general guidance for dewatering.</p> <p>Structural steel column base plates and bolts, gussets, etc., shall not project above the floor level unless and noted otherwise. These shall be encased by concrete cover up to floor level with concrete grade M 25.</p> <p>Non-shrink flow able grout shall be used for under-pinning work below base plate of columns. Nominal thickness of grout shall be 50 mm. Non-shrink cum plasticizer admixture shall be added in the grout. Crushing strength of the grout shall generally be one grade higher than that of the base concrete. Minimum grade of grout shall be M-30.</p> <p>Grouting of all pockets, blockouts, sleeves and the openings around the embedment, inserts, bolts etc. and under pinning below the base / sole plate shall be with non - shrink flow able grout. Grade of grout shall be one grade higher than concrete. However minimum grade of grout shall be M - 30.</p> <p>However, for equipment foundations, high strength (minimum characteristic compressive strength of 60 N/sq.mm at 28 days) ready mixed non-shrink, chloride free, cement based, free flowing, non-metallic grout as recommended by equipment manufacturer shall be used.</p> <p>All the buildings and site development including landscaping shall be designed to take care of rain water harvesting & ground water recharging. Development of rain water harvesting scheme for the buildings, structures, facilities in Bidder's scope and obtaining approval of the scheme from Central Ground Water board is in Bidder's scope.</p> <p>As required suitable steel frames shall be provided around openings in the roof and external walls for mounting exhaust fans.</p>			
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8.01.02.17	750mm wide x 100 mm thick plinth protection in PCC (M-15) shall be provided around all buildings, pits / sumps, clarifiers, tanks, etc.		
8.01.02.18	All masonry walls shall be provided with Damp Proof Course at plinth level.		
8.01.02.19	All monorail openings in the walls shall be provided with double plate flush steel door shutters with suitable access platform and ladder as required.		
8.01.02.20	Hand rail (of minimum 1m height), size and material to be adopted shall be as per general architectural specification.		
8.01.02.21	In all buildings, suitable arrangement for draining out water collected from equipment blow downs, leakages, floor washings, firefighting etc. shall be provided for each floor with suitable floor drains.		
8.01.02.22	Unless specified all sand filling shall be compacted to minimum 80% of the relative density and backfilled earth shall be compacted to minimum 90% of the Standard proctor density at OMC.		
8.01.02.23	All buildings shall be provided with peripheral drains by the side of plinth protection for catering to the rain water from roofs and storm water from adjacent area. Plinth protection drains shall be provided all around the building and to be connected with nearest storm water drain. Minimum size of plinth protection drain will be 300mmx300mm.		
8.01.02.24	Minimum 2.0m wide walkway with plain cement concrete (nominal mix M15 grade) paving 150 mm thick laid over 75 mm thick bed of dry aggregate shall be provided connecting all buildings and facilities. The top of walkway shall be minimum 200mm above FGL, unless specified otherwise.		
8.01.02.25	For all buildings, finished floor level (FFL) shall be minimum 500mm above finished ground level (FGL).		
8.01.02.26	40mm Diameter MS rods as earthing mat, placed at a distance of 1.0m away and at depths between 0.60m and 1.00m shall be supplied and laid all around the periphery of buildings, structures, and outdoor equipment, as per approved drawings. Riser of 40mm Dia. MS rods and connecting to the above Earthing mat shall also be supplied and laid in position by the Contractor, as per the approved drawings. Raiser shall be laid up to a height of 300 mm above the local Ground level, at each of the columns of the buildings on the outside of the buildings, and minimum 2 (two) numbers for each structures and equipment. The contractor shall also supply and lay necessary number of 3.0 m deep 40 mm diameter MS rods Earthing electrodes and connect electrodes to the Earthing mat, as per the approved drawings and supplying and laying of 40 mm Dia. MS rods for connecting the Contractor's earthing mat with the Employer's earthing mat separately.		
8.01.02.27	Hume pipes of required class shall be as per IS: 458. Hume pipe made of Geopolymer concrete may also be used. Details of ingredients for Geopolymer concrete is as per details specified elsewhere.		
8.01.02.28	Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.		
8.01.02.29	Interlocking concrete block , kerb blocks or concrete block specified for various uses shall be precast blocks made of alkali-activated concrete /Geopolymer concrete as per IS:17452-2020.		
8.01.02.30	Rail-track from transformer yard to unloading bay of Main Power House shall be provided with rigid type RCC foundation. Rail weighing 52 kg/m(minimum) shall be used.		
8.01.02.31	All opening in floors/roofs/cladding for routing of pipes/cables/ducts shall be suitably sealed by the contractors after completion of erection works.		
8.01.03	<p>Acid/ Alkali Resistant Lining</p> <p>All structures receiving acid / alkali resistant lining shall be tested for water tightness and made</p>		
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leak proof before lining work.

The acid / alkali resistant lining shall be provided broadly in the areas identified. The Bidder shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later. The Bidder shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.

The material for Acid/ Alkali Resistant Lining shall conform to the following:

- i) Bitumen primer shall conform to IS: 158.
- ii) Bitumastic compound shall conform to IS: 9510. Where the height of bitumastic layer on vertical surface is more than 2.0 m, the bitumastic layer shall be reinforced with diamond pattern expanded metal steel sheets conforming to IS: 412.
- iii) A.R. Bricks/ Tiles shall conform to class II of IS: 4860 & IS: 4457 respectively.
- iv) Mortar: Potassium silicate & resin type mortars shall conform to IS: 4832 Part-I&II respectively.

8.02.00


CONCRETE

8.02.01

GENERAL

- a) Concrete work shall be of grade as per IS 456. Mix design concrete shall be used for all areas other than lean concrete work and plain cement concrete where nominal/volume mix can be permitted. Design mix shall be carried out as per IS10262. Specific approval of the Engineer shall be obtained regarding degree of quality control to be adopted for design mix.
- b) Minimum grade of reinforced cement concrete for all foundations shall be M25 unless noted otherwise. Minimum grade of concrete for other structures/areas (other than machine foundations) shall be M25 for all superstructure and substructure unless noted otherwise elsewhere in this specification.
- c) The minimum grades of concrete for different machine foundations and some of other important structural members shall be as follows:

Sl No	Description	Minimum grade of concrete
i)	ID, FD, PA fan & Mill foundations (block foundations)	M-30
ii)	TG top Deck	M50
iii)	TG Raft/ Substructure	M35
iv)	Complete wagon trippler/track hopper, Stacker and Reclaimer foundations, Crusher Deck foundation and other railway load bearing structures.	M35
v)	BFP foundations (in case of springs supported) / (in case of block foundation)	M35 / M30
vi)	Rail load Bearing Structures	M35

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8.02.02	<p>Concrete design mix of M50 grade concrete for TG top deck and substructure shall be carried out as per IS 10262 satisfying following conditions /Specification:</p> <ul style="list-style-type: none"> i) OPC 43 grade cement shall be used to design M50 grade of concrete mix. However, in case the mix design using OPC 43 grade cement fails to achieve the target strength of M50 grade concrete, OPC 53 grade cement may be used provided adequate precautions for higher heat of hydration and quality assurance measures are in place. ii) The concrete slump shall be in the range of 150-180mm at pouring point. iii) Maximum cement content (OPC) shall be limited as stipulated in IS 456. iv) Free water-cement ratio shall be as per clause 5.1 of IS 10262. v) PCE type superplasticizers shall be used as high range water reducing admixtures (Type F as per ASTM C494 or equivalent) in the concrete mix. Dosage & mixing methodology of this chemical admixture shall be as per manufacturer's recommendation. vi) Fly ash conforming to IS 3812 part 1 shall be used as pozzolana (mineral admixture) considering approx 15%-30% (mass) replacement of total cementitious materials. <ul style="list-style-type: none"> d) Higher grade of concrete than specified above may be used at the discretion of the Bidder. e) Unless otherwise specified, 20mm and down aggregates shall be used for all structural concrete works. However, 40mm and down aggregates may also be used under special conditions for mass concreting in foundation. f) For thin concrete sections such as roof slab over profiled metal deck sheets, 12mm and down coarse aggregates shall be used for coarse aggregates. g) Minimum 75mm thick lean concrete M-7.5 shall be provided below all other underground structures, foundations, trenches, etc., to provide a base for construction. h) All structural(reinforced) concrete production shall be done at automated batching plant of suitable capacity, conforming to IS:4925., situated within the area allocated to the contractor. Batching plant shall also have provision to mix fly ash (by weight). The batching plant shall have facility of digitised recording of the materials added along with quantity of concrete produced in each batch and printout of the same. Batch-wise report for each shift shall be submitted to the Engineer. <p>Reinforcement Couplers</p> <p>Reinforcement couplers (mechanical splicing systems with upset parallel threaded couplers) may be used in reinforced concrete works, subject to following conditions:</p> <ul style="list-style-type: none"> a. Couplers shall meet the performance requirements of IS 16172 for class H. <ul style="list-style-type: none"> i. It shall have minimum tensile strength corresponding to Fe550D which is 600 N/mm² and failure shall take place outside the length of splice as per clause no 9.2.1 of IS 16172. ii. Percentage elongation at maximum force in the reinforcing bar outside the length of mechanical splice shall be minimum 3 % before the failure of test piece as per clause no. 9.2.2 of IS:16172. iii. Slip test value shall not exceed 0.10 mm. as per clause no 9.3 of IS 16172. iv. Cyclic tensile test corresponding to Fe550D reinforcement bar as per clause no 9.4 of IS 16172. v. Low cycle fatigue test as per clause no 9.5.1 of IS 16172. 		
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vi. High Cycle Fatigue test as per clause no 9.5.2 of IS 16172.

- b. The manufacturer shall mark the coupler in such a way that all finished reinforcement couplers can be traced to the original cast from which they were made along with date of manufacture.
- c. Sampling and other requirements of IS 16172 shall be complied with.
- d. Each lot shall be supplied with manufacturer's test certificate (MTC) indicating values of tests in line with IS 16172.
- e. The minimum clear cover requirements are to be ensured for reinforcement couplers also.
- f. The couplers shall be used only at the locations where joint is required as per standard lapping purpose and couplers shall not be used for joining of several cut pieces of reinforcement in a single bar. As a general guideline, the length of the bars in which coupler is to be provided should not be less than 4m.

Vendors for the reinforcement couplers shall be subject to the approval of Engineer-In-Charge

Special requirements for concreting of major equipment foundations shall be as given below.

a) **Temperature Control of Concrete**

All the machine foundations such as Mills & Fans, top decks of TG & BFPs, the temperature of fresh concrete shall not exceed 25 deg C when placed. For maintaining the temperature of 25 deg C, crushed ice shall be used in mixing water.

b) **Admixture**

Plasticizer /super plasticizer admixture shall generally be added to the concrete for promoting workability. In addition, plasticizer/super plasticizer-cum-retarder shall be added to retard the setting time for mass concreting work as required. In case of pumping, suitable pumping additive shall also be added to avoid segregation and increase flowability. The slump shall generally be in the range given below:

Top decks of TG & BFP	-	150 mm to 180 mm
Block foundations	-	100 mm to 150 mm
TG Column	-	100 mm to 150 mm

c) **Form work**

Plywood with film face form work shall be used for the top decks of all machine foundations

d) **Placing of Concrete**


Base Raft and top deck of machine foundations shall be cast in a single pour.


e) **Scheme for Concreting**


Weigh Batching Plants, transit mixer, concrete pump shall be mobilized. Arrangements for standby Plant and Equipment shall also be made.


f) **Ultrasonic Testing**


Ultrasonic pulse velocity test shall be carried out for TG top deck including TG Columns & BFP top decks (in case of Block type, UPV testing is not required) to ascertain the homogeneity and integrity of concrete. In general, grid spacing of 1.0m to 1.5m may be adopted for carrying out the UPV testing. In addition, additional cubes (at the rate of one cube per 150 Cum of concrete subject to a minimum of six cubes)

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<p>8.02.04</p>	<p>shall be taken to carry out Ultrasonic Pulse velocity (UPV) testing on the cubes, to serve as reference UPV values. Testing shall be done as per IS13311 (Part-1). In case of any defect, the Bidder shall rectify the defects suitably using cement/epoxy grout, etc.</p> <p>Wherever block type foundations are provided for machine foundations such as BFPs, UPV testing of foundation concrete is not required.</p> <p>Anchor Fasteners</p> <p>Anchor Fasteners for use in concrete shall conform to the following:</p> <ol style="list-style-type: none"> a. The safe tensile load carrying capacity of the anchors shall be arrived by providing the minimum factor of safety of 2.5 on the characteristic load of the anchor. Minimum size of the anchors shall be M8. b. All anchors shall be from established and approved makes/ manufacturers. c. Anchors shall be fixed in position as recommended by the manufacturer and as approved by the engineer. d. Anchor fastener can be of mechanical type based on working principles such as keying, friction, combined friction- keying or chemical bonding type. <ol style="list-style-type: none"> 1) Mechanical type: The anchors shall be cold formed stud type torque controlled mechanical expansion fasteners having 3-way expansion sleeve of SS 316 grade with nut and washer and galvanized to minimum 5 microns. For coastal/ corrosive environments, the anchors shall be of Stainless Steel (min grade SS 304) or HCR (High Corrosion Resistance). The anchors shall conform to a minimum grade of 5.8 as per IS: 1367. 2) Chemical type: The anchor shall be adhesive type consisting of slow curing chemical adhesive with a proportion of resin and hardener as per manufacturer's recommendation in a soft foil pack, threaded rod of carbon steel conforming to a minimum grade of 5.8 as per IS: 1367 and minimum galvanization of 5 microns with associated nut and washer. The chemical shall be dispensed through mechanical dispenser and shall be self-curing type. e. Capacity of the anchors shall be established after considering the effect of concrete grade, embedded depth, concrete thickness, anchor spacing and edge distance from the concrete. f. The selection for particular type of the anchors shall be made after considering the concrete grade, available embedment depth, load to be transferred, space available for installing anchors. 		
<p>8.03.00</p>	<p>FORMWORK</p> <p>Formwork for building RCC Slabs/ Beams & Columns shall be of 2 different types.</p> <p>Type 1 Formwork: (For RCC slab of Structural Steel Framed Buildings Only)</p> <p>Troughed colour coated metal deck sheets shall be used as permanent shuttering having</p>		
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8.04.00	<p>minimum thickness as per the criteria specified in metal deck roof material clause in Architectural Design and concept. These profiled metal deck sheets shall be fixed to the structural steel secondary beams/ Purlins using Headed shear anchor studs. The detailed material property requirement of metal deck sheet is specified elsewhere in this specification.</p> <p>The shear anchor studs for fixing metal deck sheet to floor structural beams shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19mm diameter and 100mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.</p> <p>The shear anchor studs for fixing metal deck sheet to roof structural purlins shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16mm diameter and 65mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.</p> <p>Type 2 Formwork: (For RCC Buildings)</p> <p>Plywood with film face formwork shall be used for floor & roof slabs, Columns & Beams of all RCC buildings.</p>		
8.05.00	<p>CULVERTS /RACKS ACROSS RAIL TRACKS</p> <p>Design of bridges/ culverts or any other structure crossing the Railway tracks shall be as per Railways/ RDSO guidelines/specifications for Dedicated Freight Corridor (DFC) 32.5 T loads. The Bidder shall obtain necessary approvals from Railways before start of construction work. Construction of these structures is to be done as per Railways guidelines. Any statutory and codal charges payable to Railways/ RDSO for approval & execution of the above crossings shall be borne by the Bidder. Engagement of approved Railway Consultant for the above work by the bidder would be at his own cost.</p> <p>The levels/clearances of the above crossings are to be finalized by the bidder as per Railway standards and shall be subject to approval of Owner/Owner's Consultant.</p> <p>However, for design of the above crossings above rail track, the following minimum clearance from Rail track shall be maintained:</p> <p>A. Horizontal clearance: A minimum clearance of 3.5m shall be maintained between centre line of the Railway track to face of the crossing structure.</p> <p>B. Vertical clearance: A minimum vertical clearance of 8.5m shall be maintained between Rail top level and bottom of structure. However, a minimum vertical clearance of 6.5m shall be maintained between Rail top level and bottom of structure in case of FA silo.</p> <p>Bidder has to submit to the Owner two sets of railway approved drawings and two sets of (hard & soft copies) as built drawings.</p> <p>The construction of rail network inside the plant for transportation of coal, fly ash & POL is in the scope of Owner. The bidder should plan to complete the construction work of all roads/ drainage/ pipe line/ cable crossings etc which are crossing below the rail track well in advance to facilitate owner to undertake the construction work of siding.</p>		
8.05.01	<p>FENCING AND GATE</p> <p>FENCING</p> <p>Fencing with gate shall be provided around fuel oil area, and other areas wherever necessary due to security, safety, and statutory requirements as per following specifications. However for isolation between existing station/township and the project, the total height of fence may be</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p style="text-align: center;">PAGE 8 OF 19</p>

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<p>8.05.02</p> <p>8.06.00</p> <p>8.07.00</p>	<p>reduced to 2.4m with 450mm barbed wire on top, while other details being same as given below.</p> <p>The fencing, with gate (unless specified otherwise) shall comprise of PVC coated G.I. welded wire mesh fencing of minimum 4 mm diameter (including PVC coating) of mesh size 75mmX75mm of height 2.4m above the toe wall with a 600mm high galvanised concertina at the top, such that total fence height of 3.0m above the toe wall is achieved. The diameter of the steel wire for chain link fence (excluding PVC coating) shall not be less than 2.5 mm.</p> <p>The PVC coated chain link will be stretched by the clips at 0.5m intervals to three strands of galvanised high tensile spring steel wire (HTSSW) of 2.5 mm diameter interwoven with chain link wire mesh and kept under tension which in turn are attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain link and bolted to the fence post with the help of security nuts and bolts.</p> <p>Above the chain link a 600mm high tensile serrated galvanised wire (HTSW) concertina made with wire diameter of 2.5mm will be stretched to 6m and attached to two strands of galvanised HTSSW of 2.5 mm diameter by means of clips at 1m intervals. These two HTSSW strands will be attached to the fence posts with 12 mm security fasteners.</p> <p>All nuts, bolts, fasteners, clamping strips, clamps, clips, etc., shall be galvanised.</p> <p>All fence posts shall be of 75 x 75 x 6 MS angles spaced at 2.5m c/c distance. All corner posts will have two stay posts and every tenth post will have transverse stay post. Suitable R.C.C. foundations for the post and stays shall be provided based on the prevailing soil conditions. All posts of fencing shall be painted with chlorinated rubber paint over a suitable primer.</p> <p>Toe walls either of brick masonry with bricks of minimum 50 kg./sq.cm. Crushing strength or of hollow concrete block masonry shall be provided between the fence posts all along the run of the fence with suitable foundation. Toe wall shall be minimum 200mm above the formation level with 50mm thick P.C.C. coping (1:2:4) and shall extend minimum 300mm below the formation level. Toe wall shall be plastered with cement sand mortar (1:6) on both sides and shall be painted with two coats of textured cement point (Sandtax Matt or equivalent) of approved colour and shade. Toe wall shall be provided with weep holes at appropriate spacing.</p> <p>Gate along Fencing</p> <p>All gates shall be of structural steel of minimum 3.75 metre width for single lane access road and 8.00 m width for double lane access roads. The height of gate shall be same as that of the fence unless noted otherwise. Each gate shall have provision for wicket gate of size 1.0 m x 2.1 m.</p> <p>The gate frame and post shall be fabricated from medium class MS pipe of nominal diameter not less than 75 mm. The panel plate shall be of minimum thickness 2.5 mm conforming to IS: 513.</p> <p>The gate shall be complete with fabricated hinges, MS aldrops with locking arrangement, tempered steel pivot, guide track of MS tee, bronze aluminium ball bearing arrangement, castor wheel, etc.</p> <p>GRATING</p> <p>All gratings shall be electroforged types. Minimum thickness of the grating shall be 40 mm for indoor installation and 32 mm for outdoor installation. The opening size shall not be more than 30mmx100mm. The minimum thickness of the main bearing bar shall be 5 mm or as per design requirement whichever is higher. All gratings shall be hot dip galvanised at the rate of 610 g. per sq.m. after surface preparation by means of shot blasting or cleaned by acid pickling.</p> <p>FABRICATION & ERECTION OF STEEL STRUCTURES</p>		
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p>PAGE 9 OF 19</p>

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8.07.01	<p>The fabrication shall be done as per fabrication drawing which would clearly indicate various details of joints to be welded, type of weld, length and size of weld.</p> <p>All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections.</p> <p>Coal bunkers, Lime storage silo and biomass silo with hoppers and chimney flue liners can either be fabricated at factory in segments, transported and welded at site before erection or fabricated at site. For coal bunkers, hoppers and chimney flue liners, to prevent coal dust/flue gas leakages, the applicable field joints shall necessarily be welded.</p> <p>Note: Steel structures shall mean Plant and Non-Plant building structures, boiler & ESP support structures, CHP structures, AHP structures, chimney flue liners support platforms & stairs, pipe and cable support structures.</p> <p>Site welding can be permitted in special cases where final inputs are not available before release of fabrication drawings.</p> <p>Before dispatching the fabricated structural members to site, it shall be ensured that all parts in the assembly fit accurately together by carrying out pre-assembly of fabricated structural members having bolted field joints, in the factory.</p> <p>All steelwork before and after manufacturing shall be smooth, straight and free of deformations, cracks, twists and burrs. All steelwork shall be cut and fabricated to a tolerance of ± 1.5 mm in its length and location of matching bolt holes for field connections.</p> <p>Welding</p> <p>a) Welding of Structural steel shall be done by an electric arc process and shall conform generally to relevant acceptable standards viz. IS:816, IS:9595, IS:814, IS:2014, IS:4354 and Indian Standard Hand Book for metal arc welding, and other standards, codes of practice internationally accepted. For welding of any particular type of joint, Bidder shall give appropriate tests as described in any of the Indian Standards - IS: 817, IS: 7307 and international standards as relevant.</p> <p>b) Submerged arc-welding shall be used for welding longitudinal fillet welds (connecting flange with web) and longitudinal / transverse butt joints for fabrication of columns, framing beams and crane girders and all other built-up members, unless manual arc welding is specifically approved by the Engineer. Necessary jigs and fixtures and rotation of structures shall be so arranged that vertically down-hand position of welding becomes possible. 'Open-Arc-Welding' process employing coated electrodes shall be employed for fabrication of other welded connections and field welding.</p> <p>c) Wherever welding is done for assembling the components of structures, the job shall so positioned that down hand welding is possible.</p> <p>d) Any structural joint shall be welded only by those welders who are qualified for all welding procedures and positions in such type of joint that is welded.</p> <p>e) All records for entire welding operations such as welders identification marks, the joints welded by the each welder, the welding procedures adopted, welding machine employed, pre and post heating done and any non-destructive test done and stress relieving /heat treatment performed on such joints shall be accessible to the Engineer for scrutiny.</p> <p>f) In a fabrication of plated columns/beams and built up members all shop splices in each component part shall be done before such component part is welded to other parts of the member. Wherever weld reinforcement interferes with proper fitting between components to be assembled by welding, these welds shall be ground flush prior to assembly.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION	PAGE 10 OF 19

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8.07.01.1	<p>g) The members to be joined by fillet welding shall be brought and held as close together as possible and in no event shall be separated locally by more than 3mm. If the local separation is 1.5mm or greater, the fillet weld size shall be increased by the amount of separation.</p> <p>Edge preparation for welding as per weld joint detail shall be prepared either by machines or by automatic gas cutting. All edges cut by flame shall be ground before they are welded.</p> <p>Electrodes</p> <p>a) The electrodes used for welding shall be of suitable type and size depending upon specification of the parent materials, the method of welding, the position of welding and quality of welds desired e.g. normal penetration welds or deep penetration welds. However, only low Hydrogen electrodes shall be used for plate thickness above 20 mm.</p> <p>b) All low hydrogen electrodes shall be baked and stored before use as per manufacturer recommendation. The electrodes shall be rebaked at 250°C - 300°C for one hour and later on cooled in the same oven to 100°C. It shall be transferred to a holding oven maintained at 60°C - 70°C. The electrodes shall be drawn from this oven for use.</p> <p>c) Where coated electrodes are used they shall meet the requirements of IS: 814 and relevant ASME-Sec. Covering shall be heavy to withstand normal conditions of handling and storage.</p> <p>d) Only those electrodes which give radiographic quality welds shall be used for welds which are subjected to radiographic testing</p> <p>e) Where bare electrodes are used, these shall correspond to specification of the parent material. The type of flux-wire combination for submerged arc welding shall conform to the requirements of F-60 Class of AWSA-5-17-69 and IS: 3613. The electrodes shall be stored properly and the flux shall be baked before use in an oven in accordance with the manufacturer's requirements as stipulated.</p> <p>f) 308L and 309L electrodes / fillers shall be used for welding of stainless steel to stainless steel and stainless steel to mild steel respectively.</p> <p>g) Specific approval of the Engineer shall be taken by Bidder for the various electrodes proposed to be used on the work before any welding is started.</p>						
8.07.01.2	<p>Preheating inter-pass Temperature and Post Weld Heat Treatment.</p> <p>a) Mild steel plates conforming to IS: 2062 and thicker than 20mm, may require preheating of the parent plate prior to welding as mentioned in Table-I.</p> <p>However, higher preheat and inter-pass temperatures required due to joint restraint etc. and will be followed as per approved welding procedure. In welding materials of unequal thickness, the thicker part shall be taken for this purpose.</p> <p>b) Base metal shall be preheated, notwithstanding provisions of IS: 9595, to the temperature given in Table-1 prior to welding or tack welding. Preheating shall bring the surface of the base metal to the specified preheat temperature and this temperature shall be maintained as minimum temperature while welding is in progress.</p>						
<p>TABLE – 1</p> <p>MINIMUM PREHEAT and INTER PASS TEMPERATURE FOR WELDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Thickness of thicker part at point of Welding</th> <th style="width: 50%; text-align: center;">Welding using Low hydrogen electrodes or Submerged</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"> </td> <td> </td> </tr> </tbody> </table>				Thickness of thicker part at point of Welding	Welding using Low hydrogen electrodes or Submerged		
Thickness of thicker part at point of Welding	Welding using Low hydrogen electrodes or Submerged						
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p>PAGE 11 OF 19</p>				

arc welding


Upto and including 20mm	None
Over 20mm and upto and including 40m	20°C
Over 40mm and upto and including 63mm	66°C
Over 63mm	110°C


- c) Preheating may be applied by external flame which is non-carbonising like LPG, by electric resistance or electric induction process such that uniform heating of the surface extending up to a distance of four times the thickness of the plate on either side of the welding joint is obtained.
- d) Thermo-chalk, thermo-couple or other approved methods, shall be used for measuring the plate temperature.
- e) All butt welds with plates thicker than 50mm and all site butts weld of main framing beam shall require post weld heat treatment as per procedure given in AWS D-1.1. Post heating shall be done up to 600°C and rate of application shall be 200°C per hour. The post heat temperature shall be maintained for 60 minutes per 2.5cm thickness. For maintaining slow and uniform cooling, asbestos free pads shall be used for covering the heated areas.


8.07.01.3

Sequence of Welding


- a) The sequence of welding shall be carefully chosen to ensure that the components assembled by welding are free from distortion and large residual stresses are not developed. The distortion should be effectively controlled either by a counter effect or by a counter distortion. The direction of welding should be away from the point of restraint and towards the point of maximum freedom.
- b) Each case shall be carefully studied before finally following a particular sequence of welding.
- c) Butt weld in flange plates and/or web plates shall be completed before the flanges and webs are welded together.
- d) The beam and column stiffeners shall preferably be welded to the webs before the web and flanges are assembled unless the web and flanges to the beam or column are assembled by automatic welding process.
- e) All welds shall be finished full and made with correct number of runs, the weld being kept free from slag and other inclusions, all adhering slag being removed.
- f) Current shall be appropriate for the type of electrode used. To ensure complete fusion, the weaving procedure should go proper and rate of arc advancement should not be so rapid as to leave the edges unmelted.
- g) Pudding shall be sufficient to enable the gases to escape from the molten metal before it solidifies.
- h) Non-uniform heating and cooling should be avoided to ensure that excessive stresses are not locked up resulting ultimately in cracks.
- i) The ends of butt welds shall have full throat thickness. This shall be obtained on all main butt welds by the use of run off and run on pieces adequately secured on either side of main plates. The width of these pieces shall not be less than the thickness of


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	<p>the thicker part joined. Additional metal remaining after the removal of extension pieces shall be removed by grinding or by other approval means and the ends and surface of the welds shall be smoothly finished. Where the abutting parts are thinner than 20mm the extension pieces may be omitted but the end be welded to provide the ends with the required reinforcement.</p> <p>j) The fusion faces shall be carefully aligned. Angle shrinkage shall be controlled by presetting. Correct gap and alignment shall be maintained during the welding operation.</p> <p>k) All main butt welds shall have complete penetration and back surface of the weld being gouged out clean before first run of the weld is given from the back. However, partial penetration butt weld shall be permitted, when specifically shown in the design drawings.</p> <p>l) Intermittent welds shall be permitted only when shown in the design drawings.</p> <p>m) The welding shrinkage shall be minimised by adopting the correct welding procedure and method. In long and slender member extra length should be provided at the time of fabrication for shrinkage.</p>		
8.07.01.4	<p>Testing of Welders</p> <p>All the welders to be employed for the job shall have to qualify the appropriate tests laid down in IS: 817 and IS: 1181 and ASME IX/AWS D1.1. All the necessary arrangements required for the testing of welders are to be provided by the Bidder.</p>		
8.07.01.5	<p>Inspection of Welds</p> <p>a) Visual Inspection</p> <p>100 percent of the welds shall be inspected visually for external defects. Dimensions of welds shall be checked. The lengths and size of weld shall be as per fabrication drawings. It may be slightly oversized but should not be undersized. The profile of weld is affected by the position of the joint but it should be uniform. The welds should have regular height and width of beads. The height and spacing of ripples shall be uniform. The joints in the welds run shall as far as possible be smooth and should not show any humps or craters in the weld surface. Welds shall be free from unfilled craters on the surface, under-cuts, stages on the surface and visible cracks.</p> <p>Such inspection shall be done after cleaning the weld surface with steel wire brushes and chisel to remove the spatter metal, scales, slag, etc., If external defects mentioned above are noticed, there is every possibility of internal defects and further radiographic/ultrasonic examination shall be undertaken.</p> <p>b) Production Test Plate</p> <p>Test plates shall be incorporated on either side of at least one main butt welds of each flange plate and web plate of every main frame columns and crane girder. The weld shall be continuous over the test plate. The test plate extensions of the main plates and shall be fixed so that metal lies in the same direction as that of the main plate. Test plates shall be prepared and tested in accordance with the accepted Standards, in the presence of the Engineer or his authorised representative. Should any of these tests fail, further radiographic examination of the welds shall be done. These tests for test plates and radiographic examination are additional to those contemplated under inspection and testing.</p> <p>c) Non-destructive and special testing</p> <p>Radiographic / ultrasonic or other non-destructive examination shall be carried out. All tests of welds shall be carried out by the Bidder at his own cost. The cordoning of</p>		
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8.07.01.6	<p>radiation zone, while Radiography testing is going on, shall be done.</p> <p>In case of failure of any of the tests, re-testing of the joints shall also be carried out after rectification is done.</p> <p>d) Rectification of defective welding work</p> <p>Wherever defects like improper penetration, extensive presence of blow holes, undercuts, cracking, slag inclusion, etc., are noticed by visual inspection/other tests, the welds, in such location shall be removed by gouging process. The joints shall be prepared again by cleaning the burrs and residual matters with wire brushes and grinding, if necessary, and rewelded. The gouging shall as far as possible be done using gouging electrodes.</p> <p>Inspection and Testing</p> <p>a) Fillet Welds</p> <p>Refer clause 11.1.5 of Part B Sub Section E-41 of Technical Specification</p> <p>b) Butt Welds</p> <p>Refer clause 11.1.5 of Part B Sub Section E-41 of Technical Specification</p> <p>c) Dimensional Tolerance and Acceptance Criteria of Welds</p> <p>Refer clause 11.1.5 of Part B Sub Section E-41 of Technical Specification</p>		
8.07.01.7	<p>Correction of Defective Welds</p> <p>Correction of defective welds shall be carried out without damaging the parent metal. When a crack in the weld is removed magnetic particles inspection or any other equally positive means shall be used to ensure that the whole of the crack and material up to 25mm beyond each end of the crack has been removed.</p>		
8.07.02	<p>Painting</p> <p>a) Surface treatment and painting before and after delivery to site shall be in accordance with Clause no. 6.4.0 above. All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. However, where it is not feasible to follow the design criteria given in ISO 12944 Part 3 where the steel surface are inaccessible for application of protective coating, corrosion allowance in thickness(over the design thickness) of structural steel members shall be kept.</p> <p>b) For parts to be bolted, the surfaces in contact shall be provided with ethyl Zinc silicate primer as specified in clause 6.4.3 (a) and shall be free of oil, dirt, loose rust, burrs and other defects, which would prevent proper seating of the parts. For design of friction type bolted joints slip factor for surfaces with ethyl zinc silicate primer as given in IS 4000 shall be considered.</p> <p>c) Surfaces inaccessible after shop assembly shall receive the full-specified protective treatment before assembly. However, interior surfaces of Box-sections, which are effectively sealed from all ends, need not be painted.</p>		
8.07.03	<p>Bolting</p> <p>The threaded portion of each bolt shall project through the nut by at least one thread. High strength friction grip bolts, preferably the type with indicated load, shall be used where specified and shall be tightened strictly in accordance with the manufacturer's instructions and the relevant regulations.</p> <p>When connections are made using high strength friction grip bolts the relevant standards shall be observed.</p>		
8.07.04	<p>Erection of Structures</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p style="text-align: center;">PAGE 14 OF 19</p>

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<p>8.08.00</p> <p>8.08.01</p> <p>8.08.02</p>	<p>All erection work shall be done with the help of cranes, use of derrick is not envisaged.</p> <p>Erection Marks</p> <p>a) Erection marks in accordance with fabrication drawing shall be clearly painted on the fabricated steelwork. Each piece shall be marked in at least on two places. Each piece shall also have its weight marked thereon.</p> <p>c) The centre lines of all columns, elevations and girder bearings shall be marked on the sections to ensure proper alignment and assembly of the pieces at site.</p> <p>Erection Scheme</p> <p>a) The Erection Scheme for the erection of all major structures shall be furnished. The erectability of the structure shall be checked by the Bidder before commencement of fabrication work to avoid future modification. The erection scheme shall indicate the approximate weight of the structural members, position of lifting hook, crane boom length, crane capacity at different boom length and at different boom inclination, etc.,</p> <p>b) The erection scheme shall also give details of the method of handling, transport, hoisting, including false work/staging, temporary, bracing, guying, temporary strengthening, etc., It will also give the complete details of the number and capacity of the various erection equipment that will be used such as cranes, winches, etc., along with disposition at the time of erection of columns, trusses, etc.</p> <p>c) The erection of columns, trusses, trestles, portals, etc., shall be carried out in one single piece as far as practicable. No column shall be fabricated and erected in more than 3 pieces. Galleries shall generally be erected as box i.e. the bottom chord and bracings, top chord and bracings, side vertical posts and bracings, end portals and roof-trusses shall be completely welded prior to erection and if required temporary strengthening during erection shall be made. The inside sheeting runners and roof sheeting purlins may be erected individually. When erection joints are provided in columns, their location shall generally be just above a floor level.</p> <p>8.08.00 STEEL HELICAL SPRINGS AND VISCOUS DAMPERS UNITS</p> <p>General Requirement</p> <p>This part of the specification covers the requirement for the manufacturing, testing, supply, transport to site, pre-stressing erection, supervision of erection by the vendor, release of pre-stress, alignment, commissioning, etc. of Steel helical springs and viscous dampers units.</p> <p>The Steel helical springs and viscous dampers units supplied should be of proven make.</p> <p>Codes and Standards</p> <p>Some of the relevant applicable Indian standards and codes, etc, applicable to this section of the specification are listed below:</p> <p>DIN : 4024 Machine foundations; Flexible supporting structures for machine with rotating masses.</p> <p>DIN : EN 13906-1 Cylindrical helical springs made from round wire and bar: calculation & design.</p> <p>DIN : 2096 Helical compression springs out of round wire and rod; quality requirements for hot formed compression springs.</p> <p>ISO : 10816 /IS:14817 Criteria for assessing mechanical vibrations of machine.</p> <p>ISO : 1940/IS: 11723 Criteria for assessing the state of balance of rotating rigid bodies.</p>			
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8.08.03	<div style="text-align: right; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">एनटीपीसी NTPC</div> <p>Design & Supply of Material</p> <p>i) Supply</p> <p>Steel helical springs and viscous dampers and associated auxiliaries shall consist of:</p> <ul style="list-style-type: none"> (a) Steel helical springs units (fully pre-stressable) and viscous dampers units along with viscous liquid including associated auxiliaries for installation of the spring units and dampers like steel shims, adhesive pads, etc. (b) Frames for pre-stressing of spring elements. (c) Suitable hydraulic jack system including electric pumps, high pressure tubes etc. required for the erection, alignment etc., of the spring units. One set of extra hydraulic jacks, and hand operated pumps shall also be provided. (d) Any other items which may be required for the pre-stressing, erection, release of pre-stress, alignment, and commissioning of the Steel helical springs and viscous dampers. <p>ii) Design</p> <p>The spring units should have stiffness in both vertical and horizontal directions with the horizontal stiffness not less than 50% of vertical stiffness. However, for projects in high seismic zones, the minimum stiffness in horizontal direction shall be reviewed based on the design requirement and in no case it shall be less than 15% of vertical stiffness.</p> <p>The stiffness should be such that the vertical natural frequency of any spring unit at its rated load carrying capacity is between 2 Hz to 4 Hz. The damper units or spring-cum-damper units should be of viscous type offering velocity proportional damping. The damper units should be suitable for temperatures ranging from 0 to 50°C. The damping resistance of individual damper units should be such that the designed damping can be provided using reasonable number of Units.</p> <p>The Steel helical spring units and viscous damper units and their housings shall be designed for a minimum operating life of 30 years. Steel helical spring units shall conform to infinite life fatigue load calculations as per DIN EN 13906-1.</p>		
8.08.04	<p>Manufacturing & Testing</p> <p>Complete manufacturing and testing of the Steel helical springs and viscous dampers shall be done at the manufacturing shop of the approved sub vendor / supplier. For this purpose the contractor / sub vendor shall submit the detailed quality plan for approval of engineer and take up the manufacturing / testing after approval of such quality plan. The quality plan shall include</p> <ul style="list-style-type: none"> (a) Manufacturing schedule and quality check exercised during manufacturing. (b) Detail of test to be carried out at the manufacturing shop with their schedule. (c) Special requirements, if any, regarding concreting of top deck. (d) Complete step-by-step procedure covering the installation and commissioning of the spring system. (e) Manuals for erection, commissioning, testing and maintenance of the Steel helical springs and viscous dampers. (f) A checklist for confirming the readiness of the civil fronts for erection of Steel helical springs and viscous dampers. (g) Checklist for equipment required at each stage of erection. (h) Bill of materials and data sheet of various elements such as spring units, viscous dampers, with their rating, stiffness etc. included in the supply. 		
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<p>8.08.05</p> <p>8.08.06</p> <p>8.08.07</p> <p>8.08.08</p> <p>8.08.09.1</p> <p>8.08.09.2</p>	<p>(i) Bill of material and data sheet for frames for pre stressing, hydraulic jack including electric pump, high pressure tubes, hand operated pump etc., with their rating and umbers.</p> <p>(j) Any other details which may be necessary to facilitate design and construction of the foundations / structures.</p> <p>The springs shall conform to codes DIN EN 13906-1 and DIN 2096. The quality assurance and inspection procedure shall be finalized on the basis of the above codes and the quality plans be drawn accordingly.</p> <p>Transportation</p> <p>Steel helical springs and viscous dampers shall be suitably protected, coated, covered, boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection.</p> <p>Erection and Commissioning</p> <p>Complete erection and commissioning of the Steel helical springs and viscous dampers including pre-stressing of elements, placing of elements in position, checking clearances on the shuttering of the RCC top deck, releasing of pre-stress in spring elements, making final adjustments and alignments etc. shall be carried out by a specialist supervisor of vendor.</p> <p>The contractor shall guarantee the performance of the Steel helical springs and viscous dampers for 24 months from the date of commissioning of each machine which shall be termed as Guarantee Period”.</p> <p>Supervision</p> <p>The supervision of installation of Steel helical springs and viscous dampers including pre-stressing, placing, releasing and alignment of spring units shall be done by a specialist supervisor of sub vendor / supplier, trained for this purpose.</p> <p>Realignment of Spring System</p> <p>If any realignment of the Steel helical springs and viscous dampers is required to be done for aligning the shaft or for any other reasons during the first one year of operation from the date of commissioning of the machine, the same shall be done by the contractor.</p> <p>Acceptance Criteria</p> <p>Stiffness values shall be checked. The permissible deviations shall be as per DIN 2096.</p> <p>Following acceptance criteria shall be followed:</p> <p>General workmanship is being good as recommended by the manufacturer and approved by Equipment supplier.</p> <p>Tolerances are within the specified limit.</p> <p>Manufacturer’s test certificate (MTC) shall be in compliance with the applicable codes / standards.</p> <p>Bought out material is from the approved manufacturer / vendor.</p> <p>Bought out material is matching with the approved sample.</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p style="text-align: center;">PAGE 17 OF 19</p>
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION</p>	<p style="text-align: center;">PAGE 17 OF 19</p>	

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	<p>Information on Geopolymer Concrete-</p> <p>A) Ingredients: Geo-Polymer Concrete is a special type of concrete where no cement is used unlike conventional cement concrete.</p> <p>Major ingredients of Geo-polymer concrete are as below:</p> <ol style="list-style-type: none"> a) Fly Ash (to be collected from location within existing operating plant/from existing fly ash silos near plant boundary) b) Ground Granulated Blast Furnace slag c) Aggregates (Coarse and fine) d) Sodium Silicate e) Sodium Hydroxide f) Chemical admixtures like super-plasticiser, retarder, shrink-reducing compound, evaporation reducer etc. <p>Fly ash produced by coal-based power stations of NTPC, if available, will be issued free of cost for the production of Geo-polymer concrete on 'as is where is' basis.</p> <p>B) Batching & Mixing: Geopolymer concrete of minimum required grades of M10 and M35 shall be prepared for Dry Lean Concrete (DLC) and Pavement Quality Concrete (PQC), respectively. The solid constituents of geo-polymer concrete mix such as coarse aggregate, fine aggregate, fly ash and slag are to be mixed dry for 2-3 minutes, then Geo-activator solution, consisting of sodium silicate and sodium hydroxide pre-mixed in tanks at site, is added to the dry mix in batching plant mixer. The whole mixture is mixed until a homogeneous cohesive mix is obtained. Pumping devices shall be used for transferring activator solution from tank to the mixer. Proportion of different ingredients and mixing process are to be finalized/established during mix design finalization and trial mix at site. However, if any constraint is observed related to initial setting time of the geopolymer concrete and time required for transporting the geopolymer concrete mix from batching plant to the point of application then suitable alternative option such as mixing of geoactivator solution may have to be mixed in transit mixer instead of batching plant.</p> <p>Bidder shall make available concrete batching plant suitably customized for handling/feeding/dosing/weighing etc of ingredients and capable of production of Geo-Polymer Concrete of suitable grade.</p> <p>C) Geo-activator: This solution shall be prepared using Sodium Hydroxide & Sodium silicate with water in a certain ratio. The ratio of Sodium Silicate and Sodium Hydroxide in activator solution shall be decided during finalization of Design mix. Separate tanks having adequate capacity are to be constructed close to batching plant with fencing and a lockable gate for preparation of Sodium Hydroxide and Sodium Silicate solution. These tanks shall be provided with acid-alkali resistant lining and covered with GI sheet. Each tank shall be fitted with a chemical resistant pump of suitable capacity and dual valve in the discharge line for recirculation (to enable mixing) and also for transferring the Geo-Activator solution to mixer. This connection pipe from Pump discharge to batching plant mixer shall be HDPE of suitable Diameter.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION	PAGE 18 OF 19


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Preparation of Geo-activator solution is a critical process and extra care needs to be taken during the preparation in respect of safety of personnel handling the chemicals. Worker handling the chemicals shall be provided with proper PPE's. A dedicated shower with water tank shall be available close to chemical handling area/tank on permanent basis for washing of affected person, in case of emergency. Bottles filled with distilled water in cupboard / Boxes near work place shall also be kept for emergency eye wash by worker exposed to such hazardous chemicals.


D) Placing: Laying /placing of Geopolymer concrete DLC and PQC manually with hand-guided means or by semi-mechanized methods may be permitted provided acceptance criteria as per MORT&H specification is achieved.


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9.03.02	<p>Galvanised MS pipe of medium class conforming to IS:1239 shall be used for internal piping works for service water and potable water supply. The pipes shall be concealed, and painted with anti-corrosive bituminous paint (as per IS: 158) wherever required.</p> <p>UPVC (conforming to IS:13592) shall be used for sanitary works above ground level.</p> <p>All Buildings shall be designed with Toilets as per NBC norms.</p> <p>All buildings shall have minimum one toilet block each. The facilities provided in the toilet block shall depend on the number of users. However, minimum facilities to be provided shall be as stipulated in subsequent clause. IS:1172 shall be followed for working out the basic requirements for water supply, drainage and sanitation.</p> <p>In addition, IS:2064 and IS:2065 shall also be followed.</p> <p>Each Toilet block shall have the following minimum facilities. Unless specified all the fittings shall be of Chromium plated brass (fancy type).</p> <ol style="list-style-type: none"> a) One number wall mounted coloured glazed vitreous China European water closet and flushing valve system, water faucet, toilet paper holder as per IS:2556 b) One number colour glazed ceramic oval shaped wash basin 450x 550 mm (approx.) mounted over 18mm thick granite beveled edge counter fitted with photo-voltaic control system for water controls, bottle trap as per IS:2556. For common toilets, number of washbasins shall be as per requirement. However, for Pump Houses the same shall be provided without photo voltaic control system for water control. c) For Male Toilets Urinal as per requirements, with all fittings with photovoltaic control flushing system as per IS: 2556. d) One number looking mirror 600 x 900 x 6 mm, edge mounted with teak beading and minimum 12 mm thick plywood backing, one number stainless towel rail 600 x 20 mm, one number liquid soap dispenser e) One toilet with required facilities shall be provided for physically challenged persons as per National Building Code requirements f) Janitor Space & space for drinking water cooler. g) Electric operated hand dryer with photo voltaic control. h) The pantry shall consist of one number stainless steel pantry sink, as per IS : 13983, of size 610 x 510 mm, bowl depth 200 mm with drain board of at least 450 mm length with trap, hot and cold water mixer, one number geyser of 25 liters capacity, with inlet and outlet connections, one number over head water storage tank, as per IS : 12701 and of 500 liters capacity, complete with float valve, overflow drainage pipe arrangement, GI concealed water supply pipe of minimum 12 mm diameter of medium class, cast iron sanitary pipe (with lead joints) of minimum 75 mm diameter, floor trap with Stainless <p>Steel grating, inlet and outlet connections for supply and drainage, with all bends, tees, junctions, sockets, etc., as are necessary for the commissioning and efficient functioning of the pantry (all sanitary fittings shall be heavy duty chrome plated brass, unless noted otherwise)</p> <p>One number of pantry shall be provided on Control Room floor of ESP control room building and One number of pantry shall be provided in Buildings having Control Room</p> <ol style="list-style-type: none"> i) Laboratory sink shall be of white vitreous china of size 600x400x200 mm conforming to IS: 2556 (Part-5). 		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 2 OF 30</p>


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<p>9.04.00</p> <p>9.04.01</p> <p>9.04.02</p> <p>9.04.03</p> <p>9.04.04</p> <p>9.04.05</p> <p>9.04.06</p> <p>9.04.07</p>	<p>j) In addition, adequate number of portable toilet units with adequate plumbing and sanitary arrangement, shall be provided during construction stage for workers.</p> <p>k) Adequate number of toilet units with adequate plumbing and sanitary arrangement, shall be provided for workers (O&M workers).</p> <p>Flooring</p> <p>Floor finishes of approved shade and colour (non - premium colours), over under bed of cement mortar / concrete, at all levels and for all kind of works, elevations, on horizontal and vertical surfaces for all types of work (like flooring, skirting, dado, wall lining & facing, tread and risers etc.), including topping, spreading white cement slurry at an average rate of 2.5 kg/Sq. M., (unless noted otherwise), jointing and joint filling with white cement (unless noted otherwise) slurry mixed with colour pigment, to match the shade of the finishing material, laying to plumb and water level in desired pattern, line and flush butt square jointing, curing, rubbing, grinding, polishing, edge moulding, finishing and cleaning, testing, providing opening of required size and shape, casting in panels wherever specified.</p> <p>The nominal total thickness of floor finish shall be 50 mm i.e. underbed and topping. The floor shall be laid on an already laid and matured concrete base. The underbed for floors and similar horizontal surfaces shall consist of cement concrete M20 grade. Stone chips shall be 12.5 mm down well graded & proper filling shall be done with brick bats/cinders. Flooring like Tiles/ Stones shall be laid with 1:4 cement sand mortar and Tile/ Stone Cladding on wall shall be laid with 1:3 cement sand mortar.</p> <p>All toilets shall have sunken slab to accommodate sanitary pipes and the finish level of floor shall match with general floor finish level. Sunken slabs shall be made watertight by suitable water proofing treatment.</p> <p>Metallic hardener topping -with ordinary grey cement shall be- 12 mm thick (insitu) or finishing the concrete / mortar surfaces topping shall be furnished with neat cement slurry (with ordinary grey cement)</p> <p>Heavy duty cement concrete tiles 300 mm x 300 mm shall be in using white cement with pigment, with hard and abrasion resistant carborundum / quartz chips for wearing course as per IS:1237. Laying of tiles shall be as per IS: 1443.</p> <p>Digitally glazed ceramic tiles shall be as per IS: 15622. Designer digitally glazed ceramic floor and wall tiles</p> <p>a) 300x300mm in white colour of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent</p> <p>b) 300x450mm in DIGITAL series of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent</p> <p>c) 300x600mm in DIGITAL series of Kajaria/ Nitco/ Somany/ Orient/ Johnson or equivalent</p> <p>12mm/20mm / 38mm / 75 mm/ 115mm thick acid resistant tile on horizontal and vertical surfaces, at all levels for all type of works shall include one coat of bitumen primer followed by 12 mm thick bituminastic layer, 20mm / 38mm/ 75 mm / 115mm thick A.R. tiles, 6 mm thick under-bed by potassium silicate mortar conforming to IS:4832 (Part-I), pointing of joints of tiles with acid/alkali resistant epoxy/furane mortar conforming to IS:4832 (Part-I), up to a depth of 20 mm and bituminastic end sealing.</p> <p>Battery Room in all buildings shall be provided with acid/ alkali resistant tiles on flooring & dado 1200mm high.</p> <p>(i) Mirror polished Digitally glazed vitrified & Matt Finish Digitally glazed Vitrified ceramic tiles (minimum 9.0mm thick) with 3mm groove joints as per approved pattern pointed neatly with 3x4mm stainless epoxy grout mix of 0.70kg of organic coated filler of desired shade (0.10kg of hardener and 0.20kg of resin per kg) with sizes of the tiles shall be as under:</p>			
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p>SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p>PAGE 3 OF 30</p>	


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<p>9.04.08</p> <p>9.04.09</p> <p>9.04.10</p> <p>9.04.11</p> <p>9.04.12</p> <p>9.04.13</p> <p>9.04.14</p>	<p>a) Size of tile 600x600/605x605 of Premium Series Kajaria/ Royale Series Somany/ OMA00025 Series Johnson or equivalent</p> <p>b) Size of tile 800x800 of Polished and Lapatto Series Kajaria/Diamond Series Somany/ Polished and Lapatto Series Johnson or equivalent</p> <p>ii) Anti-Skid Full Body Vitrified Tiles</p> <p>Antiskid, full body Vitrified Tiles of size 600X600X20 mm thick as specified below of approved make, shade, colour and pattern, over under bed of cement mortar / PCC shall be provided in TG Hall flooring at operating level. Full body Vitrified Tiles shall be laid on properly laid leveled floor, with joints 3 to5 mm wide & 8 to10 mm deep & shall be filled with approved Epoxy Grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardner and 0.20 kg of resin per kg).</p> <p>Full body Vitrified Tiles shall have water absorption less than 0.5%, Modulus of Rupture more than 38N/mm², Breaking strength more than 7500 N, Mohs scale more than 6, Abrasion resistance less than 144 mm³ and coefficient of friction more than 0.4. Vitrified Tiles shall generally conform to IS: 15622</p>	<p>For pathway, chequered and designed concrete tiles minimum 22 mm thick, 200x200 mm size conforming to IS: 13801 of approved shade and colour shall be used. 1000 wide pathways shall be provided for maintenance on rooftops of all buildings.</p>	<p>Epoxy Flooring</p> <p>Epoxy Flooring shall be provided with surface preparation of concrete substrate with Captive Shot Blasting Machine OR Light Grinding to form the required anchor profile on the floor substrate followed by application of epoxy resin based moisture barrier underlay of 2 mm thickness including filling of saw cut joints with epoxy cementitious resin based moisture barrier underlay as per manufacturer specification. Application of self smoothing epoxy floor topping of epoxy based resin of 2 mm thickness over epoxy resin based moisture barrier underlay including application of solvent free epoxy resin based two component primer.</p> <p>It shall include application of PU Sealant at Expansion and Isolation Joint respectively including surface preparation of the joint, fixing of backup strip and application of sealant.</p>	<p>Wherever required, carpet flooring shall be provided over cement concrete floor. The carpet shall be of tile/roll form, machine/handmade tupled un-cut loop pile and lay with under lay of 10mm thick and shall be laid as per manufacturer's recommendations, in matching grains. It shall be treated with anti fungus and anti-termite before laying.</p>	<p>Mirror polished (6 layers of polish) Granite stone (slab) - 18 mm thick (minimum) / Flame finish/ (making top surface rough by burning)/ honed finish granite stone (slab) - 18 mm thick (minimum) shall be provided.</p>	<p>Decorative/designer prepolished, plain and pigmented, high wearing resistance concrete tiles of 20mm thickness (minimum) in various non-standard interlocking patterns.</p>	<p>Skirting in general shall be 150 mm high. Dado in toilets & pantries, shall be upto false ceiling level from finished floor level. Skirting and Dado shall match with the floor finish.</p>	<p>Interlocking concrete blocks shall be of various sizes and thickness having M35 grade of concrete and pigmented to specified colours, in different pattern (in different textures chequered or other patterns in indentation for guiding band/s for visually impaired persons) including the preparation of sub base with 20mm thick sand and filling of joints with sand.</p>
	<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 4 OF 30</p>				


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9.04.15	<p>Matt finish (with grooves) Porcelain tiles (for guiding band/s for visually impaired persons) shall be with 3mm groove joints as per approved pattern pointed neatly with 3x4mm stainless epoxy grout SP- 100 of Laticrete or approved equivalent in approved colour to match colour of tile.</p> <p>24 mm x 24 mm x 3.8 mm thick (minimum) glass mosaic tiles in decorative murals and pattern.</p> <p>Laminated wooden flooring (11mm thick) shall be provided in VIP area, conference rooms.</p>		
9.04.16	<p>Rubber Flooring</p> <p>Rubber flooring shall conform to IS 809. The minimum thickness shall be 4 mm with sheet size of 602mm x 602mm. Rubber flooring shall consist of 100% virgin elastomer reinforcing agents, resins, curing agents, anti-oxidants and pigments. It shall have excellent abrasion resistance and shall have class-I fire rating. It shall be acid & alkali resistant and shall be of anti static grade. In general, BS code shall apply for their technical characteristics.</p>		
9.05.00	<p>Epoxy Resin Floor Finish</p> <p>Self-smoothing, seamless epoxy resin floor finish shall be provided on horizontal and vertical surfaces including preparation of surface, application of epoxy based primer coat, of approved colour, quality and make to give minimum thickness of 300 micron (in two coats)</p>		
9.06.00	<p>Roof</p>		
9.06.01	<p>Except for the roofs subjected to heavy loads, roof of all buildings having structural steel frame work shall consist of permanently colour coated (on exposed face) troughed metal sheet decking of approved profile as specified in clause 9.08.00. Silicon modified polyester paint having DFT of minimum 20 microns shall be used for permanent coating. The sheeting shall be fixed by means of concealed fixing system or any other compatible method approved by the Engineer. RCC slab of minimum 40 mm clear thickness in excess of trough depth shall be provided over the metal decking. Water proofing cum plasticiser compound shall be added to concrete over the metal decking. Bidder shall demonstrate that the roof is leak proof by carrying out the water-retaining test by maintaining the minimum water depth of 50mm over the roof surface for a period of 48 hours. Water Proofing Treatment as given below for RCC roof slabs shall be provided to ensure that the roof is watertight.</p>		
9.06.02	<p>DELETED</p>		
9.06.03	<p>For efficient disposal of rainwater, the run off gradient for the roof shall not be less than 1:100 and the roof shall be provided with RCC water gutter, wherever required. Gutter shall be made water tight using suitable watertight treatment. This gradient can be provided either in structure or subsequently by screed concrete 1:2:4 (using 12.5 mm coarse aggregate) and/or cement mortar (1:4). However, minimum 25 mm thick cement mortar (1:4) shall be provided on top to achieve smooth surface.</p>		
9.06.04	<p>Medium class galvanised mild steel pipes conforming to IS 1239/IS 3589 with welded joints shall be provided to drain off rain water from the roof. These shall be suitably concealed with masonry work, cement concrete / or sheeting work to match with the exterior finish. The number and size of down comers shall be governed by IS 1742 and IS 2527. Roof drain level of all RCC framed buildings having cast-in-situ RCC roof shall be provided with Rain water gutter and/or 45 x 45 cm size Khurras having minimum thickness of 30 mm with 1:2:4 concrete over PVC sheet of 1 m x 1 m x 400 micron and finished with 12 mm thick cement sand plaster 1:3. All the pipes shall be provided with suitable fittings and fixtures.</p>		
9.06.05	<p>Roof Water Proofing</p> <p>Roof water proofing treatment shall be as follows:</p> <p>a) For roofs having structural slope:</p> <p style="padding-left: 40px;">Top surface of sloped R.C.C. slab shall be finished with 15mm thick cement plaster (1:4). Over the finished surface elastomeric membrane shall be laid. The elastomeric</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 5 OF 30</p>


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	<p>shall comprise of high solid content liquid applied urethane laid over reinforcing layer of polyscrim cloth or non woven geo-textile. The top of the elastomeric membrane shall be finished with 20 mm thick cement: sand (1:4) mortar with chicken wire mesh and pressed precast concrete tiles of 20 mm thickness where applicable shall be laid over mortar at green stage. Provision for thermal expansion of roofing tiles shall be kept by providing an expansion gap in both directions filled up with polysulphide joint sealant. The expansion gap shall be provided in the cement sand mortar underbed layer also.</p> <p>b) For roofs having no structural slope:</p> <p>Screed concrete mix (1:2:4) grading having minimum 25mm thickness at the lowest point of the slope shall be laid over R.C.C. slab and shall be laid as per the slope specified elsewhere in the specification. Top surface of grading underbed shall be finished with 15mm thick cement plaster (1:4). Over the finished surface elastomeric membrane shall be laid and top of the elastomeric membrane shall be finished with 20 mm thick cement: sand (1:4) mortar with chicken wire mesh and pressed precast concrete tiles of 20 mm thickness where applicable shall be laid over mortar at green stage. Provision for thermal expansion of roofing tiles shall be kept by providing an expansion gap in both directions filled up with polysulphide joint sealant. The expansion gap shall be provided in the cement sand mortar underbed layer also</p> <p>9.06.06 Roof of all buildings shall be provided with access/approach through staircase or ladder. Roof where equipment are mounted shall be provided with access through staircase.</p> <p>9.06.07 RCC parapet wall of minimum 1000 mm height (above top of slab) for all accessible roofs and 600 mm height for all non-accessible roofs shall be provided. Alternatively, parapet wall comprising structural steel post, runner and sheeting may be provided for buildings with metal sheet cladding.</p> <p>9.06.08 Fillets at junction of roof and vertical walls shall be provided with cast-in-situ cement concrete (1:1.5:3) nominal mix followed by 12mm thick 1:4 cement sand plaster.</p> <p>9.06.09 Pathways for handling of materials and movement of personals shall be provided with 22mm thick chequered cement concrete tiles as per IS:13801 for a width of 1000mm.</p> <p>9.07.00 Walls</p> <p>9.07.01 All walls shall be non-load bearing infill panel walls.</p> <p>9.07.02 For initial height up to 1 metre in buildings one brick thick masonry wall shall be provided wherever metal cladding is specified.</p> <p>9.07.03 All internal walls shall be with one brick thick in cement mortar (1:6). However, internal partition walls for toilets shall be with half brick masonry thick with cement mortar (1:4).</p> <p>9.07.04 For ESP Control Room Building, wall shall be of Autoclaved Aerated Concrete Block. Autoclaved Aerated Concrete (AAC) block masonry shall be with blocks having dimensions of 625 mm x 250 mm. thickness ranging from 100 mm to 300 mm conforming to I.S. :2185(part III).The jointing cement sand mortar in the composition of 1: 6 (Cement: sand) shall be used with suitable plasticizer(optional). Sand having modulus of fineness 1.1 shall be used. The horizontal and vertical joint thickness shall be approximately 10 mm. In case of partition walls (100 mm /125 mm thk.) the joint reinforcement i.e. 1 number of 6-8 mm diameter bars shall be placed at every alternate course to be anchored properly with the main structure. All other structural requirements like stiffening of masonry, joint reinforcement etc. in the AAC masonry work strictly be carried out as per instructions laid down in IS 6041 – 1985, IS - 1905. For control room , control equipment room in MPH Building , walls shall be of factory made composite modular light weight aerated concrete panels,(minimum 2 hours of fire rating) consisting of 2 fiber reinforced cement sheets (minimum 4 mm thick) on either side of light weight concrete core, having minimum compressive strength of 35 Kg / Cm2 and the density in the range of 700-900 Kg. / cu.m. of the thickness and fire rating as specified below, to provide external wall and internal partition at all levels, capable of sustaining wind pressure of</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 6 OF 30</p>


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	<p>3.00 M height (H) within limiting deflection of span/250, fixed in position in tongue and groove jointing system by screwing the panels to top and bottom U channels, (channels minimum 1.25 mm thick and galvanised to grade 180 (minimum) as per IS : 277), fixing U profiled top and bottom channels to concrete / primary steel members which are placed at the maximum vertical spacing of 4.5m with the help of galvanised steel expansion fasteners, filling the joints</p> <p>from both faces with silicon acrylic paste and making the same water tight by covering with fibre glass tape (minimum 50 mm wide and minimum 0.5 mm thick) or by any other suitable material, so as to ensure that the entire construction done with the light weight aerated concrete panels are weather proof and panel surfaces are flush for painting, creating opening for doors / windows / ventilators / ducts / pipes/fans/AC etc. and finishing the opening face with the same U profiled galvanized steel channel which is used at the top and bottom.</p> <p>9.07.05 Toilet Block in ESP Control Room Building shall be of Brick Masonry</p> <p>9.07.06 50 mm thick DPC in Cement concrete (1:1.5:3) with water proofing compound followed by two layers of bitumen coating 85/25 grade as per IS: 702 @ 1.7 kg./sq.m. shall be provided at plinth level before starting the masonry work.</p> <p>9.07.07 Enclosure of the elevator shall have 2hours fire rating and it shall be sealed from outside to ensure dust free environment.</p> <p>9.08.00 COLOUR COATED AND OTHER SHEETING WORK</p> <p>9.08.01 Material</p> <p>a) Wall Cladding & Roofing Material</p> <p>Troughed permanently colour coated sheet of approved shade and colour shall be</p> <p>i) either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y250 as per IS 15961 / grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</p> <p>ii) or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y350 as per IS15961/grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150.</p> <p>iii) or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y550 as per IS 15961/grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150</p> <p>Alternatively aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS: 1254.</p> <p>Bidder to ensure that same profile is to be used throughout the package for all facilities to maintain uniformity.</p> <p>b) Metal Deck Roof Material</p> <p>Troughed permanently colour coated metal decking sheets shall be</p> <p>i) either of steel with minimum 0.8mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 7 OF 30</p>


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<p>9.08.02</p> <p>9.08.03</p>	<p>AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275.</p> <p>ii) or of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275.</p> <p>iii) or of steel of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275.</p> <p>Alternatively aluminium feed material of minimum bare metal thickness of 0.9 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254 can also be used for metal decking.</p> <p>Thickness tolerance of (+/-) 0.04mm is permissible. However, all design calculations shall be carried out on the basis of lowest value of sheet thickness provided.</p> <p>Bidder to ensure that same profile is to be used throughout the package for all facilities to maintain uniformity. In addition, the depth of the profile shall be restricted to 60 mm (maximum) to reduce the overall thickness of floor slab and thus minimizing the dead load of the floor slab. If the bidder proposes to use two different metal deck sheets (same profile but different grades or thicknesses), the unexposed (concrete) side of the metal deck sheets shall be painted with clearly distinct colours to facilitate identification.</p> <p>Bidder to ensure that both cladding sheet and decking sheet supplied at site to be provided with transparent organic film of thickness of 40 microns on each face. Also they should be stored in a covered place on wooden sleepers till erection.</p> <p>Colour Coating</p> <p>Steel shall be colour coated with total coating thickness of at least 40 microns (nominal) comprising of silicon modified polyester (SMP) paint or Super Polyester paint or SDP paint (Super Durable Polyester with no TGIC Triglycidyl Isocyanurate) . The silicon content in the SMP paint to be 30 to 50%. The paint to be , of minimum 20 microns (nominal) dry film thickness (DFT) on external face over primer coat of minimum 5 microns (nominal) and minimum 10 microns (nominal) SMP or super polyester paint over primer coat of minimum 5 microns (nominal) on internal face. SMP and Super polyester paint/SDP systems shall be of industrial finish of product type 4 of AS/NZ2728.</p> <p>Also the heavy metal content (Lead, Cadmium, Chromium etc) to be within environmental norms so that the sheet is also suitable for rainwater harvesting</p> <p>Design Criteria</p> <p>For wall cladding insulated / uninsulated and conveyor gallery sides and roof, permanently colour coated sheet of troughed profile shall be used. However alternative profile meeting the strength, deflection and other functional requirements such as section modulus and moment of inertia shall be provided.</p> <p>Sheet shall be of profile, sectional properties, colour and shade as per specifications.</p> <p>For profiled metal decking sheets (to be used for RCC floor slab or roof slab) the sectional modulus and moment of inertia of troughed profile per meter width shall be so as to limit the deflection of sheets to span/250 under total super imposed loading (DL +LL) comprising the self-weight of metal deck sheet, dead weight of green concrete and an additional construction load 100kg per sq.m for two span condition. The section modulus and moment of inertia of</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p>SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p>PAGE 8 OF 30</p>
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CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 			
<p>9.08.04</p> <p>9.08.05</p> <p>9.08.06</p>	<p>troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements.</p> <p>For metal deck sheets used for roofing (with or without RCC) and side cladding, the sectional modulus and moment of inertia of troughed profile per metre width shall be such that the deflection of sheets is limited to span/250 under design wind pressure for two span condition. The sectional modulus and moment of inertia of troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements. No increase in allowable stress is permissible under wind load condition.</p> <p>Fasteners</p> <p>Side cladding/roofing/decking sheets shall be fixed to the runner/purlins using self-drilling special coated fasteners confirming to corrosion resistant class 3 of AS3566 and tested for 1000 hours salt spray test. Spacing of Self-drilling fasteners in transverse direction (along runners/purlin) shall be equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.</p> <p>Shear anchor studs shall also be provided through metal deck, which are to be used as permanent shuttering, at regular interval on all top flange / flange plate of structural beams as specified in Clause no. 8.03.00.</p> <p>Alternatively, J/U type hooks shall be used in roofing which shall be provided in transverse direction (along runners/purlin) at a spacing equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.</p> <p>Miscellaneous Details</p> <p>To minimize the number of joints, the length of the sheet shall preferably be not less than 4.5m, cut pieces shall not be used, unless specifically approved by the Engineer. However, the actual length shall be such so as to suit the purlin / runner spacing.</p> <p>Lap between the sheets shall be at least 150mm in the longitudinal direction and at least one crest wide in the transverse direction which shall be properly anchored / fixed with fasteners.</p> <p>Z spacers if required shall be made of at least 2 mm thick galvanised steel sheet of grade 350 as per IS 277</p> <p>Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets</p> <p>Filler blocks as a trough filler shall be used to seal cavities formed between the profiled sheet and the support or flashing. The filler blocks shall be manufactured from black synthetic rubber or any other material approved by the Engineer.</p> <p>For insulation of cladding and other areas, mineral wool conforming to IS 8183 shall be used. The density shall be 32 or 48 kg. /cu.m for glass or rock wool respectively. The nominal thickness of insulation shall be 50mm.</p> <p>All flashings, trim closures, caps etc. required for the metal cladding system shall be made out of plain sheets having same material and any weather/moisture sealants with appropriate material and coating specification as mentioned above for the outer face of the metal cladding. Overlap shall be min. 150 mm or as specified by manufacturer.</p> <p>The contractor shall prepare working drawings of sheeting system including end and side laps, flashing, fixing details etc. before starting sheeting work at site.</p> <p>Pre-Fabricated Insulated Metal Sandwich Panels</p> <p>For buildings where Pre-Fabricated (Factory made) Insulated Metal Sandwich Panels shall be used for Roofing, the sandwich panels shall comprise top sheet as troughed permanently</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 9 OF 30</p>
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	<p>colour coated sheet & bottom sheet as plain permanently colour coated with 50mm thick insulation sandwiched between the two sheets. Each sheet shall be</p> <ul style="list-style-type: none"> i) either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y250 as per IS15961/ grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 ii) or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y350 as per IS15961/ grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 iii) or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade Y550 as per IS15961/ grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150. <p>Alternatively, aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254.</p> <p>Metal sheets (steel or aluminium) shall be colour coated with total coating thickness of at least 40 microns (nominal) dry film thickness (DFT) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint or Polyester paint, of minimum 20 microns (nominal) SMP or polyester paint on one side (exposed face), over minimum 5 micron (nominal) primer coat and minimum 10 micron (nominal) SMP or Polyester paint over minimum 5 micron (nominal) primer coat on other side. SMP and Super Polyester paint shall conform to product type 4 of AS/NZS 2728. Troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runners spacing), colour and shade.</p> <p>Special coated fastener conforming to corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test shall be used for fixing Pre-Fabricated Insulated Metal Sandwich Panels with the structural members below.</p> <p>The contractor shall prepare working drawings of sheeting system including end and side laps, fixing details etc. before starting sheeting work at site. The insulation shall be of Polyurethane type. The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m³ and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M Ok, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm.</p> <p>9.08.07 Polycarbonate Sheets</p> <p>The polycarbonate sheet to be used for cladding and glazing purpose in conveyor galleries, Transfer points & pump houses shall have toughed profile to match with the metal cladding profile. Minimum 3.0mm thick fire retardant and UV resistant polycarbonate clean sheet of approved make shall be used. The polycarbonate sheet shall be installed along with the metal cladding so as to have a watertight lapping arrangement. Suitable detailing shall be made to cater for the thermal expansion. IS 14434 to be referred for other details.</p> <p>9.09.00 Plastering</p> <p>9.09.01 Outer face (i.e. rough side) of all brick walls shall have 18 mm thick and inner face (i.e. smooth side) of all walls shall have 12 mm thick cement sand plaster 1:6.</p> <p>9.09.02 Acrylic wall putty in two coats shall be applied over cement plastered surfaces in interior of building. The finish surface shall be smooth and shall be of 2 mm nominal thickness.</p> <p>9.09.03 All R.C.C. walls shall have minimum 12mm thick cement sand plaster 1:6.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN	PAGE 10 OF 30


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9.09.04	All RCC ceilings (except areas provided with false ceiling, cable vault ceiling and metal decking) shall be provided with 6mm thick cement sand plaster 1:4.		
9.09.05	Groove of uniform size 12 x 12 mm up to 20 x 15 mm in plastered surface as per approved pattern, shall be provided as per approved drawing.		
9.09.06	All plastering work shall conform to IS: 1661.		
9.10.00	Painting, Aluminium Composite Panel,		
9.10.01	All painting on masonry or concrete surface shall preferably be applied by roller. If applied by brush then same shall be finished off with roller.		
9.10.02	All paints shall be of approved make including chemical resistant paint.		
9.10.03	<p>Minimum 2 finishing coats of paint shall be applied over a coat of primer.</p> <p>Stone work for wall lining etc. (Veneer work) over 20 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry @3.3kg/sq.m, including rubbing and polishing in complete. (Black polished granite stone slab, 18 mm thick / polished Sadarhally grey granite slab 18 mm thick).</p> <p>The final, finished coating shall be fungus resistant, UV resistant, water repellent, alkali resistant, and extremely durable with colour fastness.</p>		
9.10.04	Acrylic emulsion paint shall be as per IS: 15489. Acrylic distemper shall be as per IS: 428. Cement paint shall conform to IS: 5410, white wash/colour wash shall conform to IS: 627.		
9.10.05	All fire exits shall be painted in post office red/signal red colour shade, which shall not be used anywhere else except to indicate emergency or safety measure.		
9.10.06	For painting on concrete, masonry and plastered surface IS: 2395 shall be followed. For painting on wood work IS: 2338 shall be followed.		
9.10.07	For painting on steel work and ferrous metals, BS: 5493 and IS: 1477 shall be followed. The type of surface preparation, thickness and type of primer, intermediate and finishing paint shall be according to the painting system adopted.		
9.10.08	Bitumen primer used in acid/alkali resistant treatment shall conform to IS: 158.		
9.10.09	All internal paints shall be of low VOC (Less than 50 g /L) content conforming to GRIHA rating for reduction of VOC content.		
9.10.10	<p>Aluminium Composite Panel</p> <p>Aluminum Composite Panel cladding with open grooves shall be designed, fabricated, tested installed and fixed for linear as well as curvilinear portions of the building for all heights and levels including:</p> <ol style="list-style-type: none"> a) Structural analysis & design and preparation of shop drawings for pressure equalization or rain screen principle as required, proper drainage of water to make it watertight including checking of all the structural and functional design. b) Aluminium Composite Panel cladding in pan shape in metallic/ solid colour of approved shades made out of 4mm thick aluminium composite panel. ACP consisting of 3mm thick Fire Retardant mineral filled Core comprising of around 70% Inorganic compound which is 100% non-combustible mineral and balance 30% is food grade virgin polymer sandwiched between two Aluminium sheets (each 0.5mm thick). The aluminium composite panel top and bottom skin should conform to Aluminium Alloy 5005 (AlMg 1) marine grade series and H 22/24 temper. 		
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<p>9.10.11 9.10.11 9.10.13</p>	<p>The ACP sheet shall be coil coated with Kynar 500 based (70:30 ratio) PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc.</p> <p>c) The fastening brackets of Aluminium alloy 6005 T5 / MS with Hot Dip Galvanised with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316 Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing.</p> <p>DELETED. DELETED</p> <p>Exterior Painting on Wall (Premium Acrylic Smooth Exterior Paint with Silicone Additives)</p> <p>The paint shall be (premium acrylic smooth exterior paint with silicone additives) of approved brand and manufacture. This paint shall be brought to the site of work by the contractor in its original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.</p> <p>Preparation of Surface</p> <p>For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer in charge after inspection before painting is commenced.</p> <p>Application of Base Coat</p> <p>Base coat shall be of water proofing cement paint.</p> <p>Preparation of Mix for Base Coat</p> <p>Cement Paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Cement Paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement Paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement Paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.</p> <p>The lids of cement Paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement Paint rapidly becomes air set due to its hygroscopic qualities. In case of cement Paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the same is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.</p> <p>Application of Base Coat</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 12 OF 30</p>


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<p>9.11.00</p> <p>9.11.01</p> <p>9.11.02</p> <p>9.11.03</p> <p>9.11.04</p>	<p>The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement Paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work. The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.</p> <p>For new work, the surface shall be treated with three or more coats of water proof cement Paint as found necessary to get a uniform shade.</p> <p>Precaution</p> <p>Water proof cement Paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, Paints etc. It shall not be applied on gypsums, wood and metal surfaces. If water proofing cement is required to be applied on existing surface, previously treated with white wash, colour wash etc., the surface shall be thoroughly cleaned by scrapping off all the white wash, colour wash etc. completely. Thereafter, a coat of cement primer shall be applied followed by two or more coat of water proof cement.</p> <p>Application of exterior paint</p> <p>Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when applying also the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. Dilution ratio of paint with potable water can be altered taking into consideration the nature of surface climate and as per recommended dilution given by manufacturer. In all cases, the manufacturer's instructions & directions of the Engineer-in-charge shall be followed meticulously.</p> <p>The lids of paint drums shall be kept tightly closed when not in use as by exposure to atmosphere the paint may thicken and also be kept safe from dust. Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.</p> <p>Doors & Windows</p> <p>Doors, windows and ventilators of air-conditioned areas, entrance lobby of all buildings (where ever provided), and all windows and ventilators of all buildings (unless otherwise mentioned) shall have aluminium framework with glazing. The aluminium section shall have minimum 2 mm thickness. The aluminium frame shall be electro colour dyed (anodised with 15 micron coating thickness) when used on outer side of the building and it shall be powder coated(50 microns coating thickness) when used in interior of the building. All doors of toilet areas shall be of steel framed solid core flush shutter. For Mill Bunker Building, transfer points, crusher house, conveyor gallery, steel louvered windows shall be provided.</p> <p>Control Rooms of all buildings shall be provided with Aluminium Glazed door.</p> <p>Single glazed panels with aluminium framework shall be provided as partition between two air-conditioned areas wherever clear view is necessary.</p> <p>a) The doors frames shall be fabricated from 1.6 mm thick MS sheets and shall meet the general requirements of IS: 4351.</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 13 OF 30</p>
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>				

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 			
<p>9.11.05</p> <p>9.11.06</p> <p>9.11.07</p> <p>9.11.08</p> <p>9.11.09</p> <p>9.11.10</p> <p>9.11.11</p>	<p>b) All steel doors shall consist of double plate flush door shutters. The door shutter shall be 35 mm (min.) thick with two outer sheets of 1.2 mm rigidly connected with continuous vertical 1.0 mm stiffeners at the rate of 150 mm centre to centre. Side, top and bottom edges of shutters shall be reinforced by continuous pressed steel channel with minimum 1.2 mm. The door shall be sound deadened by filling the inside void with mineral wool. Doors shall be complete with all hardware and fixtures like door closer, tower bolts, handles, stoppers, aldrops, locks etc.</p> <p>Steel windows and ventilators shall be as per IS: 1361 and IS: 1038.</p> <p>Wherever functionally required Rolling shutter (fully closed/partly grilled) with suitable operating arrangement (manual/Electric) shall be provided to facilitate smooth operations. Rolling shutters shall conform to IS: 6248. M.S sliding doors with suitable mechanical and electrical operations fixtures as per requirement for bigger openings shall be used.</p> <p>All windows and ventilators on ground floor of all buildings shall be provided with suitable Aluminium grill.</p> <p>Fire-Proof doors with panic devices shall be provided at all fire exit points as per requirements. These doors shall generally be as per IS 3614 (Part 2). Fire rating of the doors shall be of minimum 2 hours. These doors shall be double cover plated type with mineral wool insulation.</p> <p>Hollow extruded section of minimum 2 mm wall thickness as per IS: 1285 (Grade of Aluminum shall be Alloy 63400) shall be used for all aluminium doors, windows and ventilators.</p> <p>Minimum size of door provided shall be 2.1 m high and 1.2 m wide. However for toilets minimum width shall be 0.75 m and office areas minimum width shall be 1.20m.</p> <p>Electrically operated, self operable/closing, aluminium framed with tinted glass, sliding doors shall be provided at the entrance of all common control rooms, entrance lobby of facility building. At the entrance of all common control rooms in MPH G.I. framed with fire resistant glass, sliding doors shall be provided. The other doors in common control rooms in MPH shall be G.I. framed with fire resistant glass as per fire zoning .FIRE RESISTANT GLAZED DOOR SYSTEM shall be of UNIFORM PROFILE 50X50 mm with 14mm EI 20 GLASS For Interior Application</p> <p>FIRE RESISTANT GLAZED DOOR SYSTEM shall have 120 minutes of integrity and radiation control (EW 120) with symmetrical (Bi-Directional) fire protection. The frames shall be cold rolled profiles as per EN standard EN 10327/ Indian Standard IS 513 . The door frames are cold rolled from 1.5 mm steel sheet to form a profile of 50 mm x 50 mm on all sides. The door shutter shall have the top rail, side rail and bottom rail dimensions of 50 mm x 50 mm. The overall door opening shall be as per tested evidence and tested as per EN 1634-1/ ISO 834-1 / ISO 3009 /(Indian Standard) IS 16947:2018 in an accredited laboratory.</p> <p>The glass must be minimum 14mm clear (MADE IN INDIA)120 min fire rated for Integrity, Radiation control (EW 120) and partially insulation (EI 20) Non Wired Toughened Interlayered glass with a light transmission of 86% and a sound reduction of 38 dB and manufactured in UL & TUV audited Facility and including UL-EU Certification and compliant to class 1(B)1 category of Impact Resistance as per EN 12600. The glass shall be tested and certified for no formation of bubbles or yellowing after 5000 hours of exposure to UV radiation by TUV Rheinland as per EN 12543-4.The base glass and finished glass must made in India .</p> <p>The shutters shall be fixed to the frame using Weld-on hinges of dimensions 179mm X 20mm. The profiles shall have groves to incorporate Fire Resistant gaskets. The glass shall be held in its place with the help of 1.5 mm cold rolled steel beading and Kerafix 2000 ceramic tape with cross section of 4 x 15 mm as per the test evidence. Beading shall be clipped on using Stainless Steel self-tapping screws fixed at a distance of 70 mm from the edges and 150 mm c/c henceforth. The glass panes are to be supported on non-combustible 6 mm Calcium</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 14 OF 30</p>
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>				

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
	<p>Silicate setting blocks. The door shall be fitted with offset pull handle and door closer of Dorma (TS 73V, TS 83V, TS93V), Geze (TS 2000NV) or equivalent. The inactive leaf (in case of double leaf only)shall be fixed to the frame using a tower bolt at meeting edge at top or as per the tested evidence. The doors shall be manufactured in a TUV audited facility. The maximum glazing size shall be as per the test certification. The profile has to be fixed to the supporting construction by means of M10 or bigger steel bolts at every 150 mm from the edges and every 500 mm (approx.) c/c. The doors shall offer C4 level of wind resistance when tested as per EN12211 and shall provide class 4 level of air permeability as per EN 1026. The door shall also be subjected to durability tests as per EN 12400 for C5 classification (200,000 cycles). The doors shall also be tested for class 5 of impact resistance when tested as per EN 13049. The doors & partition shall also be tested for class 4 level of Mechanical strength when tested as per EN13115. The door shall have water tightness level of 8A when tested as per EN 1027. Fire Rated Door shall be of Makes- Saint Gobain, Acodor , IGI, Matrix.</p> <p>9.11.12 Minimum area of windows in building on each floor level shall be 10% of floor area.</p> <p>9.12.00 Glazing</p> <p>9.12.01 All windows and ventilators (not specified elsewhere) shall be provided with minimum 6 mm thick toughened glass conforming to IS: 5437.</p> <p>9.12.02 For single glazed aluminium partitions and doors, 8mm thick clear toughened glass shall be used.</p> <p>9.12.03 Toughened tinted glass of 6 mm thickness shall be used for all windows and ventilators in toilets.</p> <p>9.12.04 All glazing work shall conform to IS: 1083 and IS: 3548.</p> <p>9.12.05 For glazings of Air Conditioned Buildings Composite double glazing shall be 24mm thick consisting of 6mm thick clear float glass on inner side and 6mm thick reflective toughened glass on outer side. The two glasses shall be separated by 12mm air-gap and hermetically sealed by beading of anodized aluminium with outer edge sealed with silicon sealant. Outer glass of 6mm thickness shall have following technical characteristics: Solar factor 25% or less, Maximum U-value 3.3 W/ SQMK, VLT min 30%: Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28)</p> <p>The glass to be used should be from the manufacturers of glass like Saint Gobain (India) or Asahi (India) or equivalent. The glass should be free from distortion and thermal stress</p> <p>9.12.06 For internal glazed partition, 8mm thick clear toughened glass shall be provided. Internal Glazed partition in in MPH shall be Vetrotech Saint-Gobain fully glazed fire rated fixed partition with 120 minutes of integrity and radiation control (EW 120) with symmetrical (Bi-Directional) fire protection. The frames shall be cold rolled profiles As per EN standard EN 10327/Indian Standard (IS 513) . The frames are cold rolled from 1.5 mm steel sheet to form a profile of 50 mm x 50 mm on all sides. he system shall be tested as per EN 1364-1/(Indian Standars) IS 16945:2018 in an accredited laboratory.</p> <p>The glass shall be Contraflam Lite 14mm (MADE IN INDIA)clear 120 min fire rated for Integrity, Radiation control (EW 120) and partially insulation (EI 20) Non Wired Toughened Interlayered glass with a light transmission of 86% and a sound reduction of 38 dB and manufactured in UL & TUV audited Facility and including UL-EU Certification and compliant to class 1(B)1 category of Impact Resistance as per EN 12600. The glass shall be tested and certified for no formation of bubbles or yellowing after 5000 hours of exposure to UV radiation by TUV Rheinland as per EN 12543-4 The glass shall provide bi-directional (Symmetrical) fire protection. The base glass and processed glass must be made in INDIA.</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 15 OF 30</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 				
<p>9.13.00</p> <p>9.13.01</p> <p>9.13.03</p> <p>9.13.05</p> <p>9.13.08</p> <p>9.13.09</p> <p>9.13.10</p> <p>9.13.11</p> <p>9.14.00</p>	<p>The glass shall be held in its place with the help of 1.5 mm cold rolled steel beading and Kerafix 2000 ceramic tape with cross section of 4 x 15 mm as per the test evidence. Beading shall be clipped on using Stainless Steel self-tapping screws fixed at a distance of 70 mm from the edges and 150 mm c/c henceforth. The glass panes are to be supported on non-combustible 5 mm Calcium Silicate setting blocks. The maximum glazing size shall be as per the test certification. The profile has to be fixed to the supporting construction by means of M10 or bigger steel bolts at every 150 mm from the edges and every 500 mm (approx.) c/c.</p> <p>The Partitions shall offer C4 level of wind resistance when tested as per EN12211 and shall provide class 4 level of air permeability as per EN 1026. The Partitions shall also be tested for class 5 of impact resistance when tested as per EN 13049. The Partitions shall also be tested for class 4 level of Mechanical strength when tested as per EN13115. The Partitions shall have water tightness level of 8A when tested as per EN 1027. Partitionr shall be of Makes - Saint Gobain,Acodor , IGI , Matrix ,Tata Pravesh.</p> <p>False ceiling</p> <p>False ceiling of 12.5 mm thick tapered/square edge glass fibre reinforced gypsum board conforming to IS : 2095 having fine texture finish, including providing and fixing of frame work at all levels, for all kind of work, consisting of light weight galvanised steel member (minimum 0.8 mm thick and galvanised as per IS: 277) having maximum grid size of 1200 mm x 600 mm for supporting panels of specified size, suspended from RCC structural steel or catwalkway grid above, with 4 mm (minimum) galvanised wires (rods), with special height adjustment clips, providing angle section of minimum 25 mm width along the perimeter of ceiling, supporting grid system (minimum 0.8 mm thick and galvanised as per IS: 277), expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts, return air grills, light fixtures, etc., all complete. (concealed grid and finished flat seamless and curve shape (dome etc.), finished smooth(seamless) along with the galvanised light gauge steel supporting system laid in profile to suit the profile of dome).</p> <p>False ceiling of 12 mm thk calcium silicate board of 'HILUX' or equivalent with suspension system as per manufacturers details including supporting grid system, expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts, return air grills, light fixtures, etc., all complete. (With concealed grid and finished flat seamless).</p> <p>ALUMINIUM FALSE CEILING : Aluminium false ceiling shall be in 600 mm x 600 mm tile or plank type of 0.6 mm thickness (minimum) with perforation of 2.5 mm dia in combination with built in nonwoven tissue for providing good acoustic properties. False ceiling shall have coil coating of thickness 25micron (minimum)and it shall be installed with T-Grid (of profile 24 mm) in same or contrasting colours or with 6 mm recess joints. The whole system shall be level adjusting arrangement and shall be suspended as per manufacturer guidelines.</p> <p>Additional hangers and height adjustment clips shall be provided for return air grills, light fixtures, A.C. ducts etc.</p> <p>Suitable M.S. channel (Minimum MC75 with maximum spacing of 1.2 m C/C both ways) grid shall be provided above the false ceiling level for movement of personnel and to facilitate maintenance of lighting fixtures, AC ducts etc.</p> <p>Underdeck insulation shall be provided on the ceiling (underside of roof slab) and underside of floor slab of air-conditioned area depending upon the functional requirements. This underdeck insulation shall consist of 50mm thick mineral wool insulation with 0.05 mm thick aluminium foil & 0.6 mm x 25mm mesh wire netting and shall be fixed to the ceiling with 2 mm wire ties.</p> <p>Suitable cut-outs shall be provided in false ceiling to facilitate fixing of lighting fixtures, AC grills, smoke detectors, etc.</p> <p>Elevator Machine Room</p> <p>Elevator machine room shall be as per NBC requirements in either way.</p>	<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p>SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p>PAGE 16 OF 30</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
<p>9.15.00</p>	<p>a) Floor of the elevator machine room shall be of RCC and wall shall be of one brick thick masonry wall. It shall be provided with fire door and other requirements as per NBC and elevator norms.</p> <p>b) Floor of Machine Room shall be provided with profiled metal decking sheet. Trough shall be filled with Insulating Material (glass wool or rock wool) and thereafter finished with Minimum 50 mm thick wooden flooring, consisting of 37 mm thick hardwood planks, finished with 11mm thick laminated wooden flooring (of 'pergo' or equivalent) with plank size 193x1195mm (material class shall be 34 as per EN13329), over 2 mm expanded polystyrene foam and polythene sheet under laying.</p> <p>Roof and Side enclosure of Machine Room shall be provided with Prefabricated Insulated Metal Sandwich panels. Composition of Insulated Metal Sandwich Panels shall be as described in Clause 9.08.00 of Part-B (Civil) of Technical Specification.</p> <p>Doors of Machine Room shall be Double Plate Steel flush doors of thickness 45 mm with steel sheets of 18 gauge with necessary stiffeners. Space between two sheets shall be filled with mineral wool insulation. Frame of doors shall be pressed steel sheets of 16 gauge. All necessary fittings for the doors shall be provided by the Bidder. Rubber sealing, for making the Doors airtight shall also be provided.</p> <p>Windows/ventilators shall be of standard extruded anodised Aluminium Sections of minimum 2 mm thickness with 24 mm hermitically sealed double glazing consisting of two 6 mm thick toughened glass separated by 12 mm. gap.</p> <p>Technical requirements of prefabricated insulated metal sandwich panels/decking sheets shall be same as given elsewhere in this specification.</p> <p>Interior Design</p> <p>A comprehensive interior design scheme shall be conceived with the intention of projecting a definite theme and aesthetic appearance to inside working environment. It shall take into account the multidisciplinary engineering activities involving power plant technology, and architectural & civil engineering for a smooth control hierarchy and man machine interface. All the design aspects such as flooring, false ceiling, furniture, colour scheme equipment design & layout, illumination, fire fighting, acoustics and ergonomics requirements shall be detailed out so as to present an overall unified aesthetic spatial appearance.</p> <p>The areas to be undertaken for this interior design process shall be control room complex including common control room, computer room, conference rooms and office areas in the buildings and the following aspects shall be reviewed and evaluated for design. Furniture to be supplied by Bidder for the control room complex and other control rooms shall be as specified under C&I specification.</p> <p>a) Layout, keeping in view the man-machine interface and suitable ergonomic practices.</p> <p>b) Integration of civil engineering with architecture and interior design.</p> <p>c) Illumination levels, noise levels, electromagnetic interference levels, taking into account the equipment and furniture.</p> <p>d) Comfort and safety requirements such as air conditioning, fire fighting, fire escapes, etc.</p> <p>e) Microprocessors based control system to control the functional requirements.</p> <p>The above design philosophy put into practice shall be detailed out through presentation drawings, perspective views, scale models, detail drawings, etc.</p>		
<p>9.16.00</p>	<p>Stainless Steel Hand railing</p> <p>Providing and fixing knockdown railing system comprising of SS 304 Grade Stainless Railing of 50mm diameter handrail fixed on 50 mm SS round baluster placed at maximum 1000 c/c along with five numbers 19 mm diameter midrail connected at side of baluster by special brackets, both the end of mid rail should be bush inserted for jointing and to give extra strength</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 17 OF 30</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
9.17.00	<p>(joints should not be welded and invisible). The balustrade should be fixed onto floor with casted plate of minimum 6mm thickness. Base plate shall be concealed with suitable SS 304 cover cap so that the mounting height fasteners are not visible after installation. Only high strength anchor fasteners would be used for fixing of baluster, as giving extra strength, rust proof and more durable. Onsite welding is strictly not allowed. Wherever welding is required, it should be Tig welding process with same grade 304/316 at factory only so that floor stone and other things would not be damaged and for safety purpose also. Baluster and handrail connector should be screwed tightened and not to be welded on site. Wall thickness of all pipes shall be taken as 2 mm. Along with all visible components developed in high grade SS and whenever required, joints to be filled with bushings for extra strength. Railing Height to be taken @ 1000/ 1200 mm from floor level.</p> <p>Finishing Schedule</p> <p>Interior and Exterior Finishes shall be as given in Tables-A & B respectively attached at the end of these specification.</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN</p>	<p style="text-align: center;">PAGE 18 OF 30</p>

**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
1.	Main power house Building.			
	a) Unloading Bay	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	b) Cable vault	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	c) Balance area including passage	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	d) SWAS Room	Matt Finished Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns upto false ceiling level	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	e) Equipment Area, ESP SWGR/ ACP Room/ UAF Room	Cement concrete with Metallic hardener topping	Acrylic distemper.	Acrylic distemper (except metal deck area)
	f) UPS Battery charger room	Matt finished Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns upto false ceiling level	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	g) Deaerator floor	Cement concrete with Metallic hardener topping.		-

**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	h) Operating Floor	20 mm thick heavy duty anti skid full body vitrified tile in TG Hall. Rubber flooring at TG deck.	Colour coated Metal cladding on A-Row& Gable end, up to crane girder level.	Metal deck roofing (bottom of sheeting with RAL 9002 finish)
	i) General circulation and movement areas	20 mm thick heavy duty anti skid full body vitrified tile		Acrylic distemper (except metal deck area).
	j) Switchgear room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)
	k)MCC Room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)
	l) Control room area including control room	Matt Finish Vitrified ceramic tiles flooring of size 1000 x1000 mm	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling

**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	m) control equipment room,	Matt finish Vitrified ceramic tiles.	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling
	n)Conference room, senior executive room., Computer Room	Matt finish Vitrified ceramic tiles	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling
	o)Record room	ceramic tiles	Acrylic distemper.	Designer metal false ceiling
	p)Locker room	Ceramic Tiles	Acrylic Emulsion Paint	Allu Designer metal false ceiling
	q)Toilet area	ceramic tiles	Digitally glazed ceramic wall tiles up to False Ceiling Height	Calcium Silicate False Ceiling

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TECHNICAL REQUIREMENTS



**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	r) Office Room, Staff Room	Matt Finished Vitrified ceramic tiles.	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	s)Laboratory area	Vitrified Ceramic / Acid/alkali resistant tiles.	Designer ceramic wall tiles up to False Ceiling Height/ Aluminium composite panel cladding for columns and walls in case of A.C Panel	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	t) RCC Stair case	18mm thick Granite (Polished and honed Finished) stone	Polished Granite Stone up to 1.2m. ht. & Acrylic Distemper Paint over wall putty finish for balance height.	Acrylic Distemper
	u) Lift and Staircase Lobby	18mm thick polished granite stone as pattern.	18mm thick polished granite & glass mosaic tile cladding up to False Ceiling Height	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	v) Passages and general circulation areas.	Deleted	Deleted	Deleted

TABLE –A
INTERIOR FINISHING SCHEDULE

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	w) Battery Room	Acid and alkali resistant tile.	Acid and alkali resistant tile up to 1.2m height and chemical resistant paint for balance height	Chemical Resistant paint except in locations where Metal deck has been provided
	x) Oil canal, oil room, oil purification Tank and other areas where oil spillage is likely to occur.	Oil resistant paint (epoxy based) 150 micron over primer.	As above except oil canal Oil resistant Paint	As above except oil canal.
	y) Pathways including roof area.	22mm thick concrete chequered tiles.	-	-
2.	ESP control building/Air compressor house			
	a) Operating/Maintenance areas	Cement concrete with Metallic hardener topping	Pre color coated metal panel cladding.	Acrylic distemper (except metal deck area)
	b) Office Room, Staff Room	Digitally glazed Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns	Mineral fiber Board False Ceiling

**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	c) Control Room	Digitally glazed Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns in ESP Control Room Building	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	d) MCC Room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)
	e) RCC Stair case	18mm thick Granite (Polished and Honed Finished) stone	Polished Granite stone up to 1.2m.ht. & Acrylic Distemper	Acrylic Distemper (except metal deck area)
	f) Battery Room	Acid, Alkali resistant tile	Acid, Alkali resistant tile 1.2m height / chemical resistant paint above dado	Chemical resistant paint (except metal deck area)
	g) AHU/ AC Plant room/ Cable vault	Cement concrete with Metallic hardener topping	Acrylic Distemper	Acrylic Distemper (except metal deck area)
	h) Toilets	ceramic tiles.	Designer ceramic wall tiles dado up to false ceiling level.	Calcium silicate false ceiling.

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TECHNICAL REQUIREMENTS



**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
3.	Mill & Bunker building/ T.P.s / Conveyor Galleries	Cement concrete with Metallic hardener topping	Acrylic distemper on masonry walls/ color coated Metal panel cladding	color coated Metal panel cladding
4.	Fire water pump house/ Fire water booster water pump house.			
	a) Maintenance /Pump floor/PLC	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	b) Control room /PLC.	Matt Finished Vitrified Ceramic Tiles	Acrylic emulsion paint.	Mineral fiber board false ceiling.
	Toilet area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200 mm	Acrylic distemper

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TECHNICAL REQUIREMENTS



**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
5.	Ash slurry pump house/ Ash water pump house / Silo Area Utility Building / Transport air compressor house/ HCS D pump house/Fuel Oil Unloading Pump House with switchgear building & control room /H2 generation Building/ Miscellaneous Switchgear room CW Pump house, Switchgear room, control room/ RW Pump house, Switchgear room, control room/Any other Building..			
	a) Operating/Maintenance areas/ MCC room	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	b) Control room /PLC /Office area.	Matt Finished Vitrified Ceramic Tiles	Acrylic emulsion paint.	Mineral fiber board false ceiling.
	c) Toilet/Pantry area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200 mm	Acrylic distemper

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TECHNICAL REQUIREMENTS



**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
6.	O&M store building/Dozer Shed			
	a) Stores/dozer shed	Cement concrete with Metallic hardener topping.	Acrylic distemper/ color coated Metal panel cladding	Acrylic distemper (except metal deck area)
	b)Office Room, Staff Room/ Electronic Store	Matt Finished Vitrified ceramic tiles.	Acrylic emulsion paint.	Acrylic Emulsion Paint. / Mineral Fibre Board False Ceiling in A.C area
	c) Passages	Matt Finished Vitrified Ceramic Tiles	Acrylic distemper	Acrylic distemper
	d) RCC Stair case	18mm thick polished Marble stone finish.	Marble stone up to 1.2m.ht. & Acrylic Distemper above.	Acrylic Distemper
	e) Toilets	ceramic tiles.	Designer ceramic wall tiles dado up to 2.1 m Height from FFL.	Acrylic distemper
7.	Rest Room for O&M Workers			

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**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	Rest room	Cement concrete with Metallic hardener topping.	Acrylic distemper	Metal roof
	Toilets	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2100 high, Acrylic Distemper paint above	Metal roof
8.	Occupational Health Centre with Crèche Facilities			
	a)Waiting Lobby cum Reception/ Doctor's Chamber /First Aid Room/ Patient Room	Matt finish vitrified tiles	Acrylic Emulsion paint	Acrylic Emulsion paint
	b) Driver's Room	Digitally Glazed vitrified tiles	Acrylic Distemper Paint	Acrylic Distemper Paint
	c)Toilet area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to false ceiling level.	Calcium Silicate False Ceiling

**TABLE –A
INTERIOR FINISHING SCHEDULE**

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	Creche	5 mm thick vinyl flooring	Glass mosaic tiles in murals & patterns and Acrylic Emulsion Paint	Acrylic Emulsion paint
9.	Watch Tower			
	Viewing area	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper

- Note :
1. All wall above false ceiling shall be plastered.
 2. The colour and pattern of finish shall be as per approved details.
 3. All materials shall be of reputed and established brand approved by Engineer-in-charge.
 4. Wherever alternative materials are specified, the final selection rests with Engineer-in-charge.
 5. This finishing schedule shall also be applicable to similar functional areas for all other buildings and facilities.
 6. All the finishing materials shall be applied/provided as per manufacturer specification and guidelines under the supervision & guidelines of manufacturer.
 7. Requirement given above are suggestive and minimum. Bidder is welcome to suggest alternative scheme conforming to design functional requirement subject to approval of the Engineer-in-charge.

CLAUSE NO.

TECHNICAL REQUIREMENTS





**TABLE –B
EXTERIOR FINISHES SCHEDULE**


SI.No.	DESCRIPTION OF AREA	WALL AND PROJECTIONS	SOFFIT OF PROJECTIONS
1.	Auxiliary building in steel framed structure.	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface/ Aluminium Composite Panel Approved colour/ colour combination of colour coated metal cladding	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface Approved colour/ colour combination of colour coated metal cladding
2.	Building with concrete frame work, etc.	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface	Premium Acrylic Smooth exterior paint with silicon additives over suitable primer of Water Proof Cement Paint over plastered surface
3.	Steel Structure, trestles, etc.	High performance Paint of approved specification and shade.	
4			

NOTE : 1. The colour and pattern of finish shall be as finalized by Engineer.
2. All materials shall be of reputed and established brand approved by Engineer.

CLAUSE NO.	TECHNICAL REQUIREMENTS				
D-1-10 10.01.00 10.02.00	<p style="text-align: right;">एनडीपीसी NTPC</p> <p>MATERIAL SPECIFICATION</p> <p>Cement</p> <p>Fly ash based portland pozzolana cement conforming to IS: 1489 (Part-1) shall be used for all areas other than for the critical structures identified below. Other properties shall be as per IS code.</p> <p>Ordinary Portland Cement (OPC) shall necessarily be used for the following structures.</p> <p>a) Ordinary Portland Cement (OPC) shall necessarily be used for RCC for Chimney shell.</p> <p>b) TG foundation top deck/ Substructure</p> <p>c) Spring supported decks of all machine foundations such as TDBFP/ MDBFP</p> <p>The grade of cement shall be Grade 43 for OPC conforming to IS: 269.</p> <p>In place of fly ash based portland pozzolana cement, OPC mixed with Fly Ash can be used. Batching plant shall have facility for mixing fly ash. Fly ash shall conform to IS: 3812(Part I). Percentage of fly ash to be mixed in concrete shall be based on trial mix. Mix design shall be done with varying percentage of fly ash mix with cement</p> <p>Aggregates</p> <p>a) Coarse Aggregate</p> <p>Coarse aggregate for concrete shall be crushed stones chemically inert, hard, strong, durable against weathering of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383.</p> <p>However, use of aggregate manufactured from other than natural sources (Listed in Annexure-A of IS 383) and Bottom Ash from Thermal Power Plants shall be permitted only in Lean Concrete of Grade M7.5 and M10 (for % of utilization refer Table-1 of IS 383).</p> <p>b) Fine Aggregate</p> <p>Fine aggregate shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS: 383. Bidder can use either natural sand or crushed sand, confirming to IS:383, based on availability.</p> <p>For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116.</p> <p>However, use of aggregate manufactured from other than natural sources (as Listed in Annexure-A of IS 383) and Bottom Ash from Thermal Power Plants conforming to IS:383 shall be permitted only in Lean Concrete of Grade M7.5 and M10 (for % of utilization refer Table-1 of IS 383).</p> <p>c) Petrographic examination of aggregate shall be carried out by the contractor at National Council for Cement and Building Materials (NCB), Ballabgarh, or any other approved laboratory to ascertain the structure and rock type including presence of strained quartz and other reactive minerals for machine foundations, etc. In case, the coarse aggregate sample is of composite nature, the proportions (by weight) of different rock types in the composite sample and petrographic evaluation of each rock should also be ascertained. While determining the rock type, special emphasis should be given on identification of known reactive rocks like chalcedony, opal etc. The procedure laid down in IS 2430 for sampling of aggregates may be followed.</p> <p>The laboratory shall determine potential reactivity of the aggregate, which may lead to reaction of silica in aggregate with the alkalis of cement and / or potential of some aggregates like limestone to cause residual expansion due to repeated temperature cycle. If the same is established, the contractor shall further carry out alkali aggregates</p>	LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-10 CIVIL WORKS MATERIAL SPECIFICATION	PAGE 1 OF 4

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>10.03.00</p> <p>10.04.00</p> <p>10.04.01</p>	<p>reactivity test as per IS 2386 (Pt.VII) and / or repeated temperature cycle test to establish the suitability of the aggregates for the concrete work. The test results, with the final recommendations of the laboratory, as to a suitability of the aggregate, for use in the concrete work for various structures and suggested measures, in case of results are not satisfactory, shall be submitted to the Engineer for his review, in a report form.</p> <p>In case in the report, it is established, that the aggregates contain reactive silica, which would react with alkalis of the cement, the contractor shall change the source of supply of the aggregate or use low alkali cement as per recommendation or take measures as recommended in the report as instructed by Engineer. In case aggregates indicate residual expansion, under repeated temperature cycle test (from 10o Celsius to 65o Celsius and for 60 temperature cycles) the material shall not be used for concreting of TGs', BFPs' and other equipment foundations which are likely to be subjected to repeated temperature cycle. The contractor shall use aggregates free from residual expansion under repeated temperatures cycle test.</p> <p>Reinforcement Steel</p> <p>Reinforcement steel shall be of high strength deformed TMT steel bars of grade Fe-415/Fe-500/Fe 500D/550D and shall conform to IS 1786 and IS 13920. However, minimum elongation shall be 14.5%.</p> <p>Relevant clause of IS 13920 are quoted below for clarity:</p> <p>Quote</p> <p>5.3.1 Steel reinforcement shall comply with all of the following:</p> <ol style="list-style-type: none"> a) Elongation shall be at least 14.5 percent, b) Ratio of ultimate stress to 0.2 percent proof stress shall not exceed 1.25, c) Ratio of ultimate stress to 0.2 percent proof stress shall be at least 1.15, and d) Steel shall be only of strength grades with minimum 0.2 percent proof stress of 415 MPa, 500 MPa or 550 MPa, in addition to other requirements of IS 1786.' <p>5.3.2 The actual 0.2 percent proof stress of steel bars based on tensile test must not exceed their characteristic 0.2 percent proof stress by more than 20 percent</p> <p>Unquote</p> <p>Mild steel and medium tensile steel bars shall conform to Grade A of IS:432-Part 1 and hard drawn steel wire shall confirm to IS:432-Part II. Welded wire fabric shall conform to IS 1566.</p> <p>Structural Steel</p> <p>Structural Steel (including embedded Steel) shall be straight, sound, free from twists, cracks, flaw, laminations and all other defects. Structural steel shall comprise of mild steel, medium strength steel and high tensile steel as specified below.</p> <p>Mild Steel</p> <ol style="list-style-type: none"> a) Rolled sections shall be of grade designation E250, Quality A/BR, Semi-killed/ killed conforming to IS 2062. All steel plates shall be of Grade designation E250, Quality BR (fully killed), conforming to IS 2062 and shall be tested for impact resistance at room temperature. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2. b) Pipes shall conform to IS: 1161. c) Hollow (square and rectangular) steel sections shall be hot formed conforming to IS: 4923 and shall be of minimum Grade Yst 240 and minimum thickness shall be 4 mm.. 			
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-10 CIVIL WORKS MATERIAL SPECIFICATION	PAGE 2 OF 4	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p>d) Chequered plate shall conform to IS 3502 and shall be minimum 6 mm thick excluding projection. Steel for chequered plate shall conform to grade E250A semi killed of IS: 2062 or equivalent grade conforming to ASTM & BS standards only.</p>			
10.04.02	<p>Medium and High Tensile Steel</p> <p>Rolled Sections and plates shall be of grade designation E350 or higher, Quality B0 (Fully killed), conforming to IS: 2062. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2.</p>			
10.05.00	<p>Bricks</p> <p>Only fly ash bricks shall be used in all construction, except for elevator shafts, which can be either of burnt clay bricks or RCC construction as per functional / codal provisions. Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75kg/cm². Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS: 13757 and IS: 12894 respectively. Minimum fly ash content in fly ash based bricks shall be 25%.</p>			
10.06.00	<p>Foundation Bolts</p> <p>Material and details of foundation bolts shall conform to IS: 5624. Mild steel bars used for the fabrication of bolt assembly shall conform to grade 1 of IS: 432 and/ or grade A of IS: 2062. Hexagonal nuts and lock nuts shall conform to IS: 1363 & IS: 1364 upto M36 diameter and IS: 5624 for M42 to M150 diameter.</p>			
10.07.00	<p>Stainless steel</p> <p>The material specification for stainless steel plates are mentioned in the design concept area of Mill Bunker building.</p>			
10.08.00	<p>Water</p> <p>Water used for cement concrete, mortar, plaster, grout, curing, washing of coarse aggregate, soaking of bricks, etc. shall be clean and free from oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. When water from the proposed source is used for making the concrete, the maximum permissible impurities, development of strength and initial setting time of concrete shall meet the requirements of IS: 456.</p> <p>All materials brought for incorporation in works shall be of best quality as per IS unless specified otherwise.</p>			
10.09.00	<p>PTFE (Poly Tetra Fluoroethylene) Bearing</p> <p>The bearing shall be of reputed make and manufacturer as approved by the Engineer, for required vertical load and end displacement/rotation. PTFE bearing shall be sliding against highly polished stainless steel and the coefficient of friction between them shall be less than 0.06 at 55 kg/sq.cm. In order to prevent cold flow in PTFE surface it shall be rigidly bonded by a special high temperature resistance adhesive to the stainless steel substrata. The stainless steel surface that slides against the PTFE is mirror polished. The stainless steel shall be bonded to the top plate by special high strength adhesive. The thickness of stainless steel plate shall be between 1.0 mm to 1.5 mm.</p>			
10.10.00	<p>Autoclave Aerated Concrete (AAC) Block</p> <p>AAC Block shall have the following physical properties: Density(Oven dry): 550-650kg/cum Compressive Strength: Minimum 30kg/sqm Thermal Conductivity: 0.162W/mk(avg)</p>			
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-10 CIVIL WORKS MATERIAL SPECIFICATION	PAGE 3 OF 4

CLAUSE NO.	TECHNICAL REQUIREMENTS 		
10.11.00	<p>Resistant to fire: 2-6hrs depending upon thickness Dry Shrinkage: 0.02%(avg) Design Gross Density: 800kg/cum(approx.)</p> <p>Statutory Requirements</p> <p>Bidder shall comply with all the applicable statutory rules pertaining to Factories Act, Fire Safety Rules at Tariff Advisory Committee. Water Act for pollution control, Explosives Act, etc.</p> <p>Provisions of safety, health and welfare according to Factories Act shall be complied with. These shall include provision of continuous walkways along the crane - girder level on both sides of building, comfortable approach to EOT crane cabin, railing, fire escape, locker room for workmen, pantry, toilets, rest room etc.</p> <p>Provisions for fire proof doors, number of staircases, fire separation wall, lath plastering/encasing the structural members (in fire prone areas), type of glazing etc. shall be made according to the recommendations of Tarrif Advisory Committee.</p> <p>Statutory clearances and norms of State Pollution Control Board shall be followed.</p> <p>Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-10 CIVIL WORKS MATERIAL SPECIFICATION	PAGE 4 OF 4

CLAUSE NO.

TECHNICAL REQUIREMENTS



D-1-11

Inspection, Testing and Quality Control

11.01.00

Sampling and testing of major items of civil works viz. earthwork, concreting, structural steel work (including welding, sheeting, etc. shall be carried out in accordance with the requirements of this specification. Wherever nothing is specified relevant Indian Standards shall be followed. In absence of Indian Standard equivalent International Standards may be used.

The Bidder shall submit and finalise a detailed field Quality Assurance Programme before starting of the construction work according to the requirement of this specification. This shall include frequency of sampling and testing, nature/type of test, method of test, setting of a testing laboratory, arrangement of testing apparatus/equipment, deployment of qualified/experienced manpower, preparation of format for record, Field Quality Plan, etc. Tests shall be done in the field and/or at a laboratory approved by the Engineer. The Bidder shall furnish the test certificate from the manufacturer's of various materials to be used in the construction.

11.02.00

Workmanship and dimensional tolerances shall be checked as stipulated else where in the specification

CLAUSE NO.	TECHNICAL REQUIREMENTS		
<p>D-1-12 D-1-12(A)</p>	<p align="center">ANNEXURES</p> <p align="right">ANNEXURE (A)</p> <p>(a) List of Codes and Standards</p> <p>All applicable standards, references, specifications, codes of practice, etc., shall be the latest edition including all applicable official amendments and revisions. A complete set of all these documents shall be available at site with Bidder. List of some of the applicable Standards, in original Codes and references is as following:</p> <p>Where provisions are not covered in Indian Standards, reference shall be made to ACI, AISC, EN, CICIND and other International Standards. <u>LIST OF CODES AND STANDARDS</u></p> <p>Excavation and Filling</p> <p>IS :2720 Methods of test for soils(relevant parts)</p> <p>IS:4701 Code of practice for earth work on canals.</p> <p>IS:9759 Guide lines for dewatering during construction.</p> <p>IS:10379 Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.</p> <p>Properties, Storage and Handling of Common Building Materials</p> <p>IS:269 33 grade for ordinary Portland cement.</p> <p>IS:383 Coarse and fine aggregates from natural sources for concrete.</p> <p>IS:432 Specification for mild steel and medium tensile steel bars and (Part 1&2) hard drawn steel wires for concrete reinforcement.</p> <p>IS:455 Portland slag cement.</p> <p>IS:702 Industrial bitumen.</p> <p>IS:712 Specification for building limes.</p> <p>IS:1077 Common burnt clay buidling bricks.</p> <p>IS:1161 Steel tubes for structural purposes.</p> <p>IS:1239 Mild steel tubes, tubulars and other wrought steel filling - MS tubes.</p> <p>IS:1363 Hexagon head bolts, screws and nuts of productions (Part 1-3) grade - C.</p> <p>IS:1364 Hexagon head bolts, screws and nuts of productions (Part 1-5) grade-A & B.</p> <p>IS:1367 Technical supply condition for threaded fasteners. (Part 1-18)</p> <p>IS:1489 Portland-pozzolana cement. (Part-I) Fly ash based</p>		
<p align="center">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p align="center">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p align="center">SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS</p>	<p align="center">PAGE 1 OF 16</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:1542	Sand for Plaster.	
	IS:1566	Hard drawn steel wire fabric for concrete reinforcement.	
	IS:1786	High strength deformed steel bars & wires for concrete reinforcement.	
	IS:2062	Hot Rolled Low, Medium and High Tensile Structural Steel	
	IS:2116	Sand for masonry mortars.	
	IS : 2185 (Part 1)	Hollow & solid concrete blocks.	
	(Part 2)	Hollow & solid light weight concrete blocks.	
	IS:2386 (Part I-VIII)	Testing of aggregates for concrete.	
	IS:3812	Specification for fly ash for use as pozzolona and admixture.	
	IS:4082	Recommendation on stacking and storage of construction materiel and components at site	
	IS:8112	43 grade ordinary portland cement.	
	IS:8500	Structural steel-Microalloyed (Medium and high strength qualities).	
	IS:12269	53 grade ordinary portland cement.	
	IS:12894	Specification for fly ash lime bricks.	
	IS:13757	Burnt clay fly ash building bricks.	
	Cast in-situ Concrete and Allied Works		
	IS:280	Mild steel wire for general engineering purpose.	
	IS:456	Code of practice for plain and reinforcement concrete.	
	IS:457	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.	
	IS:516	Method of test for strength of concrete.	
	IS:1199	Methods of sampling and analysis of concrete.	
	IS:1791	General requirement for batch type concrete mixers.	
	IS:1834	Hot applied sealing compound for joints in concrete.	
	IS:1838	Preformed fillers for expansion joints in concrete pavement and structures.	
	IS:2438	Specification for roller pan mixers.	
	IS:2502	Code of practice for bending and fixing of bars for concrete reinforcement.	
	IS:2505	Concrete vibrators - immersion type.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 2 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:2506	General requirements for screed board concrete vibrators.	
	IS:2722	Specification for Portable Swing weigh batchers for concrete (single and double bucket type).	
	IS:2750	Steel scaffoldings	
	IS:2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction.	
	IS:3150	Hexagonal wire netting for general purposes.	
	IS:3366	Specification for pan vibrators.	
	IS:3370 (Part 1-4)	Code of practice for concrete structures for the storage of liquids.	
	IS:3558	Code of practice for use of immersion vibrators for consolidating concrete.	
	IS:4014 (Part-1&2)	Code of practice for steel tubular scaffolding.	
	IS:4326	Code of practice for earth quake resistant design and construction of buildings.	
	IS:4656	Form vibrators for concrete.	
	IS:4925 IS:4990	Concrete batching and mixing plant. Plywood for concrete shuttering work.	
	IS:5256	Code of practice for sealing expansion joints in concrete lining on canals.	
	IS:5525	Recommendations for detailing of reinforcement in reinforced concrete works.	
	IS:6461	Glossary of terms relating to cement concrete.	
	IS:6494	Code of practice for water proofing of underground reservoir and swimming pools.	
	IS:6509	Code of practice for installation of joints in concrete pavements.	
	IS:7861 (Part -1&2)	Code of practice for extreme weather concreting.	
	IS:9012 IS:9103	Recommended practice for shotcreting. Admixtures for concrete.	
	IS:9417	Recommendations for welding cold worked bars for reinforced concrete construction.	
	IS:10262	Recommended guidelines for concrete mix design.	
	IS:11384	Code of practice for composite construction in structural steel and concrete.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 3 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:12118	Two parts polysulphide based sealants.	
	IS:12200	Code of practice for provision of water stops at transverse construction joints in masonry and concrete dams.	
	IS:13311	Non destructive testing of concrete - methods of test.	
	(Part 1)	Ultrasonic pulse velocity.	
	(Part 2)	Rebound hammer.	
	IS:17452	Use of Alkali Activated Concrete for Precast Products-Guidelines	
	SP-16	Design codes for reinforced concrete to IS:456-1978.	
	SP-23	Hand book of concrete mixes.	
	SP-24	Explanatory handbook on Indian standards code for plain and reinforced concrete. (IS : 456)	
	SP-34	Hand book on concrete reinforcement and detailing.	
	ACI-318	American Concrete Institute code for structural concrete.	
	Precast Concrete Works		
	SP:7 (Part 6/Sec.7)	National Building Code - Structural Design Prefabrication and system building and mixed / composite construction.	
	IS:10297	Code of practice for design and construction of floors and roofs using precast reinforced/prestressed concrete ribbed or cored slab units.	
	IS:10505	Code of practice for construction of floors and roofs using pre-cast reinforced concrete waffle units.	
	IS:15658	Pre-cast concrete block for paving.	
	Masonry & Allied Works		
	IS:1905	Code of practice for structural use of unreinforced masonry.	
	IS: 2185	Part-1 Concrete Masonry Units - Specification Part 1 Hollow and Solid Concrete Blocks Part-3 Specification for concrete masonry units: Part 2 Hollow and solid light weight concrete blocks	
	IS:2212	Code of practice for brick work.	
	IS:2250	Code of practice for preparation and use of masonry mortars.	
	IS:2572	Code of practice for construction of hollow concrete block masonry.	
	SP:20	Hand book on masonry design and construction.	
	Sheeting Works		
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
IS:277		Galvanised steel sheets (Plan & corrugated).	<p>IS:513 Cold-rolled low carbon steel sheets & strips.</p> <p>IS:730 Hook bolts for corrugated sheet roofing.</p> <p>IS:801 Code of practice for use of cold formed light gauge steel structural members in general building construction.</p> <p>IS:2527 Code of practice for fixing rain water gutters and down pipe for roof drainage.</p> <p>IS:7178 Technical supply condition for tapping screw.</p> <p>IS:8183 Bonded mineral wool.</p> <p>IS:8869 Washers for corrugated sheet roofing.</p> <p>IS:12093 Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets.</p> <p>IS:12436 Preformed rigid Polyurethane (PUR) and isocyanurate (PIR) foams for thermal insulation.</p> <p>IS:12866 Plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced).</p> <p>IS:14246 Continuously pre-painted galvanised steel sheets and coils.</p> <p>BS:5950 Code of practice for design of light gauge profiled</p> <p>(Part-6) steel sheeting</p> <p>Fabrication and Erection of Structural Steel Works</p> <p>IS:800 Code of practice for General Construction of steel.</p> <p>IS:813 Scheme for symbols for welding.</p> <p>IS:814 Covered electrodes for manual metal arc welding of carbon & carbon manganese steel.</p> <p>IS:816 Code of practice for use of metal arc welding for general construction in mild steel.</p> <p>IS:817 Code of practice for training and testing of metal arc welders.</p> <p>IS:1024 Welding in bridges and substructured subject to dynamic.</p> <p>IS:1181 Qualifying tests for Metal Arc welders (engaged in welding structures other than pipes).</p> <p>IS:1182 Recommended practice for Radiographic examination of fusion welded butt joints in steel plates</p> <p>IS:1608 Mechanical testing of metals - tensile testing</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:1852	Rolling and Cutting Tolerances for Hot rolled steel products.	
	IS:2016	Specification for Plain washers.	
	IS:2595	Code of practice for Radiographic testing	
	IS:2629	Hot dip galvanising of iron and steel	
	IS:3502	Steel chequered plate.	
	IS:3613	Acceptance tests for wire flux combination for submerged arc welding.	
	IS:3658	Code of practice for liquid penetrant flaw detection.	
	IS:3664	Code of practice for ultra sonic pulse echo testing contact and immersion method	
	IS:3757	High strength structural bolts.	
	IS:4000	High strength bolts in steel structure - code of practice.	
	IS:4353	Sub merged arc welding of mild steel and low alloy steel Recommendation	
	IS:4759	Hot dip zinc coating on structural steel and other allied products.	
	IS:5334	Code of practice for magnetic particle flaw detection of welds.	
	IS:5369	General requirements for plain washers and lock washer	
	IS : 6623	High strength structural nuts.	
	IS:6649	Hardened and tampered washers for high strength structural bolts & nuts.	
	IS:6911	Stainless steel plate, sheet and strip.	
	IS:7205	Safety code for erection of structural steel.	
	IS:7215	Tolerances for fabrication of structural steel.	
	IS:7307	Approved test for welding procedures	
	(Part - I)	Fusion welding of steel.	
	IS:7310 (Part-I)	Approval test for welders working to approval welding procedure. Fusion welding of steel	
	IS:9178 (Part-1to 3)	Criteria for design of steel bins for storage of bulk material.	
	IS:9595	Recommendations for metal arc welding of carbon & carbon manganese steel.	
	IS:12843	Tolerances for erection of steel structures.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 6 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p>SP:6 ISI Hand book for structural Engineers. (Part 1 to 7)</p> <p>Plastering and Allied Works</p> <p>IS:1661 Code of practice for application of cement and cement lime plaster finishes.</p> <p>IS:2402 Code of practice for external rendered finishes.</p> <p>IS:2547 Gypsum building plaster. (Parts 1&2)</p> <p>Acid and Alkali Resistant Lining</p> <p>IS:158 Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali & heat resisting.</p> <p>IS:412 Expanded metal steel sheets for general purpose.</p> <p>IS:4441 Code of practice for use of silica type chemical resistant mortars.</p> <p>IS:4443 Code of practice for use of resin type chemical resistant mortars.</p> <p>IS:4456 Method of Test for chemical resistant tiles. (Part I & II)</p> <p>IS:4457 Ceramic unglazed vitreous acid resisting tiles.</p> <p>IS:4832 Specification for chemical resistant mortars. (Part - 1) Silicate type (Part - 2) Resin type (Part - 3) Sulfur type</p> <p>IS:4860 Acid resistant bricks.</p> <p>IS:9510 Bitumastic acid resisting grade.</p> <p>Water Supply, Drainage and Sanitation</p> <p>IS:458 Precast concrete pipes (with & without reinforcement).</p> <p>IS:554 Pipe threads where pressure tight joints are made on the threads – dimensions, tolerances and designation.</p> <p>IS:651 Salt glazed stoneware pipes and fittings.</p> <p>IS:774 Flushing cisterns for water closets and urinals.</p> <p>IS:775 Cast iron brackets and supports for wash basins and sinks.</p> <p>IS:778 Copper alloy gate, globe and check valves for water works purposes.</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 7 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:781	Cast copper alloy screw down bib taps & stop valves for water services.	
	IS:782	Caulking lead.	
	IS:783	Code of practice for laying of concrete pipes.	
	IS:1172	Code of basic requirements of water supply, drainage and sanitation.	
	IS:1230	Cast iron rain water pipes and fittings.	
	IS:1239 (Part 1&2)	Mild Steel tubes, tubulars and other wrought steel fittings	
	IS:1536	Centrifugally cast (Spun) iron pressure pipes for water.	
	IS:1537	Vertically cast iron pressure pipes for water, gas and sewage.	
	IS:1538	Cast iron fittings for pressure pipe for water, gas and sewage.	
	IS:1703	Copper alloy float valve for water supply fitting.	
	IS:1726	Cast iron manhole covers and frames.	
	IS:1729	Cast iron / Ductile iron drainage pipes and pipe/fittings for over ground non pressure pipeline socket and spigot series.	
	IS:1742	Code of practice for building drainage.	
	IS:2064	Selection, installation and maintenance of sanitary appliances.	
	IS:2065	Code of practice for water supply in buildings.	
	IS:2326	Automatic flushing cisterns for urinals.	
	IS:2548	Plastic seats and covers for water closets.	
	IS:2556	Vitreous sanitary appliances (vitreous china).	
	IS:3114	Code of practice for laying of cast iron pipes.	
	IS:3311	Waste plug and its accessories for sinks and wash basins.	
	IS:3438	Silvered glass mirrors for general purposes.	
	IS:3486	Cast iron spigot and socket drain pipes.	
	IS:3589	steel pipe for water and sewage (168.3 to 2540mm outside diameter)	
	IS:3989	Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.	
	IS:4111 (Part 1 to 5)	Code of practice for ancillary structure in sewerage system.	
	IS:4127	Code of practice for laying of glazed stone ware pipes.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 8 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS : 4733	Methods of sampling and testing sewage effluents.	
	IS:4764	Tolerance limits for sewage effluents discharged into inland surface waters.	
	IS:1068	Electroplated coating of nickel plus chromium and copper plus nickel plus chromium.	
	IS:5329	Code of practice for sanitary pipe work above ground for buildings.	
	IS:5382	Rubber sealing rings for gas mains, water mains and sewers.	
	IS:5822	Code of practice for laying of electrically welded steel pipes for water supply.	
	IS:5961	Specification for cast iron grating for drainage purpose.	
	IS:7740	Code of practice for construction and maintenance of road gullies.	
	IS:8931	Copper alloy fancy single taps combination tap assembly and stop valves for water services.	
	IS:9762	Polyethylene floats for float valves.	
	IS:10592	Industrial emergency showers, eye and face fountains and combination units.	
	IS:12592	Specification for precast concrete manhole covers and frames.	
	IS:12701	Rotational moulded polyethylene water storage tanks.	
	IS:13983	Stainless steel sinks for domestic purposes.	
	SP:35	Hand book on water supply and drainage with special emphasis on plumbing.	
	CPH&EEO Publication	Manual on sewage and sewage treatment - as updated.	
	Doors Windows and Allied Works		
	IS:204	Tower Bolts.	
	(Part 1)	Ferrous metals	
	(Part 2)	Non - ferrous metals	
	IS:208	Door Handles.	
	IS:281	Mild steel sliding door bolts for use with padlocks.	
	IS:362	Parliament Hinges.	
	IS:419	Putty, for use on window frames.	
	IS:451	Technical supply conditions for wood screws	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 9 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:733	Wrought aluminium and aluminium alloy bars, rods and sections for general engineering purposes.	
	IS:1003 (Part I)	Timber panelled and glazed shutters (doors shutters).	
	IS:1003 (Part-1)	Timber panelled and glazed shutters door shutters.	
	IS:1038	Steel doors, windows and ventilators.	
	IS:1081	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.	
	IS:1285	Wrought aluminium and aluminium alloy extruded round tube & hollow section (for general engineering purposes).	
	IS:1341	Steel butt hinges.	
	IS:1361	Steel windows for Industrial buildings.	
	IS:1823	Floor door stoppers.	
	IS:1868	Anodic coatings on Aluminium and its alloys.	
	IS:2202 (Part-2)	Wooden flush door shutters (solid core type) particle board face panels and hard board face panels.	
	IS:2209	Mortice locks (vertical type)	
	IS:2553 (Part-1)	Safety glass. General purposes	
	IS:2835	Flat transparent sheet glass.	
	IS:3548	Code of practice for glazing in buildings.	
	IS:3564	Door closers (Hydraulically regulated)	
	IS:3614 (Part-1)	Specification for fire check doors : plate, metal covered and rolling type.	
	(Part-2) IS:4351	Resistance test and performance criteria. Specification for steel door frames.	
	IS:5187	Flush bolts.	
	IS:5437	Figured, rolled and wired glass.	
	IS:6248	Specification for metal rolling shutters and rolling grills.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 10 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IS:6315 IS:7196 IS:7452 IS:10019 IS:10451 IS:12823	Specification for floor springs (Hydraulically regulated) for heavy doors. Hold fast. Hot rolled steel sections for doors, windows and ventilators. Mild steel stays and fasteners. Steel sliding shutters (top hung type) Prelaminated particle boards.	
	Roof Water Proofing and Allied Works		
	IS:3067 ASTM C836-89a ASTM C898-89	code of practice for general design details and preparatory work for damp proofing and water proofing of buildings. Standard specification for high solid content cold liquid applied elastomeric water proofing membrane for use with separate wearing course. Standard guide for high solid content cold liquid applied elastomeric water proofing membrane for use with separate wearing course.	
	Floor Finishes and Allied Works		
	IS:5318 IS:8042 IS:13755 IS:13801	Code of practice for laying of flexible PVC sheet and tile flooring. White portland cement. Dust pressed ceramic tiles with water absorption of 3%, E 6% (Group B11a). Chequered cement concrete tiles.	
	Painting and Allied Works		
	IS:162 IS:428 IS:1477 (Part -1) (Part -2) IS:1650 IS:2074 IS:2338	Ready mixed paint, brushing fire resisting, silicate type for use on wood, colour as required. Distemper, oil, emulsion, colour as required. Code of practice for painting of ferrous metals in buildings. Pretreatment. Painting. Specification for colours for building and decorative materials. Ready mixed paint, air drying, red oxide-zinc chrome, priming. Code of practice for finishing of wood and wood based materials.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 11 OF 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		
(Part -1)		Operations and Workmanship.	
(Part -2)		Schedule.	
IS:2395		Code of practice for painting concrete, masonry and plaster surfaces.	
(Part-1)		Operations and Workmanship.	
(Part -2)		Schedule.	
IS:2524		Code of practice for painting of nonferrous metals in buildings.	
(Part -1)		Pretreatment	
(Part -2)		Painting.	
IS:2932		Enamel, synthetic, exterior, (a) under coating and (b) finishing.	
IS:2933		Enamel exterior, (a) under coating, (b) finishing.	
IS:4759		Hot dip zinc coatings on structural steel and other allied products.	
IS:5410		Specification for cement paint.	
IS:15489		Plastic emulsion paint.	
IS:6278		Code of practice for white washing and Colour washing.	
IS:10403		Glossary of term related to building finish.	
IS:12027		Silicone based water repellent	
IS:13238		Epoxy based zinc phosphate primer (2 pack)	
IS:13239		Epoxy surfacer (2 pack)	
IS:13467		Chlorinated rubber for paints	
IS:14209		Epoxy enamel, two component glossy.	
BS:5493		Code of practice for protective coating of iron and steel structures against corrosion.	
		Piling and Foundation	
IS:1080		Code of practice for design and construction of shallow foundations on soils.	
IS:1904		Code of practice for design and construction of foundation in Soils : General Requirements.	
IS:2314		Steel sheet piling sections.	
IS:2911		Code of practice for design and construction of pile foundations. (Relevant Parts)	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 12 OF 16


CLAUSE NO.	TECHNICAL REQUIREMENTS		
IS:2950 (Part-1)	Code of practice for designs and construction of Raft foundation. Design		
IS:2974 (Part-1 to 5)	Code of practice for design and construction of machine foundation.		
IS:4091	Code of practice for design and construction foundations for transmission line towers and poles.		
IS:6403	Code of practice for determination of Bearing capacity of Shallow foundations.		
IS:8009 (Part -1) (Part -2)	Code of practice for calculation of settlement of foundation. Shallow foundations. Deep foundations.		
IS:12070	Code of practice for design and construction of shallow foundations on rocks.		
ISO 10816	Criteria for assessing mechanical vibrations of machines.		
ISO 1940	Criteria for assessing the st of balance of rotating rigid bodies.		
DIN : EN 13906-1	Helical compression spring made of round wire and rod : calculation and design of compression .		
DIN:2096	Helical compression spring out of round wire and rod : Quality requirements for hot formed compression spring.		
DIN:4024	Flexible supporting structures for machine with rotating machines.		
Roads			
IRC:5 (Section-1)	Standard specifications and Code of practice for road bridges, General Features of Design.		
IRC:14	Recommended practice for 2cm thick bitumen and tar carpets.		
IRC:15	Standard specifications and code of practice for construction of concrete roads.		
IRC:16	Specification for priming of base course with bituminous primers.		
IRC:19	Standard specifications and Code of practice for water bound macadam.		
IRC:21 (Section-III)	Standard specifications and Code of practice for road bridges. Cement concrete (plain and reinforced).		
IRC:34	Recommendations for road construction in water logged areas.		
IRC:36	Recommended practice for the construction of earth embankments for road works.		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 13 OF 16


CLAUSE NO.	TECHNICAL REQUIREMENTS		
	IRC:37	Guidelines for the Design of flexible pavements.	
	IRC:56	Recommended practice for treatment of embankment slopes for erosion control.	
	IRC:58	Guidelines for the design of rigid pavements for highways.	
	IRC:73	Geometric Design standards for rural (non-urban) highways.	
	IRC : 86	Geometric Design standards for urban roads in plains.	
	IRC:SP:13	Guidelines for the design of small bridges & culverts.	
	IRC - Publication	Ministry of Surface Transport (Road wing), specifications for road and bridge works.	
	IS:73	Paving bitumen.	
	Loading		
	IS:875	Code of practice for design loads (other than earthquake) for (Relevant parts) buildings and structures.	
	IS:1893	Criteria for earthquake resistant design of structures.	
	IS:4091	Code of practice for design and construction of foundation for transmission line towers and poles.	
	IRC:6 (Section-II)	Standard specifications & Code of practice for road bridges. loads and stresses	
	Safety		
	IS:1641	Code of practice for fire safety of buildings - General principles of fire grading and classification.	
	IS:1642	Code of practice for fire safety of buildings - Details of construction.	
	IS:3696 (Part-1&2)	Safety code for scaffolds and ladders.	
	IS:3764	Excavation work - code of safety.	
	IS:4081	Safety code for blasting and related drilling operations.	
	IS:4130	Demolition of buildings - code of safety.	
	IS:5121	Safety code for piling and other deep foundations.	
	IS:5916	Safety code for construction involving use of hot bituminous materials.	
	IS:7205	Safety code for erection of structural steel work.	
	IS:7293	Safety code for working with construction machinery.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 14 OF 16


CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p>IS:7969 Safety code for handling and storage of building materials. Indian Explosives (As updated) Act 1940)</p> <p>Architectural Design of Buildings</p> <p>SP:7 National Building Code of India</p> <p>SP:41 Hand book on functional requirements of buildings (other than industrial buildings)</p> <p>ECBC Energy Conservation Building Code</p> <p>GRIHA Green Rating For Integrated Habitat Assessment.</p> <p>Tall Structures, Chimneys</p> <p>IS:4998 Criteria for design of reinforced chimneys IS:6533 Code of practice for design and construction of steel chimneys</p> <p>ICAO International Civil Aviation Organisation (ICAO)</p> <p>DGCA Instruction of Director General of Civil Aviation , India</p> <p>ACI:307 Specification for the design and construction of reinforced concrete chimneys</p> <p>BS:4076 Specification for steel chimneys</p> <p>CICIND Model Code for concrete chimneys Model code for steel chimneys</p> <p>ASCE Code Design and construction of steel chimney liners prepared by Task committee on steel chimney liners. Fossil power committee, Power division published by ASCE - 1975.</p> <p>IS:1554 PVC insulated (heavy duty) electric cables</p> <p>IS:2606 Alloy lead anodes for chromium plating</p> <p>IS:3043 Code of Practice for Earthing</p> <p>IS:9537 Conduits for electrical installations. The Indian Electricity Rules The Indian Electricity Act The Indian Electricity (Supply) Act The Indian Factories Act</p> <p>IS:2309 Practice for protection of buildings and allied structures against lightning</p> <p>Miscellaneous</p> <p>IS:802 Code of practice for use of structural steel in overhead trans-</p>		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 15 OF 16


CLAUSE NO.	TECHNICAL REQUIREMENTS		
	(Relevant parts)	mission line towers.	
IS:803		Code of practice for design, fabrication and erection of vertical mild steel cylindrically welded in storage tanks.	
IS:10430		Criteria for design of lined canals and guidance for selection of type of lining.	
IS:11592		Code of practice for selection and design of belt conveyors.	
IS:12867		PVC handrails covers.	
IS 11504		Criteria for structural design of reinforced concrete natural draught cooling towers	
BS:4485 (IV)		British Standard : Code of design for water cooling towers	
CIRIA Publication IS 4671		Design and construction of buried thin-wall pipes.	
		Expanded polystyrene for thermal insulation purposes.	
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-12(A) CIVIL WORKS Annex(A)-LIST OF CODES AND STANDARDS	PAGE 16 OF 16


<p>CLAUSE NO.</p>	<p align="center">TECHNICAL REQUIREMENTS</p>		
<p>D-1-12(B)</p>	<p align="right">ANNEXURE (B)</p> <p align="center">CONSTRUCTION METHODOLOGY</p> <p>Construction and erection activities shall be fully mechanized from the start of the work.</p> <p>All excavation and backfilling work shall be done using excavators, loaders, dumpers, dozers, poclains, excavator mounted rock breakers, rollers, sprinklers, water tankers, etc. Manual excavation can be done only on isolated places with specific approval of engineer.</p> <p>For controlled rock blasting specialized agency, equipped with sensors to assess the impact of the blast on the adjoining existing structures, shall be employed.</p> <p>Dewatering shall be done using the combination of electrical and standby diesel pumps.</p> <p>Pile installation equipment suitable for flushing with air lift technique shall be used for construction of bored piles.</p> <p>For concreting, weigh batching plants, transit mixers, concrete pumps, hoists, etc. shall be used.</p> <p>All fabrication and erection activities of structural steel shall be carried out using automatic submerged arc welding machines, cutting machines, gantry cranes, crawler mounted heavy cranes and other equipment like heavy plate bending machines, shearing machines, lathe, milling machines, etc. Use of derricks shall not be permitted. Special enclosures, for blast cleaning of steel structure surface preparation, shall be used.</p> <p>All handling of materials shall be with cranes. Heavy trailers shall be used for transportation.</p> <p>Mechanized modular units of scaffolding and shuttering shall be used.</p> <p>Grouting shall be carried out using hydraulically controlled grouting equipment.</p> <p>Roadwork shall be done using pavers, rollers and premix plant.</p> <p>All finishing items shall be installed using appropriate modern mechanical tools. Manual punching etc. shall not be permitted.</p> <p>Heavy duty hoists for lifting of construction materials shall be deployed. Compressors for cleaning of foundations and other surfaces shall be used.</p> <p>Field laboratory shall be provided with all modern equipment for survey, testing of soil, aggregates, concrete, welding, etc. For testing of steel works, ultrasonic testing machines, radiographic testing machines, dye penetration test equipment, destruction testing equipment, etc. shall be deployed.</p> <p>All persons working at site shall be provided with necessary safety equipment and all safety aspects shall be duly considered for each construction/ erection activity. Moreover, only the persons who are trained in the respective trade shall be employed for executing that particular work.</p>		
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-B</p>	<p>SUB-SECTION-D-1-12(B) CIVIL WORKS ANNEX_B CONSTRUCTION METHODOLOGY</p>	<p>PAGE 1 OF 1</p>


CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
D-1-12(C)	<p style="text-align: right;">Annexure(C)</p> <p style="text-align: center;">GEOTECHNICAL DATA</p>		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATION SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-12 (C) CIVIL WORKS FOUNDATION SYSTEM</p>	<p style="text-align: center;">PAGE 1</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS											
D-1-12(D)	<p style="text-align: right;">Annexure- (D)</p> <p>CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</p> <p>All structures shall be designed for wind forces in accordance with IS:875 (Part-3) and as specified in this document. See Annexure – I for site specific information.</p> <p>Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard.</p> <p>Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.</p> <p>Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than “5” and/or if the fundamental frequency of the structure is less than 1 Hz.</p> <p>Susceptibility of structures to across-wind forces, galloping, flutter, ovaling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards.</p> <p>It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects.</p> <p>Damping in Structures</p> <p>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 70%;">a) Welded steel structures</td> <td style="text-align: right;">: 1.0%</td> </tr> <tr> <td>b) Bolted steel structures/ RCC structures</td> <td style="text-align: right;">: 2.0%</td> </tr> <tr> <td>c) Prestressed concrete structures</td> <td style="text-align: right;">: 1.6%</td> </tr> <tr> <td>d) Steel stacks</td> <td style="text-align: right;">: As per IS: 6533 & CICIND Model Code whichever is more critical.</td> </tr> </table>			a) Welded steel structures	: 1.0%	b) Bolted steel structures/ RCC structures	: 2.0%	c) Prestressed concrete structures	: 1.6%	d) Steel stacks	: As per IS: 6533 & CICIND Model Code whichever is more critical.	
a) Welded steel structures	: 1.0%											
b) Bolted steel structures/ RCC structures	: 2.0%											
c) Prestressed concrete structures	: 1.6%											
d) Steel stacks	: As per IS: 6533 & CICIND Model Code whichever is more critical.											
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(D) CIVIL WORKS WIND DESIGN CRITERIA	PAGE 1 OF 2									

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p style="text-align: right;"><u>ANNEXURE-I</u></p> <p><u>SITE SPECIFIC DESIGN PARAMETERS</u></p> <p>The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows:</p> <p>a) The basic wind speed “V_b” at ten metres above the mean ground level : 44 metres/second</p> <p>b) The risk coefficient “K_1” : 1.07</p> <p>c) Category of terrain : Category-2</p>			
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-12(D) CIVIL WORKS WIND DESIGN CRITERIA</p>	<p>PAGE 2 OF 2</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS															
D-1-12(E)	<p style="text-align: right;">Annexure-(E)</p> <p>CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</p> <p>All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1 to Part 4). Pending finalization of Part 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for embankments.</p> <p>A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at Appendix-I.</p> <p>Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.</p> <p>The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in Appendix-I includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 to Part 4).</p> <p>Damping in Structures</p> <p>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</p> <table border="0"> <tr> <td>a) Steel structures</td> <td>:</td> <td>2%</td> </tr> <tr> <td>b) Reinforced Concrete structures</td> <td>:</td> <td>5%</td> </tr> <tr> <td>c) Reinforced Concrete Stacks</td> <td>:</td> <td>3%</td> </tr> <tr> <td>d) Steel stacks</td> <td>:</td> <td>2%</td> </tr> </table>			a) Steel structures	:	2%	b) Reinforced Concrete structures	:	5%	c) Reinforced Concrete Stacks	:	3%	d) Steel stacks	:	2%	
a) Steel structures	:	2%														
b) Reinforced Concrete structures	:	5%														
c) Reinforced Concrete Stacks	:	3%														
d) Steel stacks	:	2%														
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA	PAGE 1 OF 8													

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p>Method of Analysis</p> <p>Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1).</p> <p>In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1).</p> <p>The spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the structure falls to the left of the peak in the spectral acceleration curve.</p> <p>For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear (\bar{V}_B) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of \bar{V}_B / V_B. However, no reduction is permitted if \bar{V}_B is less than V_B.</p> <p>Design/Detailing for Ductility for Structures</p> <p>The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.</p>			
<p>LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-B</p>	<p>SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA</p>	<p>PAGE 2 OF 8</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p style="text-align: right;">APPENDIX – I</p> <p>SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT</p> <p>The various site specific seismic parameters for the project site shall be as follows:</p> <ol style="list-style-type: none"> 1) Peak ground horizontal acceleration (MCE) : 0.16g 2) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration ‘g’) to obtain the design acceleration spectra <ol style="list-style-type: none"> a) For special moment resisting steel frames designed and detailed as per IS:800 : 0.04 b) For special concentrically braced steel frames designed and detailed as per IS:800 : 0.03 c) for special moment resisting RC frames designed and detailed as per IS:456 and IS:13920 : 0.024 d) for RCC chimney, RCC Natural Draft Cooling Tower : 0.08 e) For Liquid retaining tanks : 0.048 f) for Steel chimney, Absorber tower, Vessels : 0.06 g) for design of structures not covered under 2 (a) to 2 (f) above and under 3 below, in general (excluding special structure/ configuration/materials) : 0.04 3) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration ‘g’) for design of equipment and structures where inelastic action is not relevant or not permitted : 0.08 		
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATIONS SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA</p>	<p style="text-align: center;">PAGE 3 OF 8</p>

Note: g = Acceleration due to gravity

The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION
SPECTRA COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.000	1.000	1.000	1.000
0.030	1.000	1.000	1.000
0.031	1.032	1.025	1.021
0.050	1.646	1.480	1.379
0.060	1.966	1.702	1.546
0.070	2.284	1.915	1.704
0.080	2.602	2.122	1.853
0.086	2.792	2.243	1.940
0.088	2.855	2.283	1.968
0.090	2.919	2.322	1.996
0.095	3.077	2.421	2.065
0.098	3.171	2.479	2.106
0.100	3.234	2.518	2.133
0.103	3.329	2.576	2.173
0.108	3.487	2.671	2.238
0.110	3.549	2.709	2.264
0.112	3.612	2.747	2.290
0.115	3.707	2.803	2.328
0.118	3.801	2.859	2.366
0.121	3.895	2.914	2.404
0.122	3.927	2.933	2.417
0.125	4.021	2.988	2.454
0.127	4.083	3.025	2.478
0.129	4.146	3.061	2.503
0.130	4.177	3.079	2.515
0.131	4.210	3.097	2.527
0.134	4.210	3.152	2.564

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION
SPECTRA COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.140	4.210	3.259	2.635
0.141	4.210	3.260	2.647
0.150	4.210	3.260	2.750
0.200	4.210	3.260	2.750
0.250	4.210	3.260	2.750
0.300	4.210	3.260	2.750
0.350	4.210	3.260	2.750
0.400	4.210	3.260	2.750
0.431	4.210	3.260	2.750
0.442	4.210	3.260	2.750
0.450	4.210	3.260	2.750
0.470	4.210	3.260	2.750
0.492	4.108	3.260	2.750
0.500	4.042	3.260	2.750
0.517	3.909	3.153	2.660
0.525	3.850	3.105	2.619
0.542	3.729	3.007	2.537
0.550	3.675	2.964	2.500
0.562	3.596	2.900	2.447
0.576	3.509	2.830	2.387
0.588	3.437	2.772	2.338
0.597	3.385	2.730	2.303
0.603	3.352	2.703	2.280
0.609	3.319	2.677	2.258
0.615	3.286	2.650	2.236
0.625	3.234	2.608	2.200
0.640	3.158	2.547	2.148
0.658	3.071	2.477	2.090
0.667	3.030	2.444	2.061
0.690	2.929	2.362	1.993
0.700	2.887	2.329	1.964
0.750	2.695	2.173	1.833

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION
SPECTRA COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.755	2.677	2.159	1.821
0.800	2.526	2.038	1.719
0.850	2.378	1.918	1.618
0.900	2.246	1.811	1.528
0.950	2.127	1.716	1.447
1.000	2.021	1.630	1.375
1.050	1.925	1.552	1.310
1.100	1.837	1.482	1.250
1.150	1.757	1.417	1.196
1.200	1.684	1.358	1.146
1.250	1.617	1.304	1.100
1.300	1.555	1.254	1.058
1.350	1.497	1.207	1.019
1.400	1.444	1.164	0.982
1.450	1.394	1.124	0.948
1.500	1.347	1.087	0.917
1.550	1.304	1.052	0.887
1.600	1.263	1.019	0.859
1.650	1.225	0.988	0.833
1.700	1.189	0.959	0.809
1.750	1.155	0.931	0.786
1.800	1.123	0.906	0.764
1.850	1.092	0.881	0.743
1.900	1.064	0.858	0.724
1.950	1.036	0.836	0.705
2.000	1.011	0.815	0.688
2.050	0.986	0.795	0.671
2.100	0.962	0.776	0.655
2.150	0.940	0.758	0.640
2.200	0.919	0.741	0.625
2.250	0.898	0.724	0.611
2.300	0.879	0.709	0.598

APPENDIX – I


HORIZONTAL SEISMIC ACCELERATION
SPECTRA COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
2.350	0.860	0.694	0.585
2.400	0.842	0.679	0.573
2.450	0.825	0.665	0.561
2.500	0.808	0.652	0.550
2.550	0.793	0.639	0.539
2.600	0.777	0.627	0.529
2.650	0.763	0.615	0.519
2.700	0.749	0.604	0.509
2.750	0.735	0.593	0.500
2.800	0.722	0.582	0.491
2.850	0.709	0.572	0.482
2.900	0.697	0.562	0.474
2.950	0.685	0.553	0.466
3.000	0.674	0.543	0.458
3.050	0.663	0.534	0.451
3.100	0.652	0.526	0.444
3.150	0.642	0.517	0.437
3.200	0.632	0.509	0.430
3.250	0.622	0.502	0.423
3.300	0.612	0.494	0.417
3.350	0.603	0.487	0.410
3.400	0.594	0.479	0.404
3.450	0.586	0.472	0.399
3.500	0.577	0.466	0.393
3.550	0.569	0.459	0.387
3.600	0.561	0.453	0.382
3.650	0.554	0.447	0.377
3.700	0.546	0.441	0.372
3.760	0.538	0.434	0.366
3.800	0.532	0.429	0.362
3.850	0.518	0.423	0.357
3.900	0.505	0.418	0.353

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION
SPECTRA COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
3.950	0.492	0.413	0.348
4.000	0.480	0.408	0.344

CLAUSE NO.	TECHNICAL REQUIREMENTS			
D-1-12(F)	<p style="text-align: right;">Annexure-(F)</p> <p style="text-align: center;">QA REQUIREMENT</p> <p>All Civil, Structural and Architectural construction work at the project shall be executed strictly in accordance with the Quality Assurance guidelines specified in separate part of the Specification.</p>			
<p style="text-align: center;">LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE</p>	<p style="text-align: center;">TECHNICAL SPECIFICATIONS SECTION-VI, PART-B</p>	<p style="text-align: center;">SUB-SECTION-D-1-12(F) CIVIL WORKS QA REQUIREMENT</p>	<p style="text-align: center;">PAGE 1 OF 1</p>	



D-1-12(G)

Specification For High Performance Moisture Compatible Corrosion Resistant Coating System

a) Providing & applying **High Performance Moisture Compatible Corrosion Resistant Coating System** manufactured as per technical specifications of Central Electrochemical Research Institute, Karaikudi, (C.S.I.R. affiliate Institute), Tamil Nadu, Pin - 630 006.

b) The coating system shall be water compatible, compatible for applying in wet conditions also and shall be tolerant to under-prepared surfaces and existing residual tar / paint. The system shall also be quick curing so as to be suitable for application during shut downs.

The coating material shall be stored in the manner as per recommendations of the manufacturer until ready for use. The coating material shall be used within the manufacturer's written recommended shelf life.

c) The coating system shall conform to the following :

PROPERTIES OF PAINT

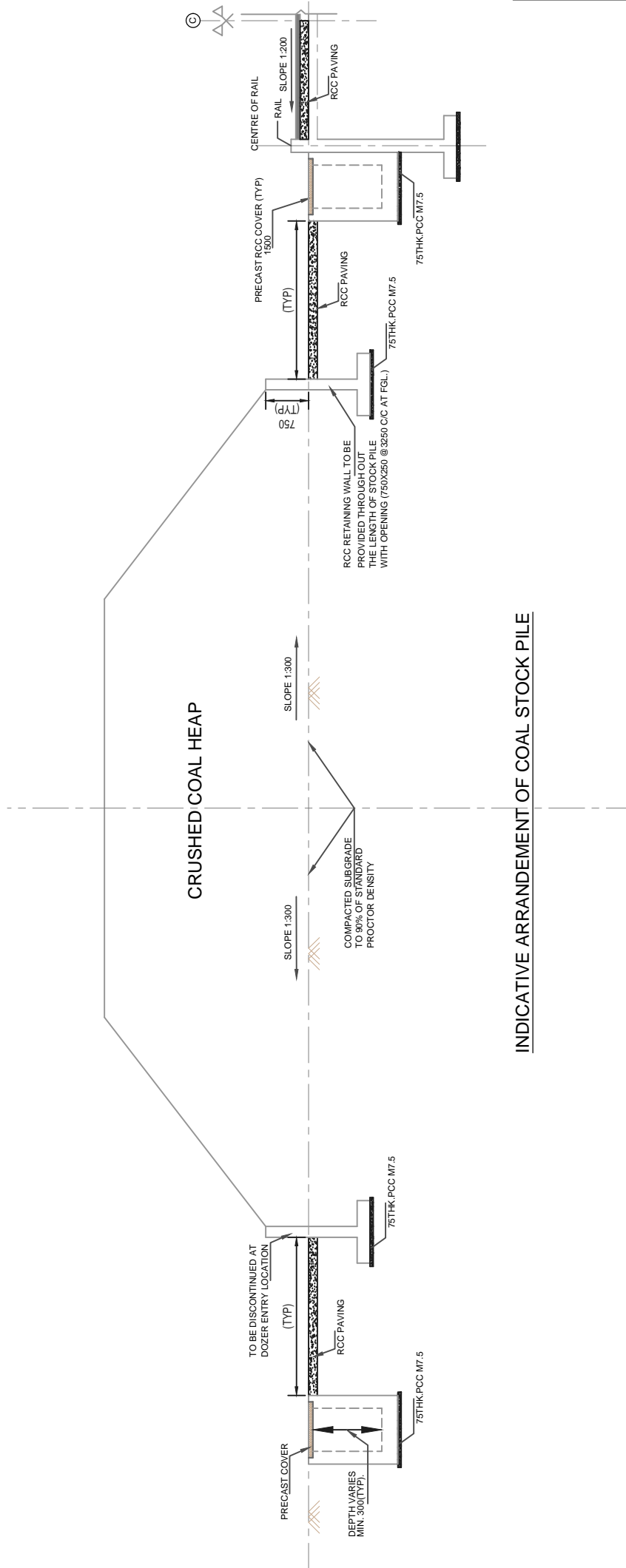
Base	High Performance Moisture Compatible Corrosion Resistant Coating System CECRI know-how system
Volume Solids	70%
Specific Gravity (ASTM-D-1475)	1.25 ± 0.1
Dry Film Thickness (ASTM-D-1186)	160 ± 10 µm per coat
Coverage	4 - 4.5 sq.m/ ltr
Touch Dry	2 Hours
Recoating	24 Hours



PROPERTIES OF COATING

Salt Spray (ASTM-B 117)	2000 Hours
Resistance to sea water (Carried out upto 6 months)	Passes
Coating Resistance (Carried out upto 6 months)	10 ⁹ Ω. cm ²
Adhesion (ASTM-D 4541)	4.5 N/mm Sq
Flexibility (ASTM-D-522)	1/8" passes
Elongation	33%
Impact (ASTM G 14-04)	45 cm passes

- d) Paint material & its application method shall be obtained from any manufacturer who has been granted License by CECRI, Karaikudi for technical know how for **High Performance Moisture Compatible Corrosion Resistant Coating System**. The application method of coating shall be got duly approved from CECRI, Karaikudi.



INDICATIVE ARRANDEMENT OF COAL STOCK PILE

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

S/N.	Section / Part / Chapter / Volume	Clause No.	Page no.	Bid Specification Stipulation	Statement of Pre-bid Query & Clarification	Employer's Reply
1.	Section-II (ITB)	27.3	32 of 44	<p>(a) Interest during Construction (IDC)</p> <p>Interest during construction shall be calculated on the month-wise payments quoted by the bidder in Cash Flow Statement (in % of total EPC Cost as defined below) from the month of payment upto the date of Completion of Trial Operation for each unit and the same shall be added to the EPC quoted price (including Taxes & Duties). Interest rate to be considered for calculating Interest during Construction has been specified in Bid Data Sheets. Format for calculation of IDC is also enclosed in Bid Data Sheets. Payments due on completion of Trial Operation and PG Test, Import Duties & GST thereon and Price Adjustments would not be considered in calculation of IDC.</p> <p>Bidders are required to quote the cash drawdown schedule for U#1 and U#2 in the Schedule(s)-4A (U#1) & 4A (U#2) in such a manner that for any year the</p>	<p>We request Employer to delete the provision of Interest During Construction (IDC) in view of the following:</p> <ol style="list-style-type: none"> 1) Fundamentally when a bidder is expected to expedite a project, a faster cash draw is a given. Further, exact prediction of Cashflows at bidding stage itself can be a limitation as the project runs over a long duration of 48/52 months. Therefore, this clause runs contrary to the stated purpose of speeding delivery. 2) This commitment during bidding stage may additionally lead to delayed start of activities (including those which have minimum / zero float). In such a case even a minor encumbrance in project execution / 	Provisions of Bidding Documents shall prevail.

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

				<p>cumulative cash drawdown quoted by bidder shall not be less than the cumulative minimum limit provided for such year from the date of NOA.</p> <p>The cumulative minimum cash drawdown limit shall be 8%, 28%, 60%, 89% and 90% of total EPC Cost (i.e. Sum total of Price Schedule(s)- 1, 2, 3, 4 & 7) for first, second, third, fourth and fifth year from NOA respectively.</p>	<p>delivery would lead to overall delay in project completion.</p> <p>3) Employer may also appreciate that power projects on EPC basis have long gestation period and require numerous internal schedule changes / adjustments during the project life cycle. Employer would appreciate that early start and faster delivery & construction will certainly facilitate timely completion of the project and it will provide flexibility to the contractor for early start and at the same time avoiding unavoidable delays.</p> <p>4) This will go a long way in providing flexibility to EPC Contractor in strategizing and focusing on the project schedule for early completion and in turn this would support EPC Contractor to achieve the same.</p>	
2.	Section-II (ITB)	27.3	32 of 44	The cumulative minimum cash drawdown limit shall be 8%, 28%, 60%, 89% and	<u>Alternatively,</u>	Provisions of Bidding

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

				<p>90% of total EPC Cost (i.e. Sum total of Price Schedule(s)- 1, 2, 3, 4 & 7) for first, second, third, fourth and fifth year from NOA respectively.</p>	<p>Considering the Suggestive Milestones Schedule (APPENDIX-II to BDS) as provided in the bidding document and to provide flexibility to the Contractor for faster project execution as per the direction of Employer, minimum cash drawdown limit will restrict the Contractor's intent to preponement /advancement of the activities.</p> <p>Therefore, we request Employer to increase the cumulative minimum cash drawdown limit which will help in providing flexibility for faster progress with ahead schedule project execution to avoid delay, if any, which are beyond the control of Contractor & Employer.</p> <p>Suggestive minimum cumulative cash drawal are as below:</p> <p>1st Year: 12% 2nd Year: 35% 3rd Year: 80% 4th Year: 91% 5th Year: 92%</p>	<p>Documents shall prevail.</p>
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**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

					Hence, we request Employer to kindly review and confirm.	
3.	Section - II (ITB)	27.3 (c)	33 of 44	(c) Loading on account of Commissioning fuel (coal and oil) The cost of coal & fuel oil shall be used as Rs. 1790/Ton (Rupees One Thousand Seven Hundred and ninety only per ton of coal) and Rs. 40,000/KL (Rupees Forty Thousand per KL of fuel oil) for such purpose, respectively.	Consumption of coal and fuel oil during pre-commissioning and commissioning stage is highly dependent on factors like quality of coal, shutdown or backing down of unit due to reasons not attributable to the EPC contractor. Accordingly, we request Employer to remove the evaluation loading on Coal and Fuel oil (LDO) and <u>specify the limit</u> for commissioning up to which coal and fuel oil (LDO) will be <u>issued free of cost</u> by Employer.	Provisions of Bidding Documents shall prevail.
4.	Section-II (ITB)	30.3	34 of 44	Employer reserves the right to vary the quantity of any of the Spares and/or delete any item of Spares altogether at the time of Award of Contract. Further, NTPC may place the award for any mandatory spares with NOA and/or within three years from the date of NOA as per mutually agreed despatch schedule and as per the	We request Employer to finalize the quantity of spares during bidding stage. Further, we request Employer to kindly award the Mandatory Spares at the time of NOA along with the Main Equipment.	Provisions of Bidding Documents shall prevail.

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

				price quoted by the bidder in their bid in accordance with the relevant clauses.	If, any mandatory spares are not awarded at the time of NOA along with the Main Equipment, in such case, the dispatch schedule and price for such mandatory spares shall be discussed and agreed between both the parties as no escalation formulae can give a fair & correct estimation of prices for such a long duration.	
5.	Section-V (SCC)	5.0 [GCC Clause- 7.3.1.9]	3 of 20	Replace Existing GCC Clause with the following: Ex-works order price of future spares shall be computed in accordance with the price adjustment provisions covered under the main Contract excepting that the base indices will be counted from the scheduled date of Commissioning of the last equipment under the main project and there will be no ceiling on the amount of variation in the prices. The above option for procuring future recommended spares by the Employer shall remain valid for the period of 5 years from the date of Commissioning of the equipment.		
6.	Section - II (ITB)	11.1	22 of 44	Bid Currencies Prices shall be quoted in the following currencies: (a) Provisions for this clause shall be provided through amendment.	(a) In line with provisions available in previous tenders, we understand that the bidders will be allowed to quote bid prices and receive payments in combination of Indian Rupees and multiple currencies. Kindly confirm.	Please Refer Commercial Amendment No. 01

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

				(b) Provisions for this clause shall be provided through amendment.	(b) Information regarding bid currencies is of paramount importance in bidder's pricing strategy and has direct bearing on the selection of sub-contractors/sub-vendors. We, therefore, request NTPC to issue the amendment in this regard at the earliest possible.	
7.	Section-II (ITB)	40.0	40 of 44	Any queries submitted by Bidder after the specified last date shall not be responded to by Employer and the Bidder will be required to submit their bid based on the Bidding documents read in conjunction with Amendments/Clarifications/Errata thereof.	Since, deviations are not permitted in the bid, we request Employer to allow bidders to raise queries and seek clarification on the amendments/ clarifications/ errata issued by the Employer after last date of receipt of queries.	Provisions of Bidding Documents shall prevail.
8.	Section - II (ITB)	10.4 (d) (i)	19 of 44	Bidders are advised to price their bids in such a manner that Installation Price Component of the bid price (excluding Civil/Structural works price) should not be less than 15% and should not be more than 20% of the cumulative total of FOB Price of Main Equipment indicated in Schedule No.1 and Ex-works Price of Main Equipment indicated in Schedule No.2.	Keeping such restriction in pricing will impact the bidders' cashflows and the bidders will be forced to change the price breakup with respect to actual expenses. We, therefore, request Employer to kindly delete this restrictive provision and allow bidders to specify the	Provisions of Bidding Documents shall prevail.

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

					breakup based on their experience/estimate.	
9.	Section - II (ITB)	10.4 (d) (ii)	19 of 44	Bidders are advised to price their bids in such a manner that the Civil Works Price Component of the bid price (including Site Fabricated Structural works price) should not be less than 20% and should not be more than 30% of the cumulative total of FOB Price of Main Equipment indicated in Schedule No.1 and Ex-works Price of Main Equipment indicated in Schedule No.2.	Keeping such restriction in pricing will impact the bidders' cashflows and the bidders will be forced to change the price breakup with respect to actual expenses. Further, cost of Civil Works mainly depends on various factors including soil parameters, material and labour rates, etc. and not on the price of main equipment only. We, therefore, request Employer to kindly delete this restrictive provision and allow bidders to specify the breakup based on their experience/estimate.	Provisions of Bidding Documents shall prevail.
10.	Section-IV (GCC)	14.4	31 of 78	.....If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract,, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 36 (Change in Laws and Regulations) hereof.....	We understand that "withdrawal of Exemptions/Benefits" (available as per extant government policy) shall also be considered under referred GCC Clause No. 14.4 and GCC Clause No. 36.1. Kindly confirm.	Provisions of Bidding Documents shall prevail.

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

Commercial Clarifications No. 01 to Bidding Document No.: CS- CS-9587-001R-2

11.	Section-IV (GCC)	36.1	60 of 78	If, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract.		Provisions of Bidding Documents shall prevail.
12.	Section-IV (GCC)	40.1	65 of 78	The Time(s) for Completion specified in the SCC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following: (a) (b) (c) (d) (e) any default or breach of the Contract by the Employer, specifically including failure to supply the items listed in Appendix 6 (Scope of Works and Supply by the Employer) to the Form	In addition of time extension, we request Employer to introduce provision for suitable overstay compensation in addition to the Contract Price in case there is any delay or default or breach of the Contract due to reasons not attributable to the Contractor.	Provisions of Bidding Documents shall prevail.

**EPC PACKAGE FOR
LARA SUPER THERMAL POWER PROJECT, STAGE - II (2x800 MW)**

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				<p>of Contract Agreement, or any activity, act or omission of any other contractors employed by the Employer or failure to give possession of site under GCC Clause 10.2.</p> <p>(f)</p> <p>by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.</p>		
13.	Section-IV (GCC)	13.2.2	28 of 78	<p>The security shall be in the form of an unconditional bank guarantee as per the proforma provided in Section VII (Forms and Procedures) – Form of Advance Payment Security. The Advance payment Security shall be reduced prorata every three (3) months after First Running Account Bill/Stage Payment under the Contract based on the value of the respective equipment/facilities received and applicable GST. <u>The cumulative amount of reduction at any point of time shall not exceed ninety percent (90%) of the advance</u> and the amount of GST paid on the advance amount as applicable corresponding to cumulative value of the respective equipment/Facilities supplied and received as per certificate issued by the Project Manager. The balance shall</p>	<p>The basic purpose of obtaining Advance Bank Guarantee (ABG) from the Contractor is to have security in lieu of advance payment being released. Therefore, such ABG should get fully reduced on adjustment of advance amount.</p> <p>In view of the above, we request Employer to allow 100% reduction of ABG on full adjustment of advance.</p>	<p>The provisions of the bidding documents shall prevail.</p>

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				be released upon release of all milestone linked payments.....		
14.	Section-IV (GCC)	13.3.1	28 of 78	The Contractor shall, within twenty-eight (28) days of the Notification of Award, provide a security for the due performance of the Contract for ten percent (10%) of the Contract Price with an initial validity upto ninety (90) days beyond the Defects Liability Period.	<p>The after-effects of Covid-19 pandemic are still continuing which caused severe damage to global economy and India is not exception to it. All business houses are struggling and are yet to get over the impact of pandemic.</p> <p>Considering the same Ministry of Finance had extended the validity of its OM No. F.9/4/2020-PPD dated 12th Nov'2020, regarding reduction of Performance Security to 3% of Contract Price, till 31st March 2023 vide an OM dated 30th Dec'2021 for existing tenders/Contracts.</p> <p>We therefore request Employer to reduce the value of performance Security from 10% to 3% of Contract Price.</p> <p>Accordingly, all Performance Security related clauses stipulated elsewhere in the bidding documents may please also be modified.</p>	The provisions of the bidding documents shall prevail.

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15.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix- 1 (Terms and Procedures of Payment) I (iii)	30 of 36	100% of applicable Taxes and Duties (other than the custom duty payable as in para (i) above) which are payable by the Employer under the Contract shall be paid/reimbursed to the Contractor or Assignee of foreign Contractor (if applicable) upon receipt of equipment/spares/services and on production of satisfactory documentary evidence by the Contractor/Assignee, as applicable.	Since the Taxes and duties (GST) will be paid to the Government authorities upon dispatch of equipment, therefore we request Employer to kindly reimburse 100% taxes and duties upon production of satisfactory documentary evidence by the Contractor. Request Employer to kindly consider the same and confirm.	The provisions of the bidding documents shall prevail.
16.	Section-IV (GCC)	16.5	32 of 78	The provisions of this GCC Clause 16 shall survive termination, for whatever reason, of the Contract.	We request Employer to modify the clause as follows: The provisions of this GCC Clause 16 shall survive <u>till one (1) year after</u> termination, for whatever reason, of the Contract.	The provisions of the bidding documents shall prevail.
17.	Section-IV (GCC)	27.8	52 of 78 Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the Defects Liability Period extended by a period of twelve (12) month from the time such replacement/repair of the Facilities or any part thereof.	We request Employer to modify the referred clause as follows: Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the Defects Liability Period extended by a period of twelve (12) month from the	The provisions of the bidding documents shall prevail.

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					time such replacement/repair of the Facilities or any part thereof <u>& in no event the Defect Liability period of repaired/ replacement part shall exceed twenty-four (24) months from the date of the commencement of the original Defect Liability Period.</u>	
18.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	1.1	-	<p>Contract Documents (Reference GCC Clause 2)</p> <p>The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:</p> <p>(a) This Contract Agreement and the Appendices hereto</p> <p>(b) Notification of Award</p> <p>(c) Special Conditions of Contract</p> <p>(d) General Conditions of Contract</p> <p>(e) Technical Specifications and Drawings</p> <p>(f) The Bid and Price Schedules submitted by the Contractor</p>	<p>We request Employer to insert a new point (c) as under in the Order of precedence.</p> <p>The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:</p> <p>(a) This Contract Agreement and the Appendices hereto</p> <p>(b) Notification of Award (NOA)</p> <p><u>(c) Amendments, clarifications, corrigenda including Minutes of Meetings, Record Notes, and correspondences issued between issuance of IFB and NOA.</u></p>	The provisions of the bidding documents shall prevail.

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				(g) Procedures (as listed) (h) Integrity Pact (IP) signed between the Employer and the Bidder/Contractor	(e) (d) Special Conditions of Contract (d) (e) General Conditions of Contract (e) (f) Technical Specifications and Drawings (f) (g) The Bid and Price Schedules submitted by the Contractor (g) (h) Procedures (as listed) (h) (i) Integrity Pact (IP) signed between the Employer and the Bidder/Contractor												
19.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) A1 & B1	1 to 11 of 36	FOB/Ex-works <table border="1" style="margin-left: 20px;"> <tr> <td>Advance</td> <td>5%+7% (Interest Free)</td> </tr> <tr> <td>Dispatch</td> <td>50%</td> </tr> <tr> <td>Receipt at Site</td> <td>20%</td> </tr> <tr> <td>Intermediate Milestones</td> <td>8%</td> </tr> <tr> <td>Initial Operation</td> <td rowspan="2">2 x (4%+1%)</td> </tr> <tr> <td>Completion of PG Test</td> </tr> </table>	Advance	5%+7% (Interest Free)	Dispatch	50%	Receipt at Site	20%	Intermediate Milestones	8%	Initial Operation	2 x (4%+1%)	Completion of PG Test	Kindly note that most of the milestones are related to commissioning which can only be achieved immediately prior to or after the trial operation of the unit. Further commissioning of the systems also depends upon Employer's inputs. Thereby linking the progressive supply payment with later date milestones will result in deferment of cash-flow and increased working capital for the Contractor, which is not in line with the intent and spirit of the progress of project.	The provisions of the bidding documents shall prevail.
Advance	5%+7% (Interest Free)																
Dispatch	50%																
Receipt at Site	20%																
Intermediate Milestones	8%																
Initial Operation	2 x (4%+1%)																
Completion of PG Test																	

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					Accordingly, we request Employer to revise the terms of payment as follows:										
					<table border="1"> <tr> <td>Advance</td> <td>5% + 7% (Interest Free)</td> </tr> <tr> <td>Dispatch</td> <td>63%</td> </tr> <tr> <td>Receipt at Site</td> <td>15%</td> </tr> <tr> <td>Initial Operation</td> <td rowspan="2">2 x (4%+1%)</td> </tr> <tr> <td>Completion of PG Test</td> </tr> </table>	Advance	5% + 7% (Interest Free)	Dispatch	63%	Receipt at Site	15%	Initial Operation	2 x (4%+1%)	Completion of PG Test	
Advance	5% + 7% (Interest Free)														
Dispatch	63%														
Receipt at Site	15%														
Initial Operation	2 x (4%+1%)														
Completion of PG Test															
20.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) E, F & G	12 to 25 of 36	Installation Services, Civil Works & Site Fabricated Structural Works <table border="1"> <tr> <td>Advance</td> <td>5%+5% (Interest bearing)</td> </tr> <tr> <td>Progress Payment</td> <td>80%</td> </tr> <tr> <td>Initial Operation</td> <td rowspan="2">2 x (4%+1%)</td> </tr> <tr> <td>Completion of PG Test</td> </tr> </table>	Advance	5%+5% (Interest bearing)	Progress Payment	80%	Initial Operation	2 x (4%+1%)	Completion of PG Test	<p>Cash flow is the key to success of any project. Realising the same Govt. of India has also taken number measures to ease the Contractor's financial liability. With the same thought process, we request Employer to consider interest free advance for Installation Services, Civil Works & Site Fabricated Structural Works.</p> <p>Considering labour intensive nature of work, we request Employer to reduce the retention amount to 5% instead of current 10% for service part of work. Please note 10% retention will lead to severe cashflow constraints.</p> <p>Accordingly, we request Employer to revise the terms of payment for</p>	The provisions of the bidding documents shall prevail.		
Advance	5%+5% (Interest bearing)														
Progress Payment	80%														
Initial Operation	2 x (4%+1%)														
Completion of PG Test															

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					<p>“Installation Services, Civil Works and Site Fabricated Structural Works” as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Advance</td> <td>5%+5% (Interest free)</td> </tr> <tr> <td>Progress Payment</td> <td>85%</td> </tr> <tr> <td>Initial Operation</td> <td rowspan="2">2 x (1.5%+1%)</td> </tr> <tr> <td>Completion of PG Test</td> </tr> </table>	Advance	5%+5% (Interest free)	Progress Payment	85%	Initial Operation	2 x (1.5%+1%)	Completion of PG Test	
Advance	5%+5% (Interest free)												
Progress Payment	85%												
Initial Operation	2 x (1.5%+1%)												
Completion of PG Test													
21.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment)	4 to 25 of 36	<p>..... However, if for reasons attributable to the Employer, the performance Guarantee (PG) Test of the Facilities or the relevant part thereof cannot be successfully completed within the period of 01 (one) month from the date of Completion of Trial Operation, then 50% of the amount due on "Completion of Trial / Initial Operation alongwith PG Test" shall be released to the contractor without submission of any BG.</p>	<p>We request Employer to modify the clause as follows:</p> <p>However, if for reasons not attributable to the Employer Contractor, the performance Guarantee (PG) Test of the Facilities or the relevant part thereof cannot be successfully completed within the period of 01 (one) month from the date of Completion of Trial Operation, then 50% of the amount due on "Completion of Trial /</p>	<p>The provisions of the bidding documents shall prevail.</p>							

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				<p>Further, if for reasons attributable to the Employer, in case the performance Guarantee (PG) Test of the Facilities or the relevant part thereof cannot be successfully completed within the period of one year from the date of Completion of Trial Operation, then pending 50% amount shall be released upon submission of Bank Guarantee of equivalent value. Such BG shall be released after successful conductance of PG test.</p>	<p>Initial Operation alongwith PG Test" shall be released to the contractor without submission of any BG. <u>Balance 50% shall be released against submission of Bank Guarantee of equivalent amount.</u></p> <p>Further, if for reasons <u>not</u> attributable to the Employer <u>Contractor</u>, in case the performance Guarantee (PG) Test of the Facilities or the relevant part thereof cannot be successfully completed within the period of one year <u>three (3) months</u> from the date of Completion of Trial Operation, then pending 50% amount shall be released upon submission of Bank Guarantee of equivalent value. Such BG shall be released after successful conductance of PG test <u>the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GCC Sub-Clauses 28.2 and 28.3 shall not apply and the Bank Guarantee submitted in this regard shall be released.</u></p>	
22.	Section-VII Book 3 of 3 (Part-1)	Appendix-1 (Terms and Procedures	4 to 25 of 36	<p>However, if for reasons attributable to the Employer, in case the performance Guarantee (PG) Test of the Facilities or the relevant part thereof to be conducted</p>	<p>We request Employer to modify the clause as follows:</p>	The provisions of the bidding

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	(Form of Contract Agreement)	of Payment)		<p>after Trial/Initial operations cannot be successfully completed within the period of one year from the due date of completion of such PG test(s), then aforesaid 1% amount shall be released upon submission of Bank Guarantee of equivalent value. Such BG shall be released after successful conductance of PG test.</p>	<p>However, if for reasons not attributable to the Employer Contractor, in case the performance Guarantee (PG) Test of the Facilities or the relevant part thereof to be conducted after Trial/Initial operations cannot be successfully completed within the period of one year month from the due date of completion of such PG test(s), then aforesaid 1% amount shall be released upon submission of Bank Guarantee of equivalent value. Such BG shall be released after successful conductance of PG test.</p> <p><u>Further, if for reasons not attributable to the Contractor, in case the performance Guarantee (PG) Test of the Facilities or the relevant part thereof to be conducted after Trial/Initial operations cannot be successfully completed within the period of three (3) months from the due date of completion of such PG test(s), the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GCC Sub-Clauses 28.2 and 28.3 shall not apply and the Bank</u></p>	documents shall prevail.
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					<u>Guarantee submitted in this regard shall be released.</u>	
23.	Section-IV (GCC)	6.4.2	14 of 78	<p>Resolution of Dispute through Conciliation Committee of Independent Experts (CCIE), constituted by Ministry of Power (MoP) {For cases with Disputed amount (Claim/ Counter claim whichever is higher) above Rs. 25 Crore excl. interest}</p> <p>If the parties fail to resolve such a dispute or difference by mutual consultation and through Independent Engineer (if applicable) and/or through Mediation (if applicable) within a period specified at Cl. 6.1, 6.2, 6.3 above, the dispute, if the parties agree, may be referred to Conciliation Committee of Independent Experts (CCIE), in cases where the Disputed amount (Claim/ Counter claim whichever is higher) is above Rs. 25 crore excl. interest. <u>The option of Arbitration would not be available once the conciliation mechanism through CCIE has been exercised.</u></p>	<p>We request Employer to allow the option of arbitration to parties in case CCIE fails to resolve the dispute bearing value above Rs. 25 Crore.</p> <p>Accordingly, the referred clause may please be modified as follows:</p> <p>If the parties fail to resolve such a dispute or difference by mutual consultation and through Independent Engineer (if applicable) and/or through Mediation (if applicable) within a period specified at Cl. 6.1, 6.2, 6.3 above, the dispute, if the parties agree, may be referred to Conciliation Committee of Independent Experts (CCIE), in cases where the Disputed amount (Claim/ Counter claim whichever is higher) is above Rs. 25 crore excl. interest. The option of Arbitration would not be available once the conciliation mechanism through CCIE has been exercised.</p>	The provisions of the bidding documents shall prevail.

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24.	Section-IV (GCC)	6.4.1.2.1.	11 of 78	Where Invitation for Conciliation has been furnished under GCC sub clause 6.4.1.1, the parties shall attempt to settle such dispute through Expert Settlement Council (ESC) which shall be constituted by CMD/Chairman of Employer.	To make the dispute resolution process fair and equitable for both the parties, we request Employer to modify the clause as follows: Where Invitation for Conciliation has been furnished under GCC sub clause 6.4.1.1, the parties shall attempt to settle such dispute through Expert Settlement Council (ESC) which shall be constituted <u>mutually by Contractor's Representative and</u> by CMD/Chairman of Employer.	The provisions of the bidding documents shall prevail.
25.	Section-IV (GCC)	6.4.1.2.2.	11 of 78	ESC will be formed from experts comprising three members from the panel of Conciliators maintained by EMPLOYER. However, there will be single member ESC for disputes involving disputed amount (Claim/ Counter claim, whichever is higher excl. interest) is up to Rs. 1 crore. CMD/ Chairman of Employer shall have the authority to reconstitute the ESC to fill any vacancy.	To make the dispute resolution process fair and equitable for both the parties, we request Employer to modify the clause as follows: ESC will be formed from experts comprising three members from the panel of Conciliators maintained by EMPLOYER <u>and as proposed by the Contractor.</u> However, there will be single member ESC for disputes involving disputed amount (Claim/ Counter claim, whichever is higher	The provisions of the bidding documents shall prevail.

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					excl. interest) is up to Rs. 1 crore. CMD/ Chairman of Employer <u>and Contractor's Representative together</u> shall have the authority to reconstitute the ESC to fill any vacancy.	
26.	Section-IV (GCC)	6.4.1.3.5	13 of 78	ESC will conclude its proceedings in maximum 10 meetings and give its recommendations within 90 days from the date of reference to ESC. ESC will give its recommendations to both the parties recommending possible terms of settlement. CMD/ Chairman of Employer may extend the time/number of meetings, in exceptional cases, if ESC requests for the same with sufficient reasons and as agreed by the parties.	We request Employer to modify the clause as follows: ESC will conclude its proceedings in maximum 10 meetings and give its recommendations within 90 days from the date of reference to ESC. ESC will give its recommendations to both the parties recommending possible terms of settlement. CMD/ Chairman of Employer <u>in mutual consultation with Contractor</u> may extend the time/number of meetings, in exceptional cases, if ESC requests for the same with sufficient reasons and as agreed by the parties.	The provisions of the bidding documents shall prevail.
27.	Section-IV (GCC)	6.4.1.4	14 of 78	Aforesaid fees is subject to revision by NTPC from time to time and subject to government guidelines on austerity measures, if any. All the expenditure	We request Employer to modify the clause as follows: Aforesaid fees is subject to revision by NTPC <u>in mutual consultation with</u>	The provisions of the bidding documents shall prevail.

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				incurred in the ESC proceedings shall be shared by the parties in equal proportions.	Contractor from time to time and subject to government guidelines on austerity measures, if any. All the expenditure incurred in the ESC proceedings shall be shared by the parties in equal proportions.	
28.	Section-IV (GCC)	6.5.1	17 of 78	<p>The mechanism of settling the disputes through arbitration shall be applicable only in cases where the disputed amount (i.e. Claim/ Counter claim, whichever is higher, excluding interest) does not exceed Rs. 25 crores.....</p> <p>.....</p> <p>In case the disputed amount (Claim/ Counter claim, whichever is higher, excl. interest) exceeds Rs. 25 Crores, the parties shall be within their rights to take recourse to remedies as may be available to them under the applicable laws other than Arbitration after prior intimation to the other party. There shall be no arbitration where the disputed amount (Claim/ counter claim, whichever is higher) is only up to Rs. 5 lakhs.</p>	<p>Looking at the overall scale of the project, the restriction with respect to disputed amount is not justifiable.</p> <p>We request NTPC to delete the referred provision of limiting the value of disputed amount between INR 5 lakhs to INR 25 Crores to be considered under arbitration.</p>	The provisions of the bidding documents shall prevail.

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29.	Section-IV (GCC)	6.5.1	18 of 78	<p>The parties to the contract shall invoke arbitration within Six months from the date of completion of the Facilities under the contract or the termination of the contract as the case may be and the parties shall not invoke arbitration later on after expiry of the said period of six months.</p>	<p>There should not be any pre - requisites/ restrictions regarding point of time at which arbitration procedure can be invoked. Seeking lawful recourse under Arbitration at any time during course of Contract is a fundamental right of the Contractor. We, therefore, request NTPC to modify the said provisions so as to allow invocation of arbitration also during the course of execution of project.</p>	<p>The provisions of the bidding documents shall prevail.</p>
30.	Section-IV (GCC)	6.5.3	18 of 78	<p>Any dispute raised by a party to arbitration shall be adjudicated by a Sole Arbitrator appointed by mutual consent from among the List of empanelled Arbitrators maintained by EMPLOYER, in the following manner:</p>	<p>As per standard industry practice being followed for such large scale EPC projects, the arbitral tribunal consists of three arbitrators wherein either party has right to appoint respective arbitrator and presiding arbitrator is appointed by such two arbitrators, which basically provides equal opportunities to either parties for appointment of arbitrator(s) which is in accordance with Arbitration & Conciliation Act, 1996.</p> <p>In view of the same, we request Employer to review the referred provision pertaining to arbitration</p>	<p>The provisions of the bidding documents shall prevail.</p>

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					through appointment of Sole Arbitrator by NTPC and amend the provisions suitably to include the three-member arbitral tribunal.	
31.	Section-IV (GCC)	16.3	32 of 78	<p>The obligation of a party under GCC Sub Clauses 16.1 and 16.2 above, however, shall not apply to that information which</p> <p>(a) now or hereafter enters the public domain through no fault of that party</p> <p>(b) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto</p> <p>(c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.</p>	<p>We request Employer to add following at the end of referred clause:</p> <p>(d) <u>is required to be disclosed in accordance with a judicial or government order or decree.</u></p>	The provisions of the bidding Documents shall prevail.
32.	Section-VII Book 2 of 3	Price Schedules (BOQ)	-	Revised BOQ shall be provided later	Since, the bid is required to be submitted in Single Stage inclusive of Price Bid, we request Employer to issue all the Price Schedule at the earliest.	BOQ shall be provided at the earliest

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					Further, we request Employer not to specify any minimum takeout price for any items in "Takeout Price schedule".	
33.	Section-V (SCC)	19 [GCC Clause- 26.2]	9 of 20	iii) Maximum deduction for Liquidated Damages: The total amount of Liquidated Damages for delay under the contracts will be subject to a maximum of 7.5 % of the total contract price (Total of First, Second & Third contract).	The delay LD Cap of 7.5% is very high compared to industry standards. We request Employer to levy LD Cap unit-wise and in line with previous NTPC tenders, reduce the same to 5%. Accordingly, we request Employer to modify the referred clause as follows: "The total amount of Liquidated Damages for delay under the contracts will be subject to a maximum of 7.5% 5% of the total Unit contract price (Total of First, Second & Third contract). <u>Further, for the purpose of computation of LD, the Unit Contract price shall be 50% of the Total Contract Price.</u> Kindly confirm.	Provisions of Bidding Documents shall prevail.
34.	Section-IV (GCC)	10.2	25 of 78	The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access	In case Contractor opts for Laydown area outside plant boundary due to non-availability of sufficient land within	Provisions of Bidding

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				thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in Appendix 6 (Scope of Works and Supply by the Employer) to the Form of Contract Agreement. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in Appendix 6.	plant area, we understand that the supply payment linked with “receipt of equipment/material” as stipulated under Sl. Nos. A1 (III) and B1 (III) of Appendix- 1 (Terms and Procedures of Payment) to “Form of Contract Agreement” shall be released to the Contractor after receipt and physical verification of equipment/material at laydown area identified by the Contractor outside the plant boundary, Kindly confirm.	Documents shall prevail
35.	Section-IV (GCC)	53.2	78 of 78	No claim for interest or damage will be entertained or be payable by the Employer in respect of any amount or balance which may be lying with the Employer or may become due upon settlement/adjudication of any dispute, difference or misunderstanding between the parties by way of arbitration or court proceedings or otherwise or in respect of any delay or omission on the part of the Employer in making intermediate or final payment or in respect of any amount/damage which may be claimed	The referred clause restricts the Contractor to rightfully claim the interest cost or any damage that the Contractor may incur while undergoing the proceedings of arbitration or court or otherwise. In this regard, it may please be noted that it is a general and established practice that parties to the dispute have right to claim compensation towards losses and/or damage(s) within the legal framework. The decision for allowing payment towards any interest	Provisions of Bidding Documents shall prevail.

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				through arbitration or court proceedings or in any other respect whatsoever.	cost or damage arising out of any dispute or differences between Employer and Contractor should lie with the arbitral or the judicial authority. The unilateral restriction on the Contractor as stipulated in this clause is removing the fairness and equitableness of the contract. We therefore request Employer to relook and delete this clause.	
36.	Section-IV (GCC)	7.3.1.3	21 of 78	The Contractor will provide the Employer with the manufacturing drawings , catalogues, assembly drawings and any other document required by the Employer so as to enable the Employer to identify the recommended spares. Such details will be furnished to the Employer as soon as they are prepared but in any case not later than six months prior to commencement of manufacture of the corresponding main equipment.	We request Employer to delete ' manufacturing drawing ' from this clause as these drawings are proprietary in nature of Suppliers/OEM's.	Provisions of Bidding Documents shall prevail.
37.	Section-IV (GCC)	7.3.1.4	22 of 78	To enable the Employer to finalise the requirement of recommended spares which are ordered subsequent to placement of order for main equipment/plant in addition to necessary	We request Employer to modify the clause as follows: To enable the Employer to finalise the requirement of recommended spares	Provisions of Bidding Documents shall prevail.

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				<p>technical details, catalogue and such other information brought out hereinabove, the Contractor will also provide a justification in support of reasonableness of the quoted prices of spares which will, inter-alia, include documentary evidence that the prices quoted by the Contractor to the Employer are not higher than those charged by him from other customers in the same period.</p>	<p>which are ordered subsequent to placement of order for main equipment/plant in addition to necessary technical details, catalogue and such other information brought out hereinabove, the Contractor will also provide a justification in support of reasonableness of the quoted prices of spares which will, inter-alia, include documentary evidence that the prices quoted by the Contractor to the Employer are not higher than those charged by him from other customers in the same period.</p>	
38.	Section-IV (GCC)	7.3.1.13 (b)	24 of 78	<p>For the item of spares ordered or to be ordered by the Employer for 3 years operational requirement of the plant,will stand valid till the expiry of thirty six(36) months from the scheduled date of Completion of facilities for the last unit of equipment/plant covered under the contract or 6000 hrs of trouble free operation after such spares are put in service, whichever is earlier.</p>	<p>We request Employer to modify the clause as follows:</p> <p>For the item of spares ordered or to be ordered by the Employer for 3 years operational requirement of the plant,will stand valid till the expiry of thirty six(36) twenty-four (24) months from the scheduled date of Completion of facilities for the last respective unit of equipment/plant covered under the contract or 6000 hrs of trouble free</p>	<p>Provisions of Bidding Documents shall prevail.</p>

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					operation after such spares are put in service, whichever is earlier.	
39.	Section-IV (GCC)	20.3.2	37 of 78	Within twenty one (21) days after receipt by the Project Manager of any document requiring the Project Manager's approval.....	We request Employer to modify the clause as follows: Within fifteen (15) twenty one (21) days after receipt by the Project Manager of any document requiring the Project Manager's approval..... <u>If, documents/ drawings are not approved in 15 days then same shall be treated as approved.</u>	Provisions of Bidding Documents shall prevail.
40.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-2 (Price Adjustment) (xi)	11 of 16	The following components of the contract price shall not be subject to price adjustment and shall remain firm during the execution of the contract : (1) (2) Inland Transportation charges (including Inland Transit Insurance, port clearance, port handling & port charges) for plant & equipment and Spare Parts.	In view of fluctuating oil prices and present market volatility, we request Employer to kindly allow Price Adjustment for the items referred at Sl. No. 2 (i.e. <u>Inland Transportation Charges</u>) under referred provision.	Provisions of Bidding Documents shall prevail.
41.	Section-VII Book 3 of 3 (Part-1)	Appendix-2 (Price Adjustment)	1 of 16	Only following components of the Contract Price will be subject to Price adjustment:	We understand that taxes & duties applicable on Price adjustment of Ex-Works (India) Price of Plant and Equipment's shall be paid over and	Provisions of Bidding Documents shall prevail.

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	(Form of Contract Agreement)	(iii)		(a) Ex-Works (India) Price of Plant and Equipment including Mandatory Spares manufactured within the Employer's Country, but excluding Type Tests Charges (covered in Schedule 2) and FOB Price Component for Plant and Equipment including Mandatory Spares supplied from abroad, but excluding Type Tests Charges (covered in Schedule 1).	above the amount of taxes & duties as quoted in "Schedule No. 7 : Taxes and Duties". Kindly confirm.	
42.	Section-IV (GCC)	27.8.1	52 of 78	At the end of the Defects Liability Period, the contractor liability ceases except for latent defects. The contractor's liability for latent defects warranty shall be limited to a period of five (5) years from the end of Defects Liability Period.	We request Employer to modify the clause as follows: At the end of the Defects Liability Period, the contractor liability ceases except for latent defects. The contractor's liability for latent defects warranty shall be limited to a period of five (5) years from the end of Defects Liability Period Completion of Facilities .	Provisions of Bidding Documents shall prevail.
43.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-2 (Price Adjustment) (vii)	3 of 16	For the purpose of this clause the date of shipment/despatch shall mean the schedule date of shipment/despatch or actual date of shipment/despatch, whichever is earlier. The schedule date of shipment/despatch shall be as identified	We request Employer to modify the clause as follows: For the purpose of this clause the date of shipment/despatch shall mean the schedule date of shipment/despatch or	Provisions of Bidding Documents shall prevail.

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				in line with provisions of Time Schedule, Appendix-4 to the Contract Agreement.	actual date of shipment/despatch, whichever is earlier. The schedule date of shipment/despatch shall be as identified in line with provisions of Time Schedule, Appendix-4 to the Contract Agreement <u>approved PERT Network.</u>	
44.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-2 (Price Adjustment) (viii)	5 of 16	For the purpose of this clause, month of execution of installation work shall mean the schedule month of execution of the installation work or actual month of execution of the installation work, whichever is earlier. The schedule date for completion of a particular installation activity shall be as identified in line with provisions of Time schedule, Appendix-4 to the Contract Agreement.	We request Employer to modify the clause as follows: For the purpose of this clause, month of execution of installation work shall mean the schedule month of execution of the installation work or actual month of execution of the installation work, whichever is earlier. The schedule date for completion of a particular installation activity shall be as identified in line with provisions of Time schedule, Appendix-4 to the Contract Agreement <u>approved PERT Network.</u>	Provisions of Bidding Documents shall prevail.
45.	Section-VII Book 3 of 3 (Part-1)	Appendix-2 (Price Adjustment)	8 of 16	For the purpose of this clause, month of execution of structural work shall mean the schedule month of execution of the structural work or actual month of	We request Employer to modify the clause as follows:	Provisions of Bidding Documents shall prevail.

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	(Form of Contract Agreement)	(ix)		execution of Structural Work, whichever is earlier. The schedule date for completion shall be as identified in line with provisions of Time Schedule, Appendix-4 to the Contract Agreement.	For the purpose of this clause, month of execution of structural work shall mean the schedule month of execution of the structural work or actual month of execution of Structural Work, whichever is earlier. The schedule date for completion shall be as identified in line with provisions of Time Schedule, Appendix 4 to the Contract Agreement <u>approved PERT Network.</u>	
46.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-2 (Price Adjustment) (x)	10 of 16	For the purpose of this clause, month of execution of civil work shall mean the schedule month of execution of Civil work or actual month of execution of Civil Work, whichever is earlier. The schedule date for completion shall be as identified in line with provisions of Time Schedule, Appendix-4 to the Contract Agreement.	We request Employer to modify the clause as follows: For the purpose of this clause, month of execution of civil work shall mean the schedule month of execution of Civil work or actual month of execution of Civil Work, whichever is earlier. The schedule date for completion shall be as identified in line with provisions of Time Schedule, Appendix 4 to the Contract Agreement <u>approved PERT Network.</u>	Provisions of Bidding Documents shall prevail.
47.	Section-IV (GCC)	36.1	60 of 78	If, any law, regulation, ordinance, order or by-law having the force of law is	In the event of change in law and/or statutory variation of taxes & duties	Provisions of Bidding

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				<p>enacted, promulgated, abrogated or changed that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affectedunder the Contract. However, these adjustments would be restricted to direct transactions between the Employer and Contractor and Bought out items..... <u>These adjustments shall not be applicable on procurement of raw materials, intermediary components, and intermediary services etc. by the Contractor</u>.....</p>	<p>affecting the cost of raw material, intermediary components and intermediary services etc. (i.e. indirect transactions), which are not getting compensated through any other provision available in the Contract should be re-imbursed to the Contractor on production of documentary evidence.</p> <p>We, therefore, request Employer to DELETE the following phrase from the referred clauses (GCC Clause-36.1 and GCC Clause-14.4):</p> <p><i>“These adjustments shall not be applicable on procurement of raw materials, intermediary components, and intermediary services etc. by the Contractor”</i></p>	<p>Documents shall prevail.</p>
48.	Section-IV (GCC)	14.4	31 of 78	<p>.....If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such</p>		<p>Provisions of Bidding Documents shall prevail.</p>

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				change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GCC Clause 36 (Change in Laws and Regulations) hereof. However, these adjustments would be restricted to direct transactions between the Employer and Contractor and Bought out items (dispatched directly from sub-vendor's works to Site). <u>These adjustments shall not be applicable on procurement of raw materials, intermediary components, and intermediary services etc. by the Contractor.</u>		
49.	Section-II (ITB)	10.4 (d) (iii)	20 of 44	Bidders are advised to price their bids in such a manner that the component for 'Amount linked to Safety Aspects/ compliance to Safety Rules' should not be less than 1 % of the cumulative total of Service Portion of the Contract, i.e. Civil + Installation/ Erection + Structural Works.....	We adopt the highest standards of quality and safety while executing the projects and will abide by the Safety Rules of NTPC. In view of the above, we request Employer to kindly delete this restrictive provision.	Provisions of Bidding Documents shall prevail.
50.	Section-VII Book 3 of 3 (Part-1) (Form of Contract)	3.1	-	Effective Date (Reference GCC Clause 1) The Time of Completion of the Facilities shall be determined from the date of Notification of Award provided all of the	We request Employer to add following events in the referred clause: (a) (b)	Provisions of Bidding Documents shall prevail.

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	Agreement)			<p>following conditions have been fulfilled within a period of two (2) months from the date of said Notification of Award:</p> <p>(a) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor.</p> <p>(b) The Contractor has submitted to the Employer the Performance Security, Security towards faithful performance of the Deed(s) of Joint Undertaking (if applicable) and the Advance Payment Security.</p> <p>(c) The Employer has paid the Contractor the Advance Payment.</p>	<p>(c)</p> <p>(d) <u>The Employer has provided encumbrance free land.</u></p> <p>(e) <u>The Employer has obtained the Environmental Clearance</u></p>	
51.	General	-	-	New Clause	We request Employer to introduce the cap of Contractor's aggregate liability to pay liquidated damages for delay in Completion of Facilities plus failure to attain the functional guarantee at fifteen percent (15%) of the Contract Price Unit wise.	Provisions of Bidding Documents shall prevail.
52.	General	-	-	General	To make it fair & equitable and bring parity amongst all the participating bidders, we request Employer to exclude the BOCW cess from the bidder's scope. Employer may kindly	Provisions of Bidding Documents shall prevail.

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					<p>settle this separately with relevant statutory authority.</p> <p>Accordingly, the bidders may please be allowed to quote their prices without considering the BOCW Cess.</p>	
53.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) 4.1	34 of 36	<p>Due Dates for Payment</p> <p>.....Progressive payment other than that under the Letter of Credit will become due and payable by the Project Manager within thirty (30) days from the date of receipt of Contractor's bill/invoice/debit note by the Employer, provided the documents submitted are complete in all respects.</p>	<p>In line with previous tender of NTPC for Talcher (Stage-III) Project, we request Employer to release the payment within 15 days from the date of receipt of Contractor's bill/invoice/debit note.</p> <p>Accordingly, we request Employer to modify the referred provision as follows:</p> <p>.....Progressive payment other than that under the Letter of Credit will become due and payable by the Project Manager within thirty (30) fifteen (15) days from the date of receipt of Contractor's bill/invoice/debit note by the Employer, provided the documents submitted are complete in all respects.</p>	Provisions of Bidding Documents shall prevail.

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54.	Section-V (SCC)	33.1	18 of 20	Materials of any kind obtained from excavation on the Site shall remain the property of the Employer and shall be disposed of as the Engineer in- Charge may direct.	<p>(i) We request Employer to confirm whether any surplus excavated material/ rock/ sand/earth within plant boundary may be utilized by the Contractor for the purpose of construction activities/backfilling, free of cost (with prior consent of Employer). Also clarify regarding the responsibility towards any royalty payable on the use of material as mentioned above.</p> <p>(ii) We understand that in case, it is necessary to dispose the excessive excavated material and/or dump the excavated soil/earth in Employer owned area outside the plant premises, then Employer shall become the custodian of such excavated material/soil and all clearance(s)/ permissions shall be arranged by Employer and all the applicable charges including royalty, transportation etc. shall be borne by Employer. Kindly confirm.</p>	The provisions of the bidding documents shall prevail.
55.	Section-III (BDS)	-	-	New Clause	Execution of project is the joint responsibility of both the Contractor	Provisions of Bidding

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				Employer's Inputs	and the Employer. Accordingly, NTPC used to specify timelines of providing major Employer's inputs like land, fuel oil, coal, operational staff etc. in earlier tenders. Similar provision regarding Employer's inputs is missing in this tender. We request Employer to kindly introduce the same.	Documents are clear and shall prevail.
56.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) A1 (I) (b) & B1 (I) (b)	2 , 7 & 8 of 36	Submission of copy of work order placed by Contractor and duly accepted by Sub-Contractor(s) for Main plant civil agency (Boiler foundation and Main power House foundation work) Submission of copy of work order/ purchase order placed by Contractor and duly accepted by Sub-Contractor(s) for NDCT Submission of copy of purchase order placed by Contractor and duly accepted by Sub- Contractor(s) for stacker reclaimer	Employer may please note that referred work (i.e. Civil works for Boiler foundation & Main Power House foundation work, IDCT & stacker reclaimer) are executed by ourselves (i.e. Bidder) through our in house capabilities and we may not subcontract these work on lumpsum basis. Therefore, we understand that the Interim Advance Payment linked with ordering of such items shall be released on submission of undertaking(s) on commencement of such works by the Contractor. Kindly confirm.	Provisions of Bidding Documents shall prevail.

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57.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) A1 (III)	3 of 36	Twenty Percent (20%) of Total FOB Supply Price Component of the Contract Price for each identified equipment on receipt of equipment at site on pro rata basis and physical verification and certification by the Project Manager for the equipment received and stored at site <u>and on furnishing the confirmation from the contractor that all the payments due w.r.t. the Bought out Items are paid to their Sub-vendor(s) as per the agreed payment terms between Contractor and their sub-vendor.</u>	The underlined provision of the referred clause (i.e. <u>and on furnishing the confirmation from the contractor that all the payments due w.r.t. the Bought out Items are paid to their Sub-vendor(s) as per the agreed payment terms between Contractor and their sub-vendor"</u>) is not feasible and therefore we request Employer to kindly delete the same. However, Employer may ask the Contractor to submit an executive report stating the details of payment made to sub-contractor/sub-vendors for this project for his reference and monitoring.	Provisions of Bidding Documents shall prevail.
58.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) A1 (III)	3 of 36	Note: In case of non-payment/ delayed payment to sub-vendors for bought out items, NTPC reserves the right to pay to sub vendors for bought out items directly, on account of the Contractor.	We request Employer to kindly delete the referred clause as this would lead to unnecessary litigation and confusion during the project execution. However, Employer may ask the Contractor for the explanation for such non-payment/delayed payment to sub-vendors for bought out items.	Provisions of Bidding Documents shall prevail.

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					We request Employer to kindly issue amendment/corrigendum in this regard.	
59.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) A1 (I) (b) & B1 (I) (b)	2, & 8 of 36	Note- ii: However, if contractor fails to complete the despatches for Unit 1 along with the common facilities and Unit 2 till the date of unit wise completion of supplies as per agreed schedule, then the advance paid for such delayed supplies shall become interest bearing. The applicable interest shall be calculated at the rate specified in the bidding documents on the advance amount (i.e. 12% of FOB/Ex-works (Main Equipment) supply component) of the balance despatches beyond such agreed schedule date of unit wise completion of supplies, for the period of delay between its actual despatch and the agreed schedule date of unit wise completion of supplies correspondingly and the same shall be deducted from the due payments to the contractor.	Since, the tender already has the provision for levy of Liquidated Damages for delay in achieving successful Completion of the Facilities, imposition of such interest will lead to further penalization of the Contractor for the same event. We, therefore, request NTPC to kindly review and delete the referred clause.	Provisions of Bidding Documents shall prevail.
60.	Section-VII, Book 3 of 3 (Part-1)	Appendix-1	14 of 36	Note: The release of first progressive payment for installation services shall be on	Employer may please note that the referred site infrastructural works are in contractor's scope and the same shall	Provisions of Bidding

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	(Form of Contract Agreement)	(Terms and Procedures of Payment) E (II)		completion of pre-installation activities i.e. readiness of Priority 1 Roads and first phase development of Storage and laydown area (i.e. 50000 sqmtr. Hard crusting with roads and drains for storage of steel, foundation materials, readiness of 2 storage sheds, readiness of store office with material management group at site)and subject to submission of documentary evidence by the Contractor towards having taken the insurance policy(ies.) in terms of relevant provisions of GCC Clause 34 (Insurance) and acceptance of same by the Project Manager.	be initiated as per site requirement and Employer's direction. Therefore, we request Employer not to link such pre-installation activities for issuance of progressive payment towards Installation service as the same will hamper the site progress and Contractor's cash flow. Kindly confirm.	Documents shall prevail.
61.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) F (II)	19 of 36	Note: The release of first progressive payment for civil works shall be on completion of pre-Civil works activities i.e. establishment of Safety Control Room & Site office of NTPC and establishment of workers habitat (as per spec) for 500 workers and subject to submission of documentary evidence by the Contractor towards having taken the insurance policy(ies) in terms of relevant provisions of GCC Clause 34 (Insurance) and acceptance of same by the Project Manager	Employer may please note that the referred infrastructural works are in contractor's scope and the same shall be initiated as per site requirement and Employer's direction. Therefore, we request Employer not to link such pre-Civil works activities for issuance of progressive payment towards Civil works as the same will hamper the site progress and Contractor's cashflow.	Provisions of Bidding Documents shall prevail.

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					Kindly confirm. Also, Employer may please note that Site office of NTPC is not in bidder's scope.	
62.	Section-VII, Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-1 (Terms and Procedures of Payment) 4.1 & 6.0	34 & 36 of 36	Contractor shall be required to raise its consolidated invoices/bills only once a month except for LC payments.	Contractor shall give his best effort to raise consolidated invoices/bills in each month; however, such restriction of only once/month cannot be accepted since this will have severe impact on the Contractor's cashflow. Therefore, we request Employer to kindly delete/ modify the referred clause accordingly.	Provisions of Bidding Documents shall prevail.
63.	Section-VII Book 3 of 3 (Part-1) (Form of Contract Agreement)	Appendix-2 (Price Adjustment) (viii), (ix) & (x)	3,8 & 10 of 16	In case of installation/Structural Works/Civil Works activities which are delayed beyond the schedule date for reasons attributable to the contractor, the price adjustment provision shall not be applicable for the period of time between the schedule date of completion and actual date of completion of the respective installation/Structural/Civil Work activity. For this purpose, the schedule date for completion of a particular installation/Structural/Civil Work activity shall be as identified in line with provisions	Approval of Extension of Time (pursuant to GCC Clause-40.1) usually takes longer time after due diligence by the Employer; sometimes it goes up to end of the Project Schedule with provisional approval. We understand, Contractor shall be eligible to claim Price Adjustment for the work executed during extended period even with provisional time extension approval.	Provisions of Bidding Documents shall prevail.

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				of Time Schedule, Appendix-4 to the Contract Agreement.		
64.	Section-II (ITB)	10.3 <i>[Price Schedule No. 1, 2 & 4]</i>	17 of 44	<p>Schedule No. 1: Plant and Equipment including Type Tests charges and Mandatory Spares to be supplied from Abroad</p> <p>Schedule No. 2: Plant and Equipment including Type Tests charges and Mandatory Spares to be supplied from within the Employer's Country</p> <p>Schedule No. 4: Installation Services including Erection and Civil/Structural Works (as applicable), Insurance covers other than inland transit insurance, Safety Aspects/ Compliance to Safety Rules and other services as specified in the bidding documents.</p>	<p>Since this tender is invited on EPC package basis including Steam Generator, Steam Turbine Generator, Balance of Plant system and associated Electrical and C&I systems, the prices for such systems in Price Schedule No. 1, 2 & 4 shall be quoted on lump sum basis only, as price break-up details (as required to be quoted in the referred price schedules) are not required for bid evaluation.</p> <p>However, the price break-up details [billing break-up] shall be furnished during contract finalization.</p> <p>In the context of above, we request Employer to kindly draft the price schedules accordingly.</p>	Provisions of Bidding Documents shall prevail.
65.	Section-IV (GCC)	12.4	27 of 78	<p>For payments related to Erection / Civil / Site Fabricated Structural works:</p> <p>A single designated ESCROW account shall be opened by the Contractor in any Scheduled Bank of India under intimation</p>	<p>We understand that the Employer is concerned about payments being rightly utilized by the Contractor during implementation of Contract.</p> <p>However, considering the financial soundness and practice of fair</p>	Provisions of Bidding Documents shall prevail.

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				<p>to Employer. All payments related to Erection / Civil / Site Fabricated Structural works by the Employer due under the contract to the Contractor shall be released into above-mentioned ESCROW account set up as per the Tri-Partite</p> <p>Contractor and the Escrow Bank within 15 days of the placement of award.</p>	<p>utilization of payments for various completed and ongoing projects, bidder would not be able to accept such provisions as:</p> <p>a) With such Escrow account provisions, we will not be able to manage desired cash flow requirements of the project.</p> <p>b) payments to the suppliers are managed at corporate level with internal debits to various divisions based on time to time requirement</p> <p>To summarize, the current mechanism of Escrow account proposed by the Employer is not tenable for bidders. Such mechanism should only be put on Contractors with whom Employer has/had poor experience of fund managements.</p> <p>Hence, we request you to kindly delete the provision of ESCROW Account.</p>	
66.	Section-IV	25	48 of 78	NEW CLAUSE	We request Employer to introduce a new clause as follows:	Provisions of Bidding

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	(GCC)				In case the unit is ready for Initial/Trial Operation and the Employer is unable to permit the Contractor to proceed for the period of three (3) months from such readiness owing to statutory, environmental, lack of start-up steam, fuel, utilities or any other reason beyond Contractor's control, the unit shall be deemed to have achieved the Initial/trial Operation. In such event, all liabilities of Contractor in respect of Contract shall be deemed to have been discharged. Defect Liability Period for the unit shall commence on such date of deemed Initial/Trial Operation. All Bank Guarantees and linked payments due on Initial/Trial Operation and PG Test shall be released.	Documents shall prevail.
67.	Section-II (ITB)	10.3 <i>[Price Schedule No. 7]</i>	18 of 44	Schedule No. 7: Goods and Services Tax (GST), applicable on Schedules - 2, 3 & 4, not included in bid price.	The format of Price Schedule No. 7 is yet to be shared by the Employer. However, based on our experience in previous NTPC tenders, we have noted that the bidders are required to indicate the rates of GST along with the	BOQ shall be furnished at the earliest. Further, Provisions of Bidding Documents shall prevail.

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					<p>amount on which such GST is applicable in such schedule.</p> <p>Considering the voluminous items covered under the scope of work under this EPC package, it would be very difficult to specify/indicate the rate of GST for each item in Price Schedule No. 7 at bid stage itself.</p> <p>Therefore, we understand that the rate of GST for various items shall be as applicable as on seven (07) days prior to the last date for submission of price bids and the rates are not required to be specified in the Schedule No. 7.</p> <p>Kindly confirm.</p>	
68.	Section-II (ITB)	10.6	21 of 44	Custom Duty Benefits for Power Projects	<p>In line with provisions of previous tender of NTPC for Talcher (Stage-III) Project, we understand that the bid prices are to be quoted without considering concessional customs duty benefits which are going to be subsumed vide Notification No. 02/2022- Customs dated 01.02.2022 issued by Dept. of Revenue, MoF, Gol.</p>	Provisions of Bidding Documents shall prevail.

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					Kindly clarify & confirm.	
69.	Section-IV (GCC)	31.2	54 of 78	Ownership of the Plant and Equipment (including spare parts) quoted in Schedule-2 shall be transferred to the Employer when the Plant and Equipment (including spares) are loaded on to the mode of transport to be used to convey the Plant and Equipment (including spares) from the works to the site <u>and upon endorsement of the despatch documents in favour of the Employer.</u>	We request Employer to review and delete the underlined sentence in the referred clause since the practice of <u>endorsement of the despatch documents</u> is no more required under GST regime.	Provisions of Bidding Documents shall prevail.
70.	Section-II (ITB)	10.3	17 of 44	Schedule No. 3 Local Transportation including Port handling, Port clearance, Port charges, Custom reconciliation, Inland transit insurance and other local costs incidental to delivery of Plant & Equipment and Mandatory Spares	Local Transportation including Inland transit insurance and other local costs incidental to delivery of Plant & Equipment are under Schedule 3 of the bid documents. However, as per section 15(2)(c) of CGST Act, 2017, freight and insurance and other costs incidental to delivery are required to be added in the value of goods. In line with the stated legal position, we request Employer to transfer the said elements of cost from Price Schedule No. 3 to Price Schedule No. 1 & 2	Provisions of Bidding Documents shall prevail.

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					pertaining to offshore and onshore supply.	
71.	Section-III (BDS)	9.0 <i>[ITB Clause- 36.1]</i>	5 of 17	Time for Completion of Facilities from the date of Notification of Award shall be 48 & 52 months for Unit 1 & Unit 2 respectively.	We understand, the EPC Contractor shall be responsible to achieve Completion of Facilities by 48 & 52 months for Unit 1 & Unit 2 respectively. However, the EPC Contractor has the choice to alter the intermediate milestones as indicated alongside as per its execution methodology/ strategy. Kindly confirm.	Provisions of Bidding Documents shall prevail.

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S/N	Section / Part / Chapter / Volume	Clause No.	Page no.	Bid Specification Stipulation	Statement of Pre-bid Query & Clarification	Employer's Reply
72	VII, Appendix-1 to Contract Agreement	3.1	33 of 36	Being EPC package, the Contractor shall necessarily be required to provide the single designated account for billing and payment. The BBU shall also be furnished accordingly. System wise/ Unit wise interaction/submission will not be entertained for BBU, Billing and Payment.	Supplies to the projects shall be made from our manufacturing facilities across India. In order to avoid Taxation issues and smooth Financial and material reconciliation, we request NTPC to delete this provision.	Provisions of Bidding Documents shall prevail.
73	VII, Appendix-1 to Contract Agreement	4.1 & 6.0	34, 36 of 36	Contractor shall be required to raise its consolidated invoices/bills only once a month except for LC payments.	Billing shall be done prorata to the supplies made/services rendered. Such provision shall delay the realization of the payment in time which will have cascading effect on the smooth execution of the project. We request NTPC to delete this provision.	Provisions of Bidding Documents shall prevail.
74	II-ITB	10.6		"Custom Duty Benefits for Power Projects"	NTPC to inform Custom duty benefits available to the bidder/contractor for the project	Provisions of Bidding Documents shall prevail.

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75	Section-VII	Note-ii	2 & 8 of 36	However, if contractor fails to complete the despatches for Unit 1 along with the common facilities and Unit 2 till the date of unit wise completion of supplies as per agreed schedule, then the advance paid for such delayed supplies shall become interest bearing. The applicable interest shall be calculated at the rate specified in the bidding documents on the advance amount.....	Initial Advance and Interim Advance payments should not be interest bearing as delay in completion of supplies can be attributable to various reasons and Employer's inputs. Delay in completion shall be known after delay analysis and Final time extension only after actual completion of the project. Request NTPC to consider.	Provisions of Bidding Documents shall prevail.
76	II / ITB	27	31 of 44	Evaluation Criteria	NTPC to confirm whether any evaluation benefits for better technical parameters will be provided during evaluation of bids.	Evaluation shall be done as per Provisions of Bidding Documents.
77	II / ITB	34	36 of 44	.....the successful Bidder shall furnish performance securities for ten (10%) of Contract Price	Bidder request NTPC to suitably incorporate the provisions of performance security for 3% of contract price in line with the circular no. F9/4/2020-PPD from Dept. of Expenditure, Ministry of Finance dated 12/11/2020	Provisions of Bidding Documents shall prevail.
	IV / GCC	13.3	28 of 78	The Contractor shall, within twenty-eight (28) days of the Notification of Award, provide a security for the due performance of the Contract for ten percent (10%) of the Contract Price		

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78	IV / GCC	7.3.1.2	21 of 78	All the mandatory spares covered under the Contract shall be produced along with the main equipment as a continuous operation and the delivery of the spares will be effected along with the main equipment in a phased manner and the delivery would be completed by the respective dates for the various categories of equipment as per the agreed network. In case of recommended spares, the above will be applicable provided the order for the recommended spares have been placed with the Contractor prior to commencement of manufacture of the main equipment.	In case the order for Mandatory spares is placed along-with the main equipment, the same shall be generally produced along-with the main equipment wherever possible. Spares shall be delivered with Main Equipment only upon NTPC's confirmation for immediate taking over at that point of time. NTPC to confirm.	Provisions of Bidding Documents shall prevail.
79	IV / GCC	42.1.2. (d) (ii), 42.2.3 (d) & 42.3.3 (d)	Page 68, 70 & 72 of 78	To the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works and to the Plant and Equipment as at the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors	These clauses may please be deleted.	Provisions of Bidding Documents shall prevail.

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80	IV / GCC	42.2.3 (e)	Page 70 of 78	deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Facilities.	Please add the word “non-proprietary” between “all” and “drawings”.	Provisions of Bidding Documents shall prevail.
81	IV / GCC	42.3.3(d) (iii)	Page 73 of 78	deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.	Please add the word “non-proprietary” between “all” and “drawings”.	Provisions of Bidding Documents shall prevail.
82	VII / Book 3 of 3	Schedule No. 4 : Installation Services excluding .....Works Portion	Page 14 of 36	Note: The release of first progressive payment for installation services shall be on completion of pre-installation activities i.e. readiness of Priority 1 Roads and first phase development of Storage and laydown area (i.e. 50000 sqmtr.) and acceptance of same by the Project Manager.	Bidder request NTPC not to link the processing of bills / payment with the readiness of pre-installation activities. The same shall be taken care by the bidder in the best interest of the project.	Provisions of Bidding Documents shall prevail.
83	VII / Book 3 of 3	Schedule No. 4 : Civil Works	Page 19 of 36	Note: The release of first progressive payment for civil works shall be on completion of pre-Civil works activities i.e. establishment of Safety Control Room & in terms of relevant provisions of GCC Clause 34	Bidder request NTPC not to link the processing of bills / payment with the completion of pre-Civil works activities. The same shall be taken care by the bidder in the best interest of the project.	Provisions of Bidding Documents shall prevail.

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				(Insurance) and acceptance of same by the Project Manager.		
84	VII / Book 3 of 3	5.3	Page 35 of 36	For Payments related to Erection/ Civil/ Site Fabricated Structural Works	Single designated ESCROW account: We understand that NTPC is concerned about funds being rightly utilized by the Contractor during execution of Contract. However, considering that there is Qualification requirement in the tender for financial soundness of the bidder, such stringent method like Escrow account seems inappropriate. There may be possibility of negative cash flow requirements at various times during the tenure of the project especially during the initial phase of the project. With such Escrow account provisions, we will not be able to manage negative cash flow requirements of the project. Further, we procure	Provisions of Bidding Documents shall prevail.

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					major commodities in bulk (and not project wise) and funds generated from one project may be used for other projects, as we execute a number of projects at the same time.To summarize, the current mechanism of Escrow account proposed by NTPC is not tenable for companies like us. Hence we request you to kindly delete such provisions.	
85	III / BDS	9.1	5 of 17	As Infrastructure works like construction power, lighting, water supply, construction offices, Construction store, Solar PV plant on Roof tops of Buildings, Portable DM Plant for Hydro test etc (as specified in the scope) and SG,TG, ESP, AHP & Chimney civil works etc are included in the scope of contract, it is necessary that the prospective bidders will be required to tie up with sub agency/sources during bidding stage, so that the award for such work is finalized/ placed by the successful bidder in the 1st	Bidder request NTPC not to insists such tie-ups during bidding stage. The same shall be taken care by the bidder in the best interest of the project. Pre-bid tie up with sub-agencies can be possible if NTPC indicates firm date of NOA.	Provisions of Bidding Documents shall prevail.

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				month on award of Main Plant Package and mobilization of these works take place in 2nd month itself.		
86	IV-GCC	45	Page 73 of 78	Contractor Performance Feedback and Evaluation System	In EPC package, majority of system/ package are supplied by NTPC approved venders. These venders are selected based on the stringent qualification requirement specified in tender specification. Similarly execution of civil/ chimney works etc also carried out through NTPC approved agency/subcontractor. Majority of issues concerning progress of engineering/supplies and execution is dependent on	Provisions of Bidding Documents shall prevail.

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					these approved vender/agencies. It would not be appropriate to evaluate the performance of main contractor on the basis of performance of abovesaid approved venders/agencies as majority of supplies and execution in EPC package would be assigned to them.	
87	IV / GCC	General			In case BOCW Act is applicable, Bidder shall pay the cess to the concerned authorities through their Sub-contractor and following the statutory compliance in the act. NTPC shall not retain/recover amount against BOCW Act from the bidder and proof of payment in the form of challan shall be submitted to NTPC for compliance against BOCW Act. NTPC to confirm.	Please refer to BOCW act and BOCW cess shall be deducted as per BOCW act.

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88	V / SCC	27	10 & 11 of 20	Rate applicable for reimbursement of BG Charges and Rate applicable for Insurance Charges	Due to change in economic scenario and after-effects of Covid-19 pandemic, banks have substantially increased the BG charges and Insurance premium. Further, these charges are varying from bank to bank. Bidder request NTPC to reimburse actual BG charges and premium on extension of Insurance incurred by bidder for the extended period on account of delays attributable to employer and request to issue suitable amendment.	Provisions of Bidding Documents shall prevail.
89	V / SCC	19 (iii)	9 of 20	Maximum deduction for Liquidated Damages: The total amount of Liquidated Damages for delay under the contracts will be subject to a maximum of 7.5 % of the total contract price (Total of First, Second & Third contract).	Bidder request NTPC to keep the maximum deductions for Liquidated damages for delay of project to 5% of total contract price (Total of First, Second & Third contract), in line with other NTPC packages.	Provisions of Bidding Documents shall prevail.

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90	II / ITB	30.3	Page 34 of 44	The Employer reserves the right to vary the quantity of any of the Spares and/or delete any item of Spares altogether at the time of Award of Contract.	The Employer may vary the quantity of spares to be ordered provided the ordered quantity results in a “whole number” or a “complete set”. Order for spares with quantity expressed as a fraction will not be accepted. Further, variation in quantities, wherever quoted in percentage or LOT will not be accepted. However, complete deletion of any item shall be acceptable. Where the requirement is in percentage no reduction or change is acceptable. NTPC to confirm.	Provisions of Bidding Documents shall prevail.
91	II (ITB)	1.2	1 of 44 The bidder shall, in case of award of contract, facilitate completion of such formalities as may be required by the respective Export Credit Agency to enable NTPC to avail Buyers Credit for funding eligible goods and services covered in the package.....	During the course of arranging Buyers credit through Export Credit Agencies, certain declaration is to be provided by Bidder or its Sub-vendors in favour of Export Credit Agencies, the Employer shall indemnify, defend and hold harmless the Bidder and its Sub-vendors from and against any and all claims, losses, liabilities, costs, fees, expenses or damages, resulting from or	Provisions of Bidding Documents shall prevail.

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					in connection with the declaration given to Export Credit Agencies during the project execution. We will discuss the matter, if desired by NTPC.	
92	ITB VII Book 1 of 3		6 of 6	Attachment 4A : Special Tools and Tackles The bidder shall provide the details regarding Special Maintenance Tools and Tackles. The cost of these Tools and Tackles shall be included in the Stage-II (Price) Bid	Special Tools and Tackles: The list of Special Tools and Tackles has been furnished at Attachment 4A. It is clarified that the supply of Special Tools and Tackles shall be limited to the list as furnished at Attachment 4A.	The list of maintenance tools and tackles is not furnished by the owner in the referred attachment. Bidder has to furnish the list of special maintenance tools & tackles for various system/equipment as per the Scope of Work of the subject package. Bidder has to further confirm that any additional special maintenance tools and tackles, required for the equipment under this package shall be furnished by them at no extra cost to the Employer.

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93	BDS		9 to 17 of 17	Suggestive list of T&P, Equipment ; related Annexure to BDS	Schedule of Erection/Civil/Safety Tools & Plant - The deployment of T&Ps shall be done to attain completion of facilities period as specified in the bidding documents. The proposed quantity and type of T&Ps and safety equipment & safety personal protective equipments shall be discussed and finalised during post bid discussions. The Erection strategy shall be discussed during Contract Execution Stage.	Provisions of Bidding Documents shall prevail.
94	SECTION – IV	19	36 of 78	Subcontracting:- Appendix 5 (List of Approved Subcontractors) to the Contract Agreement specifies major items of supply or services and a list of approved Subcontractors against each item, including vendors. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time	Bidder being PSU has standard practice to finalize the subcontractor through open/global tender. and the finalised subcontractors are well qualified satisfying the PQR criteria of NTPC specifications. Bidder shall select sub-contractor's through Open Tender and names of Technically qualified	Provisions of Bidding Documents shall prevail.

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				propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties or responsibilities under the Contract.	subcontractors shall be forwarded to owner for their approval. Any subsequent details will be provided only after technical approval. In view of this, we understand that bidder is not required to furnish the list of subcontractors to NTPC for their approval. Kindly Confirm.	
95	GCC cl. 34 Section VII Book 3 of 3 (Part-1) Appendix 3	34 of GCC 3 of Appendix-3	2 of 3	To the extent specified in Appendix 3 (Insurance Requirements) to the Form of Contract Agreement, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract,..... Any loss or damage to the plant and equipment during handling, transportation,	Bidder shall take insurance coverage till completion of 72 Hours Full Load operation during commissioning of system OR Commercial Operation (COD) by Customer whichever is earlier.	Provisions of Bidding Documents shall prevail.

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				storage, installation, commissioning, and all activities to be performed till the "Completion of Facilities" shall be to the account of the contractor		
96	Section IV (GCC)	24	46 of 78	Completion of facilities	Please confirm that if the commissioning cannot be carried out due to reasons attributable to the Employer, the facilities will be considered as deemed completed and suitable time and cost compensation will be provided to bidder.	Provisions of Bidding Documents shall prevail.
97	General			Access to & Possession of site	Employer shall ensure the site is approachable from state & national highways for material movement. If there is any obstruction or local issues pertaining to movement of goods the Employer shall be responsible for resolving	Provisions of Bidding Documents shall prevail.

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					same, the Contractor shall be entitled to suspend the work till such site issues are resolved	
98	Section IV GCC	3.6.2	6 of 78	The award of the separate Contracts shall not in any way dilute the responsibility of the Contractor for the successful completion of the Facilities as per Contract Documents and a breach in one Contract shall automatically be construed as a breach of the other Contract(s) which will confer a right on the Employer to terminate the other Contract(s) also at the risk and the cost of the Contractor.	Right to invoke the breach clause shall be available to both the parties i.e. Employer & contractor equally, if other party breaches the contract. NTPC to accept.	Provisions of Bidding Documents shall prevail.

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99	Section IV GCC	36.1	60 of 78	<p>If, after the date seven (7) days prior to the deadline set for Price Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. However, these adjustments would be restricted to direct transactions between the Employer and Contractor and Bought out items (to be dispatched directly from the sub-vendor's works to NTPC Site).</p>	<p>Bidder requests to consider adjustments to-wards transactions between the Contractor and Sub-Contractor also under said clause. The adjustments shall be applicable on pro-curement of raw materials, intermediary components, and intermediary services etc. by the Contractor.</p> <p>NTPC to accept.</p>	Provisions of Bidding Documents shall prevail.
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				These adjustments shall not be applicable on procurement of raw materials, intermediary components, and intermediary services etc. by the Contractor. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the Appendix 2 to the Contract Agreement.		
100	SECTION - VII BOOK 3 OF 3 (PART-1) Form of Contract Agreement	Appendix-I	Page 1 of 36	Terms of payment Schedule No. 4 : Installation Services excluding Civil and Site Fabricated Structural Works Portion Four Percent (4%) of total Installation Services Component of Contract Price (excluding Civil and Site Fabricated Structural Works) on Successful Completion of Trial/Initial Operation	There are numerous guarantees which are to be conducted much later, after the PG tests (some after 2-5 years of operation). We request that the Terms of Payment linked to release the final 5% payments should be delinked from these extended period functional guarantees in all the Schedules (i.e. Supplies, Installation, Civil & Site fabricated Structural	Provisions of Bidding Documents shall prevail.

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					Works) as in a project of this magnitude the retained amount is extremely large. We propose that retained amounts should be released against a BG. Detailing can be worked out post discussions. Further, Bidder requests NTPC to replace the heading "Completion of Trial/Initial Operation " (as mentioned in the referred SCC clauses) with "Synchronization & Full load".	
101	General			Building & Other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996	In case BOCW Act is applicable, Bidder shall pay the cess to the concerned authorities through their Sub-contractor and following the statutory compliance in the act. Customer shall not recover amount against BOCW Act from Bidder and proof of payment in the form of challan shall be submitted to Customer for compliance against BOCW Act.	Please refer to BOCW act and BOCW cess shall be deducted as per BOCW act.

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102	IV (GCC)	32	Page 55 of 78	<p>32. Care of Facilities</p> <p>32.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Completion of the Facilities pursuant to GCC Clause 24 (Completion of the Facilities) or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to</p>	<p>We request to modify the clause as</p> <p>32.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Commercial Operation Declaration or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever</p>	Provisions of Bidding Documents shall prevail.

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				<p>the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 27 (Defects Liability). Notwithstanding the foregoing, the Contractor shall not be liable for any loss</p>	<p>during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 27 (Defects Liability). Notwithstanding the foregoing, the Contractor shall not be liable for any loss</p>	
103	SECTION - VII BOOK 3 OF 3 (PART-1)	5. FORM OF CONTRACT AGREEMENT APPENDIX - 1		General	All payments payable on completion of facilities should be modified as payable on Commercial Operation Declaration (COD)/ trial operation / initial operation for each unit whichever occurs first	Provisions of Bidding Documents shall prevail.

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104	SECTION - VII BOOK 3 OF 3 (PART-1)	5. FORM OF CONTRACT AGREEMENT APPENDIX - 1		<p>Schedule – 7 & 7A: Payment Terms for Taxes & Duties</p> <p>iii) 100% of applicable Taxes and Duties (other than the custom duty payable as in para (i) above) which are payable by the Employer under the Contract shall be paid/reimbursed to the Contractor or Assignee of foreign Contractor (if applicable) upon receipt of equipment/spares/services and on production of satisfactory documentary evidence by the Contractor/Assignee, as applicable.</p>	<p>For Taxes & Duties of plants & equipment and/or Mandatory spares</p> <p>As the Bidder would be paying 100% of applicable Taxes & duties to the Govt. at the time of dispatch of plants & equipment and/or Mandatory spares, therefore, NTPC is requested to reimburse 100% of applicable Taxes & duties along with the despatch payment of plants & equipment and/or Mandatory spares.</p>	Provisions of Bidding Documents shall prevail.
105	IV (GCC)	19.4	36 of 78	The Contractor shall not be allowed to sub-contract works to any subcontractor/ sub-vendor from a country which shares a land border with India unless such contractor is registered with the competent Authority.	Please elaborate the meanings of the word " works " mentioned in the referred clause.	Provisions of Bidding Documents are clear and shall prevail.

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106	SECTION – III, BDS	Annexure-I to BDS		Suggestive Milestone Schedule	<p>Suggestive Schedule for award of BoPs:</p> <p>As per suggestive schedule of award of packages. All sub contracting works to be awarded within 1 to 5 months which is not practical as these activities are done progressively over schedule period of 52 months. Bidder request to modify the clause as " suggestive schedule of award of packages shall be 1 month prior to schedule of start activity of corresponding package in approved L2 "</p>	Provisions of Bidding Documents are clear and shall prevail.
107	SECTION – III, BDS	Annexure-I to BDS		<p>Suggestive Milestone Schedule</p> <p>Suggestive Milestone Schedule for Site Levelling and Basic Infrastructure: Establishment of workers habitat (as per spec) in phased manner For 500 workers in Phase 1 For additional 1000 workers in Phase 2 For additional 1000 workers in Phase 3</p>	<p>Since at initial stage labour deployment shall be less and progressively it will be augmented based on L2 schedule . Bidder request NTPC to modify the clause as under: "Suggestive Milestone Schedule for Site Levelling and Basic Infrastructure: Establishment of workers habitat (asper spec) in phased manner For 50 workers in Phase 1 by 3</p>	Provisions of Bidding Documents shall prevail.

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				For additional 1500 workers in Phase 4	months For additional 450 workers in Phase 1 by 6 months For additional 500 workers in Phase 2 by 10 months For additional 1000 workers in Phase 3 by 14 months For additional 1500 workers in Phase 4 by 20 months	
108	SECTION – III, BDS	Annexure-I to BDS		Suggestive Milestone Schedule Suggestive Milestone Schedule for Site Levelling and Basic Infrastructure: Establishment of Safety Control Room & Site office of NTPC (As per spec)	Bidder understood that construction of Site office of NTPC is not a part of EPC tender. NTPC to confirm	Provisions of Bidding Documents shall prevail.
109	SECTION - VII BOOK 3 OF 3 (PART-1) Form of Contract Agreement	E	Page 1 of 36	Terms of payment Schedule No. 4 : Installation Services excluding Civil and Site Fabricated Structural Works Four Percent (4%) of total Installation Services Component of Contract Price (excluding Civil and Site Fabricated Structural Works) on	There are numerous guarantees which are to be conducted much later, after the PG tests (some after 2-5 years of operation). We request that the Terms of Payment linked to release the final 5% payments should be delinked from these extended period functional guarantees in all the	Provisions of Bidding Documents shall prevail.

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				Successful Completion of Trial/Initial Operation	Schedules (i.e. Supplies, Installation, Civil & Site fabricated Structural Works) as in a project of this magnitude the retained amount is extremely large. We propose that retained amounts should be released against a BG. Detailing can be worked out post discussions. Further, Bidder requests NTPC to replace the heading "Completion of Trial/Initial Operation " (as mentioned in the referred SCC clauses) with "Synchronization & Full load".	
110	Terms of Payment	1 (b) III	Page 3 of 36	(III) Twenty Percent (20%) of Total FOB Supply Price Component of the Contract Price for each identified equipment on receipt of equipment at site on pro rata basis and physical verification and certification by the Project Manager for the equipment received and stored at site and on furnishing the confirmation from the contractor that all the payments due w.r.t. the Bought out Items are paid to	We request NTPC to modify the clause as " (III) Twenty Percent (20%) of Total FOB Supply Price Component of the Contract Price for each identified equipment on receipt of equipment at site on pro rata basis and physical verification and certification by the Project Manager for the	Provisions of Bidding Documents shall prevail.

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				<p>their Sub-vendor(s) as per the agreed payment terms between Contractor and their sub-vendor.</p> <p>Note: In case of non-payment/delayed payment to sub-vendors for bought out items, NTPC reserves the right to pay to sub-vendors for bought out items directly, on account of the Contractor.</p>	<p><i>equipment received and stored at site."</i></p> <p>and delete the rest of clause as it is contractor's responsibility to pay their sub-vendor.</p>	
111	SECTION - VII, BOOK 3 OF 3 (PART-1)	Note- 3	2 of 3	Any loss or damage to the plant and equipment during handling, transportation, storage, installation, commissioning, and all activities to be performed till the "Completion of Facilities" shall be to the account of the contractor	Bidder shall take Insurance till Full Load /COD, whichever is earlier as per IRDAI guidelines and after that Owner has to take O&M policy of its own.	The provisions of the bidding documents shall prevail.
112	SECTION I : INVITATION FOR BIDS (IFB)	B (d)	2 of 4	Compliance with statutory requirements and obtaining clearances from statutory authorities, wherever required;	Statutory clearance/permit needs to be taken by NTPC being owner of the project.	Provisions of Bidding Documents shall prevail.

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113	SECTION – IV GCC	40	65 of 78	The Time(s) for Completion specified in the SCC shall be extended if the for Completion Contractor is delayed or impeded in the performance of any of its obligations under the Contract	Please confirm that if the performance delay cannot be carried out due to reasons attributable to the Employer, then the Contractor can request extension of time for completion and PVC & GST shall be payable in extended period and bidder shall also qualify for additional compensation. Further, NO LD is to be levied by NTPC during the extended period.	Provisions of Bidding Documents shall prevail.
114	SECTION – IV GCC	25.3.3	49 OF 78	The Project Manager shall, after consultation with the Employer, and within forty five (45) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.	We request the Owner to consider 7 days in place of 45 days after the notice.	Provisions of Bidding Documents shall prevail.
115	SECTION – IV GCC	27.8.1	52 OF 78	At the end of the Defects Liability Period, the contractor liability ceases except for latent defects. The contractor's liability for latent defects warranty shall be limited to a	Please confirm that the burden of proof that the damage of the facilities is caused by a latent defect is with the employer.	Provisions of Bidding Documents shall prevail.

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				period of five (5) years from the end of Defects Liability Period. For the purpose of the this clause, the latent defects shall be the defects inherently lying within the material or arising out of design deficiency which do not manifest themselves during the Defects Liability Period as defined in this GCC clause 27, but later.		
116	SECTION – IV GCC	19	36 of 78	Appendix 5 (List of Approved Subcontractors) to the Contract Agreement specifies major items of supply or services and a list of approved Subcontractors against each item, including vendors. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion	Bidder has its own robust and exhaustive process to qualify a vendor prior to award of contract. Bidders are meticulously scrutinized by bidder and qualified based on thorough evaluation including Technical as well as financial capability . Hence in order to minimize the ordering time owner may please exempt vendor approval for all type of subcontracting works viz. civil, E & C and site fabrication etc. Same has kindly been	Provisions of Bidding Documents shall prevail.

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				from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties or responsibilities under the Contract.	accepted by M/s NTPC in previous order.	
117	SECTION - VII, BOOK 3 OF 3 (PART-1)	Cl. No. E (Schedule No. 4 : Installation Services)	-	Advance Payment for Installation services price components shall be released after certification of Engineer-in-Charge that the Contractor has brought to site the Safety equipment & Safety Personal Protective Equipment as per minimum quantity specified in the Bidding Documents. In case the Contractor decides not to take advance payment, the first progressive payment for Installation services price	Kindly note that safety equipment shall be brought to site with due course of time as per contract requirement. Hence same should not be linked with RA bills. Further Condition to release first RA bill need not to be linked with conditions mentioned in Appendix 3(payment Terms, Cl.No.E (Sc No.4). These activity shall be	Provisions of Bidding Documents shall prevail.

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			<p>component shall be released after certification of Engineer-in-Charge that the Contractor has brought to site the Safety equipment & Safety Personal Protective Equipment as per minimum quantity specified in the Bidding Documents.</p> <p>The release of first progressive payment for installation services shall be on completion of pre-installation activities i.e. readiness of Priority 1 Roads and first phase development of Storage and laydown area (i.e. 50000 sq.mtr. hard crusting with roads and drains for storage of steel, foundation materials, readiness of 2 storage sheds, readiness of store office with material management group at site)and subject to submission of documentary evidence by the Contractor towards having taken the insurance policy(ies.) in terms of relevant provisions of GCC</p>	<p>progressively completed in due course of time.</p>	
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				Clause 34 (Insurance) and acceptance of same by the Project Manager.		
118	SECTION - VII,BOOK 3 OF 3 (PART-1) Appendix-3 (Payment Terms)	Cl. No. F (Schedule No. 4 : Civil works)	-	<p>Advance Payment for Civil works price components shall be released after certification of Engineer-in-Charge that the Contractor has brought to site the Safety equipment & Safety Personal Protective Equipment as per minimum quantity specified in the Bidding Documents. In case the Contractor decides not to take advance payment, the first progressive payment for Civil works price component shall be released after certification of Engineer-in-Charge that the Contractor has brought to site the Safety equipment & Safety Personal Protective Equipment as per minimum quantity specified in the Bidding Documents.</p> <p>The release of first progressive payment for civil works shall be</p>	Kindly note that safety equipment shall be brought to site with due course of time as per contract requirement. Hence same should not be linked with RA bills.	Provisions of Bidding Documents shall prevail.

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				on completion of pre-Civil works activities i.e. establishment of Safety Control Room & Site office of NTPC and establishment of workers habitat (as per spec) for 500 workers and subject to submission of documentary evidence by the Contractor towards having taken the insurance policy(ies) in terms of relevant provisions of GCC Clause 34 (Insurance) and acceptance of same by the Project Manager		
119	SECTION - VII BOOK 3 OF 3 (PART-1) Form of Contract Agreement	F	Page 19 of 36	Terms of payment "The release of first progressive payment for civil works shall be on completion of pre-Civil works activities i.e. establishment of Safety Control Room & Site office of NTPC and establishment of workers habitat (as per spec) for 500 workers and subject to submission of documentary evidence by the Contractor	Bidder requests NTPC to delete the Condition to release first RA bill need not to be linked with conditions mentioned in Appendix 3(payment Terms, Cl.No.F(Sc No.4). These activity shall be progressively completed in due course of time.	Provisions of Bidding Documents shall prevail.

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				towards having taken the insurance policy(ies) in terms of relevant provisions of GCC Clause 34 (Insurance) and acceptance of same by the Project Manager"		
120	SECTION – IV GCC	27.2	Page 50 of 78	27.2 The Defects Liability Period shall be eighteen (18) months from the date of Completion of the Facilities (or any part thereof) or twelve (12) months from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, unless specified otherwise in the SCC.	We request to modify the clause as 27.2 The Defects Liability Period shall be eighteen (18) months from the date of Commercial Operation Declaration or twelve (12) months from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, unless specified otherwise in the SCC.	Provisions of Bidding Documents shall prevail.
121	General			NTPC is requested to include term Commercial Operation Declaration (COD) in GCC/SCC and define the term.		Provisions of Bidding Documents are clear and shall prevail.

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122	SECTION - II (ITB)	46.1	42 of 44		Latest Government of India circulars related to "Restrictions on procurement from a Bidder of a country which shares a land border with India" to be followed. Please confirm acceptance.	Provisions of Bidding Documents shall prevail.
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EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

SL. NO.	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.	SPECIFICATION REQUIREMENT	Bidder's Query	NTPC's Clarification
1	SECTION-VI	SUBSECTION – 1A	2 of 36	3.1	The Bidder/ Sub vendor should have previously designed (either by itself or under collaboration / licensing agreement), manufactured / got manufactured the respective equipment(s) of the type and minimum equipment rating as stipulated below such that the respective equipment(s) are in successful operation in at least one (1) plant for a period not less than one (1) year.	Our understanding is that the reference date for one year experience is the date of submission of Sub-vendor approval request to NTPC. Please clarify that our understanding is correct.	Bidder understanding is not correct. Kindly refer page no. 1/36 of sub section IA "Provenness" where following is mentioned: "For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses."
2	SECTION-VI	SUBSECTION – 1A	2 of 36	3.1 (p)	For HP Bypass system for super critical steam turbine generator sets, required equipment rating is provided as "Capacity of each valve not less than 750 Ton/hr at 270 Kg/cm2(abs) & 600 deg C Main Steam pressure and temperature at Turbine inlet".	It is requested to note that in India, there are no thermal power plants which have run for at least one year with HP Bypass systems operating at 750 Ton/hr per valve at 270 Kg/cm2(abs) & 600 deg C Main Steam pressure and temperature at Turbine inlet. Also, it has come to our notice that even the systems supplied by vendors meeting the specified provenness criteria are creating problems. Considering both the points above, it is felt that to allow supply from reasonably proven suppliers, the provenness requirement can be modified as "HP Bypass Valve Manufacturer with supply experience to power plants with supercritical parameters".	Bidder proposal is not acceptable. Bidder to comply specification requirement.
3	SECTION-VI	SUBSECTION – 1A	35 of 36	14	However, supply of HP Bypass system shall be limited to only one unit from such indigenous sources and HP Bypass valves for other unit shall be supplied only from approved sources meeting provenness requirement as specified.	It has come to our notice that even the systems supplied by vendors meeting the specified provenness criteria are creating problems. Since the intention of the specification is to promote Make in India, in order to implement it in letter and spirit, it is requested to modify this clause allowing the supply for both the units of the project.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
4	SECTION-VI	SUBSECTION – 1A	36 of 36	14.1 (ii)	In such a case additional Testing and Quality requirement shall be tied-up for quality assurance checks before award.	Please clarify what are the additional testing and quality requirements to be tied-up.	This will be finalized during detail engineering stage in line with other Quality plans. Additional tests may include creep test, NDT etc.
5	SECTION-VI	SUBSECTION – 1A	36 of 36	14.1 (iv)	Apart from specific mandatory spares (identified for HP Bypass system), one additional HP Bypass valve set of such indigenous manufacture/source shall be supplied in addition to the requirement as per specification. Same shall be supplied along with the main equipment without any extra cost to the Employer.	Our understanding is that only one indigenous make HP Bypass valve (without actuator and controls) needs to be supplied as a spare apart from the mandatory spares of HP Bypass system from approved sources. Mandatory spares for indigenous make HP Bypass system are not required. Please clarify.	Bidder to supply additional HP Bypass valve set of indigenous manufacture/source. Bidder to comply specification requirements.
6	SECTION-VI	SUBSECTION – 1A	36 of 36	14.1 (v)	Additional replacement warranty of 5 year after latent defect period shall be given by the bidder.	The latent defect period reasonably covers the period in which any defects in material or arising out of design deficiency can manifest during the operation of the plant. Hence, it is requested that this clause be removed from the tender.	This requirement is specified only for those items which are allowed to be indigenously manufactured in order to promote Make in India. Bidder to comply specification requirement.
7	SECTION-VI	SUBSECTION – 1A	36 of 36	14.1 (vi)	In case of any failure of these HP Bypass system during unit operation/commissioning, then bidder shall replace the same from NTPC approved sources. Further, in such a case bidder shall keep provision (in additional warranty period) for insurance to compensate the Employer for consequential losses due to unit outage.	Since the criteria considered for evaluating the Provenness of HP Bypass system supplier is w.r.t HP Bypass valve, we understand that in the event of failure of HP Bypass valve, it shall be replaced with the HP Bypass valve from NTPC approved sources. In this scenario, failure of HP Bypass Valve may please be elaborated in the tender.	Failure means any unit outage and/or generation loss due to HP bypass.
8	SECTION-VI	SUBSECTION – VI	5 of 31	27	Mandatory Spares: HP Bypass Valve servomotor complete assembly including actuator, yoke and its control.	Our Understanding is Electro-Hydraulic Actuator yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), fast opening device (if applicable) and position feedback transmitter only should be supplied. Hydraulic hoses and their associated fittings, additional accumulator assembly (if applicable) and cables are not included in the scope of supply. Customer is requested to confirm that our understanding is correct.	HP Bypass Valve servomotor complete assembly means HPBP actuator along with yoke assembly, directional valve (Proportional valve/Servo valve as applicable), fast opening device (if applicable) and position feedback transmitter should be supplied. Hydraulic hoses and their associated fittings, additional accumulator assembly (if applicable) and cables are not included in the scope of supply.
9	SECTION-VI	SUBSECTION – VI	5 of 31	28	Mandatory Spares: Spray water injection valve for HP Bypass system complete assembly including actuator, yoke and its control.	Our Understanding is Valve Actuator assembly along with directional valve (Proportional valve/Servo valve as applicable) and position feedback transmitter only should be supplied. Hydraulic hoses and their associated fittings and cables are not included in the scope of supply. Customer is requested to confirm that our understanding is correct.	HPBP Spray water valve along with Valve Actuator assembly, directional valve (Proportional valve/Servo valve as applicable) fast opening/closing device (if applicable) and position feedback transmitter should be supplied. Hydraulic hoses and their associated fittings and cables are not included in the scope of supply. Further bidder also to refer amendment TG1-10 in this regard.
10	SECTION-VI	SUBSECTION – VI	6 of 31	29	Mandatory Spares: Control fluid pump assembly including motor and complete coupling	Our understanding is this requirement is not for HP Bypass system since the same is not mentioned against it. Customer is requested to confirm that our understanding is correct.	Bidder understanding is correct. Main Turbine Governing system Control fluid pump assembly including motor and complete coupling
11	SECTION-VI	SUBSECTION – VI	11 of 31	Xxv	Valve seat for HPBPASS VALVE, HPBPASS SPRAY VALVES, HP BYPASS SPRAY ISOLATION VALVE - 1 No. of each kind of valve	Replacement of valve seat may not be possible in all proven designs. Hence valve seats of each type if applicable will be supplied. Customer is requested to agree.	Refer Amendment TG1-01 in this regard.
12	SECTION-VI	SUBSECTION – VI	11 of 31	Xxvii	Seal kit for Electrohydraulic actuators for HP bypass system - 2 sets of each.	Our understanding is that 1 set of seal kit will contain 1 no. seal kit for each kind of actuator. Please confirm.	Bidder understanding is correct
13	SECTION-VI	SUBSECTION – VI	11 of 31	Xxviii	Interface Seal kit for HP/PLP bypass servomotor/proportional valve and blocking unit – 2 sets	As per our understanding, 1 set consisting of 1 No interfacing seal kit between Actuator and Proportional valve assembly for each kind of valve are offered. Please confirm.	Yes. Confirmed but two sets to be supplied
14	Section VI	SUBSECTION – VI /Chapter -02	23 of 31	4.00.00/A (3)	a. Electro-Hydraulic Converter/Servo unit/ proportional valve for HPBP b. Blocking unit for HPBP (as applicable) c. Position feedback transmitter for HPBP d. Positioner for HPBP - 1 Set	Our understanding of "1 set" is 1 number of each component of HP Bypass valve listed in this clause. Please confirm.	Bidder's understanding is not correct. 1 set shall include quantity of each items mentioned under referred clause for complete replacement in one stream of HP bypass system as applicable for the offered system.
15	Section VI	SUBSECTION – VI /Chapter -02	23 of 31	4.00.00/A (4)	High pressure hoses for HPBP – 2 complete sets	Our understanding is that one set will comprise of hoses required for one 800 MW unit. Please confirm.	1 set consist of complete hoses required for 1 X 800 MW unit. Bidder to comply specification requirement.
16	Section VI	SUBSECTION – VI /Chapter -02	24 of 31	4.00.00/B (F(i))	Solenoid valves in the HPBP - 10 % or 1 no. of each type and model whichever is more.	Our understanding is that 10% or 1 no whichever is more of each type of solenoid valve that are mounted on one HP Bypass valve assembly. Please confirm.	Bidder understanding is correct. Bidder to comply specification requirement.
17	SECTION-VI	SUBSECTION – A-07	5 of 25	1.16.00 (h)	All the piping, fittings, valves, oil tanks, strainers including body and element associated with oil system of HP bypass system shall be of stainless steel.	Stainless steel piping, fittings and oil tanks can be offered. Based on our previous experience Valves and strainers (if applicable) associated with oil system are not being offered with Stainless steel MOC by the suppliers. Hence, MOC as per supplier's proven practice will be offered. Please confirm.	Bidder to comply specification requirement.
18	SECTION-VI	SUBSECTION – A-07	5 of 25	1.16.00 (j)	HP Bypass should have the provision of removable valve seat/any other arrangement for ease of maintenance.	The provenness criteria clause indicated in Part-A/Section-VI /Sub-Section-IA/Clause 3.1 specifies that "Bidder shall offer and supply only the type of the above equipment(s) for which it, itself or the manufacturer proposed by the Bidder for the above equipment(s) is qualified." Accordingly, proven designs will be offered. Hence this clause may be removed. If not possible to remove the clause, customer is requested to elaborate the requirement of "any other arrangement"	Intent of any other arrangement is that valve seat should be easily replaceable in situ. Bidder to comply specification requirement.
19	SECTION-VI	SUBSECTION – A-07	5 of 25	1.16.00 (k)	However, HP bypass valve internal/trim shall also be designed to withstand wet steam entry during cold start-up case.	The provenness criteria clause indicated in Part-A/Section-VI /Sub-Section-IA/Clause 3.1 specifies that "Bidder shall offer and supply only the type of the above equipment(s) for which it, itself or the manufacturer proposed by the Bidder for the above equipment(s) is qualified." There are different constructions of HPBP valve of different OEMs. Valve manufacturers would prefer dry steam through valves to avoid damage to the valves. Hence it would be practical to avoid entry of wet steam to the valves altogether. To the best of our knowledge, till date no HP Bypass valve has been designed for wet steam entry and has been proven as per the provenness criteria specified for HP Bypass system of the subject tender by any valve manufacturer in the world. Hence customer is requested to remove this clause.	Refer Amendment TG1-14 in this regard.
20	SECTION-VI	SUB-SECTION-IIIC-08	1 of 5	1.01.03	For special type of control valves such as combined pressure and temperature control valves for Aux PRDS application, separator drain control valves, refer to the corresponding mechanical sections.	Since there is a separate mechanical section for HP Bypass system, we understand that, this section is not applicable to HP Bypass system. Please confirm.	Bidder's understanding is correct. However, it is already indicated in referred clause.
21	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL SUB-SYSTEM-TG-Mech		3 of 11	16 & 17	Vendor list is provided for Electro-Hydraulic Actuators and Hydraulic Power Pack Unit	Since HP Bypass systems will be supplied from Customer approved OEMs, no separate approvals for sub-suppliers of the systems is required. Hence these clauses are not applicable for HP Bypass system. Customer is requested to confirm.	The items Electro-Hydraulic Actuators & Hydraulic Power Pack Unit of HP Bypass Systems being critical in nature are customer controlled and the same shall be tied-up during finalisation of MOP.
22	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL SUB-SYSTEM-TG-Mech		6 of 11	41	Approved suppliers list for HP Bypass Valves	As per Part-A/Section VI /Sub-Section-IA/3.1/ sl.no. (q) page 2 of 36, provenness is required for "HP Bypass system", whereas, in this clause, approved sources are indicated for HP Bypass valves. Customer is requested to change the description of "item" as "HP Bypass System".	HP Bypass valves are part of the HP Bypass System and indicative vendor list also contain acceptable sub-vendors for other items of HP Bypass System.
23	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL SUB-SYSTEM-TG-Mech		6 of 11	41	Approved suppliers list for HP Bypass Valves	It is requested to note that in India, there are no thermal power plants which have run for at least one year with HP Bypass systems operating at 750 Ton/hr per valve at 270 Kg/cm2(abs) & 600 deg C Main Steam pressure and temperature at Turbine inlet. It has come to our notice that even the systems supplied by vendors meeting the specified provenness criteria are creating problems. Since the intention of the specification is to promote Make in India, in order to implement it in letter and spirit, it is requested to include Bidder as an approved source in this clause.	Additional Sub-vendor proposal shall be discussed during detailed engg. in line with NTPC sub-vendor approval procedure.
24	VI / A	I-A	23 of 36	4.26.1.a	Agitator Application: Wet Limestone FGD application in Coal fired power plant Equipment rating: Agitator rating not less than that supplied for 500MW or higher size unit for similar application	Bidder should have designed, manufactured, tested, supplied / commissioned at least 1 No. of Horizontal or Side Entry Agitator in ether for Wet Limestone based Flue Gas Desulfurization (FGD) application or any other industrial / process application such as petrochemicals, metals, mining, sugar, paper, fertilizers etc. and the equipment should have been in successful operation in at least one (1) plant for a period not less than one (1) year reckoned as on the date of consideration for approval but not later than one (1) year to award date of contract.	Specifications requirements are amply clear and bidder to comply the same.
25	VI / A	I-A	1 of 36	--	Provenness For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses.		

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26	VI / A	I-A	23 of 36	4.26.1.d	Slurry Pumps Application: Wet Limestone based FGD application or ash slurry application in Coal fired power plant Equipment Rating: Flow 50 m ³ /hr (min.) with head 30 Me-ters of Liquid Column (min.)	Bidder should have designed, manufactured, tested, supplied / commissioned at least 1 No. of Slurry pump having Flow 50 m ³ /hr (min.) with head 30 Meters of Liquid Column (min.) in either for Wet Limestone based Flue Gas Desulfurization (FGD) application or Ash Slurry Application or any other industrial / process application and the equipment should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on the date of consideration for approval but not later than one (1) year to award date of contract.	Specifications requirements are amply clear and bidder to comply the same.
27	VI / A	I-A	1 of 36	--	Provenness For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses.		
28	Sub Section B02	Motors	1	3.01 (B)	Motors upto 200 KW Efficiency IE3	For such low capacity motors we shall offer motors with efficiency class IE2 For small HT motors offered in TEC enclosure (Cooling - ICA111) due to space constraints Vibration pad size shall be a) Horizontal Motor 40 x 40 x 40 b) Vertical Motor 16 x 30 x 30 The same is followed for all NTPC projects till date.	Bidders proposal is not acceptable. Pl. Refer Amendment no Elec1-09
29	Sub Section B02	Motors	2	7.06	Vibration pads size		Bidders proposal is acceptable on case to case basis subjected to the constraint for installation of Vibration pickup during detailed engineering
30	Sub Section B02	Motors	2	7.09	SIC connectors IEEE 386	For 11KV HT Motors, We shall be offering Phase segregated Terminal Box capable of through Fault level of 50 KA for 0.25 sec. The same is proven & already installed in many mo-tors of NTPC & State electricity boards power projects. This shall eliminate Imported SIC Connectors and shall boost Local Manufacturing & Make in India under Atma Nirbhar Bharat Initiative of Govt. of India. Detailed write up and reference list can be submitted for your consideration and approval.	Bidders proposal is acceptable on case to case basis during the detailed engineering only.
31	Sub Section B00	General Electrical Requirements	2	1.11.00	Locked Rotor MVA of ID Fan & MDBFP Motor shall be restricted to 75 MVA	With Combined ID Fan (Boiler Draft + SCR + FGD) the ratings are as high as 14.5 MW as in case of NTPC Pa-tratu .The same can be much more than 14.5MW depending upon site requirements. For MDBFP , the ratings are generally 15 to 17.5 MW in case of NTPC projects of 800 MW can be even go upto 20 MW also. Hence in view of such high capacities of Motors restriction of Starting MVA to 75 MVA is not practical . It varies and even go upto 125 MVA. Hence the same should depend upon the ratings of Motor and should be atleast upto 125 MVA.	Bidders proposal is not acceptable. Bidder must comply to technical specifications.
32	II-TB VI-A	SUB-SECTION-I	16 & 33 of 44 5 of 9	8.2.1 (d) 27.3 (c) 4.02.00	Attachment 3(P): Declaration on Commissioning Fuel (Coal & Oil) The declaration .....successful completion of "Initial Operation" (as defined) Specification) for both the units, as per Employer's format. c) Loading on account of Commissioning fuel (coal and oil) Bidders are required to quote the total maximum quantity of.....	The term "Initial Operation" may be replaced with "Full Load" for the first time as completion of Initial Operation can be delayed intermittently depending of the inputs and certain reasons beyond the Control of the Contractor. We request NTPC to consider following changes in the clause. 1. Contractor shall quote the total maximum quantity of coal & fuel oil as required upto the achievement of "Full Load" for the first time, not upto completion of "Initial Operation", in case of each unit which shall be issued by NTPC free of charges. 2. Further, coal and fuel oil as required from first full load till the successful completion of "Initial Operation" for both the units shall also be provided free of any charge to the contractor by NTPC	The specifications requirements are clear and bidder to adhere to the same.
33	VI A	I-A	1 of 36		For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses	In the recent past, it has been observed that there is significant time gap between opening of Techno-commercial bid date and actual award date. Therefore, we request NTPC to modify the said clause as below, in line with earlier NTPC tenders: "For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the date of consideration for approval but not later than six months after award date of EPC package unless otherwise specified in the respective clauses."	Bidder's proposal is not acceptable. Bidder is requested to comply with the stipulation of technical specifications.
34	VI-A	I	Page 7 of 9	4.09.00	The Contractor shall be responsible to undertake some activities related to its Corporate Social Responsibility (CSR) in the immediate vicinity of the project. The Contractor shall undertake such activities after prior consultations with the Employer to ensure that the efforts of the Employer and Contractor are complemented. The share of CSR expenditure to be incurred by the vendor / contractor for this project in the total CSR expenditure incurred by the vendor/contractor as a company will be in the same proportion as the turnover of the project concerned to the total company turnover. This will be certified by the chartered accountant once every fiscal year. Such activities will be undertaken by the contractor / vendor in consultation with the Employer.	This does not provide the level playing field to all the bidders. We request NTPC to indicate expenditure to be incurred for carrying out the CSR activities in the immediate vicinity of the project as stated.	CSR activities as per the provision (Rules) under section 135 of the companies Act 2013 relating to CSR and other circulars / instructions of various government departments viz MoEF etc. are to be carried out by the contractor, being statutory in nature.
35	VI-D & VII Book 3 of 3			27.00.00 Appendix-6 to Contract Agreement	Facilities to be provided by the Employer	We request NTPC to physically hand over the clear encroachment free land immediately after award of Contract i.e. within one month of issuance of NOA. Only Employer shall be responsible for coordinating and resolving all issues with Central & State Government, local bodies and local authority w.r.t land acquisition.	No major land acquisition issue is envisaged for the project. Further envisaged role of the contractor is only facilitation in resolution of the land acquisition issues related to the project. Bidder is requested to comply with the stipulations of tender documents.
36	VI-A	I	45 of 119	4.10.00 28.00.00	The vendor / contractor shall visit the site to ascertain the position of land acquisition etc. Training of Employer's Personnel		
37	VI	C				There seems to be difference in the no. of Manmonths indicated at 02 places under the clause for AHP, CHP, UF/RO Membranes etc. We request that the number of man-months training shall be mutually agreed after Award. All the expenditure towards travel (internal & external), boarding and lodging and living expenses of Employer's personnel shall be borne by the Employer for all types of trainings. Any kind of training shall only be provided by Bidder's personnel experts at Bidder works / project site only. However if training is not availed by employer during the contract period no rebate on this account shall be admissible in contract price. NTPC to confirm.	There is no difference in manmonths indicated. Bidder's proposal is not acceptable. Bidder is requested to comply with the stipulation of technical specifications.
38	VI	F			Mandatory Spare List	Wherever, Bidder quotes lot price for a clause/system in the list of mandatory spares, the offered price will remain same regardless of the deletion / change of items / quantity corrections etc as applicable to the particular design/vendor selected during execution. This should not be a point of contention during execution of the order. NTPC to confirm the same.	Bidder's understanding is not correct. Bidder is requested to comply with the stipulation of technical specifications.
39	VI-A	II-D	Page 6 of 8	2.01.00	LABOUR & STAFF COLONY	We request NTPC to provide Land for labour & staff colony within Plant boundary. Availability of above land within plant boundary shall help in smooth execution of the project.	Bidder is requested to comply with the stipulation of technical specifications. Bidder to further refer amendment D2-19 in this regard.
40	VI-A	II-B & II-C	Page 4 of 20 Page 18 of 18	1.05.03 25.00.00	Switchgear (Numerical Relay Networking) Annual Maintenance Services (AMS)	Annual Maintenance Contract Services(AMC) As per technical specification requirements, AMC/AMS to be provided for certain CAI / Instruments for 03 years. We understand that on successful completion of facilities and completion of defect liability period, NTPC will release the contractor's Bank Guarantees, applicable payments and close the contract. Therefore, providing AMC beyond defect liability period is not envisaged.	Bidder's understanding is not correct. For Switchgear (Numerical Relay Networking - AMC period of 3 years will be from the date of takeover by the employer. For C&I/Instruments - AMC will be after defect liability period.
41	VI-B	E-59	2 of 6	4.0 b)	Structural steel (plates and rolled sections i.e. channels, beams & angles) conforming to IS 2062 and Reinforcement steel conforming to IS 1786 supply if in the scope of the contractor shall be procured from Primary Steel Producers (Refer NOTE below). Currently, Primary Steel Producers acceptable.....	Steel products are only to be procured from Primary Steel producers indicated in the NTPC specification. As per notification/order dated 14.12.16, 09.08.16 and 12.05.16 by the Ministry of Steel, Govt. of India, such classification to steel producers is disposed off. Such classification will also lead to situation wherein deliveries committed by NTPC specified steel producers are not adhered or these steel producers are not winning tenders in supply of certain steel sections to match supply schedule. Request NTPC to amend the specification accordingly in the said clause and at other places wherever such classification is indicated.	Bidder to follow Technical specification requirements.
42	VI-A	SUB SECTION-VI	3 of 3	13.00.00	Bidder shall not indicate "Not Applicable" against any of the spare (except for those items for which "if applicable" is specified). In case of not applicability, functionally equivalent spare to be	a. Generally, lot price is quoted by the bidder for a main system considering applicable items (for the offered design) under that heading. In such scenario, there should not be a question of rebate (for not applicable items in the lot) during execution/closing of the Contract. b. In case there is no equiv. spare technically for a specified spare, there should not be a question of rebate during execution/closing of the Contract. Kindly confirm the above understanding	Bidder to supply all spares or their functional equivalent as per specification. In case of non supply, same shall be dealt as per provision of the contract.
43	SECTION - VI, PART-A SUB-SECTION-I INTENT OF SPECIFICATION		1 of 9	1.01.00 (d)	Compliance with statutory requirements and obtaining clearances from statutory authorities, wherever required	Bidder request Owner to obtain the necessary statutory approval and clearances. However, bidder may assist the Owner for the obtaining the same. Owner is requested to provide an exhaustive list of statutory approval to be obtained by NTPC for Talcher 2x660MW EPC project.	Bidder query is not related to Lara project. However, Bidder to comply specification requirement.
44	General				Access to & Possession of site	Employer shall ensure the site is approachable from state & national highways for material movement. If there is any obstruction or local issues pertaining to movement of goods the Employer shall be responsible for resolving same, the Contractor shall be entitled to suspend the work till such site issues are resolved.	Bidder to refer Cl no 2.00.00 Sub-section-I, Intent of Specification, Part-A/Section- VI of technical Specification.
45	VI-A	IID IIB A2	1 of 8 11 of 20 5 of 11	1.00.00 1.16.03 4.00.00 a	Dismantling of existing structures/substructures/facilities, as per specifications.	Bidder request NTPC to dismantle the super-structure / sub-structure of various facilities/buildings specified in bidding documents, as per specification and provide the encumbrance free land for complete facilities under the scope of bidder as on date of NOA. NTPC to confirm and issue suitable amendment.	Dismantling is in bidder's scope. Bidder to refer Cl. 1.00.00 of part A, section VI Sub section IID
46	SECTION - VI Part B	B-05(A)	Page 6 of 7	3.00.00 (h)	(h) Wireless temperature monitoring system to be provided and same shall be integrated to DDCMS/ separate HMI. Temperature sensors shall be installed in all relevant joints, contact joints etc. as per the standard OEM Practice, however Position of such sensors shall be decided at the time of detailed engineering.	1. Customer is requested to kindly share the further technical details of this wireless temp. monitoring system for HT Switchgear. 2. Please also provide available vendors name for this system if any).	Technical details are already specified in the clause referred. Temperature sensors shall be installed in all relevant joints, contact joints etc. as per the Standard OEM Practice. Further other details shall be finalised during the detailed engineering.

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93	VI/ Part-B	B-08	5 of 7	4.00.05 (a)	Cables shall be supplied in steel drums of heavy construction.	Bidder proposes wooden drum also in addition to steel drums for the cables. Owner may kindly review and confirm.	Bidders Proposal is not acceptable. Bidder must follow technical Specifications.
94	VI/ Part-B VI/ Part-B	IIIC-04 B-01	5 of 36 6 of 25	3.02.00 (1) 6.00.00 (A)	Type of RTD: Four wire, Pt-100 Temperature Detectors: Resistance temperature detectors (RTD) to be duplex four three wire type 100 ohms platinum	Bidder proposes that 3-wire RTD may also be given for temperature measurement of the various equipment (FANS/ Motors etc) as per the bidder's proven design. This is in-line with all the other projects. Owner may kindly review and confirm for 3-wire RTD also for FANs.	Bidder's proposal is not acceptable. Bidder to comply technical specification Bidder shall consider as per clause 3.02.00(1) of Sec-IV, Part-B, IIIC-04.
95	VI/ Part-B	IIIC-04	32 of 36	23.00.00	Complete Level Monitoring System comprising of Acoustic Frequency Based 3D Level measurement system. Scanners and all other accessories required to make the system complete and fully functional, shall be provided on as required basis for continuous level measurement and monitoring of level of each coal bunker, each Fly Ash Silo and each ESP Hopper (First to Third Field of ESP) complying...	Bidder understands that the 3D level measurement system is to be provided only for the first ESP field hoppers as mentioned in the tender specification chapter for ESP. Hence the 3D level measurement is not applicable for second and third field hoppers. This is in-line with other NTPC tenders like Talcher. Owner may kindly review and confirm.	Bidder understanding is not correct. Bidder to provide 3D level measurements for ESP hopper (first to third field).
96	VI/ Part-B VI/Part-A	IIIC-17 IIC	1 of 4 16 of 18	3.00.00 17.00.00	Electrical actuators for valves / dampers / gates These actuators shall be Non-intrusive type electric actuators. The interface of these actuators with DDCMS shall be of two type's viz. with Hardwired interface and with Fieldbus interface. Electric actuators with integral starters along with associated accessories etc shall be supplied on as required basis for Valves / Dampers to meet the functional and the other specification requirements. Following types of Electric Actuators are envisaged for the project: a) Non-intrusive Hardwired Electric Actuators b) Non-intrusive Fieldbus based Electric Actuators c) Modulating Duty Electric Actuators	Bidder proposes that all the actuators for the gates and dampers can be hardwired interface instead of fieldbus interface for the following reasons: a) Lesser cost b) Uniformity of actuators c) Some vendors don't have the Profibus based actuators for the complete range Owner may kindly review and confirm.	Bidder's proposal is not acceptable. Bidder to comply technical specification Bidder's proposal is not acceptable. Bidder to comply technical specification
97	VI/ Part-B	IIIC-17	2 of 4	4.11.00	All actuators shall be certified for SIL-2 or better.	The SIL-2 compliant models include imported actuators and are about 5 times costlier. Considering the initial cost, maintenance as well as spares costs and the import requirements, bidder request NTPC to kindly remove the SIL-2 requirement for the electrical actuators. Owner may kindly review and confirm.	Bidder's proposal is not acceptable. Bidder to comply technical specification
98	VI/ Part-B	B-0	8 of 15	3.06.00 (h) (1)	The loads for mechanical auxiliary systems shall be met by auxiliary transformers based on the criteria that each switchgear/ MCC/Distribution board shall be fed either by 2x100% or 3x50% transformers/feeders and, these shall be rated to carry the maximum load expected to be imposed.	Bidder understands that FGD MCC boards can be fed from 3 x 50% LT transformers based on the load requirement of the FGD boards. The same is in-line with the other NTPC FGD/ EPC projects also. Owner may kindly review and confirm.	Bidder has a choice of selecting either 2x100% or 3x50% LT Transformers based on the load requirement of FGD boards.
99	NA				General Electrical query-1	Bidder understands that the maximum LT transformer size is 2.5 MVA, as mentioned in point No 2 (F) of the Single Line Diagram-Main Plant Notes (Drawing No. 9587-999-POE-J-001). Owner may kindly review and confirm.	Bidder's understanding is correct.
100	NA				General Electrical query-2	The number of layers of cables in the cable trays is not mentioned. Bidder understands that the maximum cable layer is 2 layers for power cables and 3 layers for control and instrumentation cables. This is based on standard NTPC specification. Owner may kindly review and confirm	Bidders Proposal may be considered on case to case basis during the detailed Engineering.
101	NA				General Electrical query-3	Detailed specification for LT Control Cables is not given. Bidder understands that LT Control Cables are Cu conductor 1.5 sq mm, PVC insulated, PVC inner sheath, armoured and FRLS PVC outer sheath as per standard NTPC Specification and hence the same shall be provided. Owner may kindly review and confirm.	Bidder's understanding is correct. However, Cable sizes shall be considered as indicated elsewhere in the specifications and also refer to B-08 Chapter.
102	VI / A	I-A	23 of 36	4.26.1.e	Application: Wet Limestone FGD application in Coal fired power plant Equipment rating: Agitator rating not less than that sup-plied for 500MW or higher size unit for similar application	Bidder request customer to change the provenness of FGD agitators as mentioned below * Bidder should have designed, manufactured, tested, supplied / commissioned at least 1 No. of Horizontal or Side Entry Agitator in either for Wet Limestone based Flue Gas Desulphurization (FGD) application or any other industrial / process application such as petrochemicals, metals, mining, sugar, paper, fertilizers etc. and the equipment should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on the date of consideration for approval but not later than one (1) year to award date of contract". Kindly accept.	Bidder to comply with the specifications requirements.
103	VI / A	I-A	1 of 36	--	Provenness For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses.		
104	VI / A	I-A	23 of 36	4.26.1.d	Slurry Pumps Application: Wet Limestone based FGD application or ash slurry application in Coal fired power plant Equipment Rating: Flow 50 m ³ /hr (min.) with head 30 Me-ters of Liquid Column (min.)	Bidder request customer to change the provenness of FGD Slurry pumps as mentioned below Bidder should have designed, manufactured, test-ed, supplied / commissioned at least 1 No. of Slurry pump having Flow 50 m ³ /hr (min.) with head 30 Meters of Liquid Column (min.) in either for Wet Limestone based Flue Gas Desulphurization (FGD) application or Ash Slurry Application or any other industrial / process application and the equipment should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on the date of con-sideration for approval but not later than one (1) year to award date of contract. Kindly accept.	Bidder to comply with the specifications requirements.
105	VI / A	I-A	1 of 36	--	Slurry Pumps Application: Wet Limestone based FGD application or ash slurry application in Coal fired power plant Equipment Rating: Flow 50 m ³ /hr (min.) with head 30 Me-ters of Liquid Column (min.)		
106	VI / B	A-05	16 of 26	7.07.06	The Waste water collection tank shall be of Steel construction with rubber lining.	The wastewater collection tank shall be of steel construction with rubber lining or vinyl ester based flake glass lining of min 3 mm thk. Kindly accept.	Bidder to refer the amendment SG1 in this regard.
107	VI / B	A-05	16 of 26	7.07.00	Waste Water System		
108	VI / A	IIA-04	04 of 06	5.05.01	The under flow from the secondary hydro-cyclone shall be taken to the filtrate water tank. The over flow from the secondary hydro-cyclone shall be taken to ZLD System	Kindly mention the terminal point of FGD Waste water discharge.	Bidder to refer the amendment SG1 in this regard.
109	VI / B	A-05	17 of 26	7.08.03	Agitation shall be provided to prevent settlement of slurry by sufficient no. of Top entry agitators with emergency flush start system.	Bidder understanding is slurry by sufficient no of Top or Side entry agitators with emergency flush start system. Kindly accept	Bidder to refer the amendment SG1 in this regard.
110	VI / B	A-05	17 of 26	7.08.06	Coarse -screen of suitable material at suction side of the pumps shall be provided.	Coarse screen will be provided at suction side till commissioning of slurry pump. The same will be removed after commissioning. This is based on OFGDM & current commissioning practice. Kindly accept.	Bidder to comply with the specifications requirements.
111	VI / A	IV	04 of 76	1.01.01	Guarantees under Category-I Limestone Consumption rate: Bids with lime stone consumption higher than 9440 kg/hr shall not be accepted and no evaluation credit shall be given for lower consumption rate.	As per clause no: 1.01.01 of Functional guarantees, the limestone consumption rate is mentioned as 9440 kg/hr whereas as per Attachment-11, it is indicated as 8700 kg/hr. These statements are contradictory. Requesting customer / consultant to review and confirm the limestone consumption rate at Guarantee point (TMCR-DC).	Bidder to refer the amendment SG1 in this regard.
112	VI / A	IV	07 of 76	1.01.02	Attachment-11 Declaration of Guarantee Parameter. Limestone consumption rate not exceeding 8700 kg/hr.		
113	VI / B	A-01	43 of 101	2.01.02 (v) & Note-7	Design & operational requirement including variations in rated steam temp. & pressure : Generally as per IEC 45 or otherwise specified elsewhere in the specification. Extent and duration of permissible variations in rated steam temperature shall be same as specified for rated steam temperature upto 566 deg C in IEC-45 even though rated steam temperature exceeds 566 deg C.	It is suggested to delete Note-7. Bidder is offering proven turbine modules designed with temperature / pressure variations as per OEM guidelines. Allowable Temperature Variation as per OEM guideline shall be as under : + 4 °C duration not limited (*) + 10 °C for a maximum of 400 hrs / annum (*) + 24 °C for a maximum of 80 hrs / annum, single event limited to 15 min (*) (*) subject to that average steam temperature over any 12 months of operation is not exceeded the rated temperature for Main Steam & Reheat Steam.	Bidder to ensure that steam parameters at boiler outlet are maintained. Bidder proposal is not acceptable. Bidder to comply specification requirements.

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114	VI / B	G-07	3 of 8	2.05.00	Turbine Data Sheet	Technical data of Steam Turbine required for operation, maintenance and information purpose shall only be furnished. Data / information which are proprietary in nature, shall not be furnished. Request to add a note stating the above in the specification.	The data/information sought are not proprietary in nature and these information are provided in past also. Bidder to comply specification requirements.
115	VI / A	IV	1 of 76	1.00.00 f)	The Contractor shall make the plant ready for the performance guarantee tests before start of Initial Operation. All CAT-1 Performance Guarantee tests shall be conducted along with initial operation.	All the efforts will be made to make unit ready for performance guarantee test before start of Initial Operation, however CAT-1 performance guarantee test shall be conducted after stabilization of Unit as per satisfaction of both parties. Request to incorporate correction in the Specification	Cat-1 guarantee test shall be conducted along with initial operation. Bidder to also refer clause 1.00.01 f) of Sub section-IV, Section-VI of technical specification. Bidder to comply specification requirements.
116	VI / A	IV	2 of 76	1.00.00 (j)-2	However, preliminary test reports shall be submitted to the Employer after completing each test run.	Preliminary test raw Data shall be submitted to the Employer after completing each test run. Request to incorporate correction in the Specification	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
117	VI / A	IV	11 of 76	1.01.03.01 (2) Note	In case any of the above correction curves are not submitted along with price bid , no negative corrections shall be allowed on turbine Heat rate on this account. Positive corrections if required to be applied, the amount shall be decided by Employer. Further, no positive corrections shall be allowed on turbine output on this account. Negative corrections if required to be applied, the amount shall be decided by Employer.	Correction Curves shall be generated after approval of Heat Balance Diagrams and shall be submitted to Customer for Approval and inclusion in TG-PG test procedure. Request to incorporate correction in the Specification	Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.
118	VI / A	IV	52 of 76	2.03.00	Test Reports : The Contractor shall prepare test reports in which the methods followed, instrument readings, graphs, observations, final results obtained online, etc. shall be recorded. Soft copies of each test report shall be submitted to Employer for Approval	TG-PG test report shall be generated as per standard format and will be submitted within shortest possible as per agreement during MOM of TG-PG test. Request to incorporate correction in the Specification	Bidder to refer the clause 1.00.01(i), sub-section IV, PART-A, SECTION - VI for PG Test report submission schedule. Bidder to comply specification requirements.
119	VI / B	A-07	7 of 25	1.18.00	Any additional heat balances deemed necessary by the Employer shall be furnished. All the heat balances shall show turbine output, mechanical and electrical losses in turbine and generator and input to shaft driven auxiliaries, if any.	Mechanical losses, Generation Efficiency should be given in Guaranteed HBD's as per standard practice. Request to incorporate correction in the Specification	Bidder to comply technical specification requirement.
120	VI / B	A-07	7 of 25	1.19.00	Furnish thermal kit data for plant performance by DDCMIS and true copies of Performance Guarantee test reports for sets rated for 800 MW or above.	Need correction in line with other portion of specification. TG-PG test report shall be generated as per standard format and will be submitted within shortest possible as per agreement during MOM of TG-PG test. Request to incorporate correction in the Specification	Bidder proposal is not acceptable. Bidder to comply specification requirement.
121	VI / B	G-04	9 of 227	3.3	The turbine generator performance test is carried out according to ASME PTC6-2004 or latest revision and technical specification. Uncertainty on the test results is not applicable on account of measuring instruments inaccuracy & Fluctuation of parameters during the conduction of test. Ageing correction is not applicable for TG Cycle Heat Rate & Output test. Test will be conducted during trial operations. No shutdown will be allowed on account of PG Test preparations.	Ageing is a physical phenomenon and once steam enters into the cycle the ageing of the components starts. Hence the ageing period will be considered from the date of first synchronization to the conduction of PG test. Request to incorporate correction in the Specification	PG test shall be conducted along with initial operation. Hence, ageing correction is not applicable. Bidder to comply specification requirements.
122	VI / B	G-04	14 of 227	4.7	Duration of test run shall be two hours. One hour as minimum is necessary before the test run to confirm whether the plant is at satisfactory condition for the test. If unit is operated in steady-state conditions in shorter period, data taken during this shorter period may be used for official test calculations subject to owner agreement.	Duration of test shall be two hours, out of which most stable 1 hour period shall be selected for calculation and reporting. Request to incorporate correction in the Specification	Bidder to comply specification requirement.
123	VI / B VI-E Tender drawings	A-07	1 of 25	1.03.01 a)	Adequate drainage facility and temp. sensing devices in casings, strainers housings, stop and control valves, extraction lines etc and in drain lines at upstream of the isolating valve to detect any choking and passing of high energy drains. The power operated high energy drain isolating valves seat tightness shall be conforming to MSS SP-61. Tender drawing: XXXX-999-POM-A-012 STEAM DRAIN SYSTEM P&ID Note 11: Temperature element TE to be provided at the downstream of all remote controlled ON/OFF drain valves. Temperature element to be connected to control system wherein upstream drain valve is being connected.	We don't recommend / envisage to provide Temp Elements / Temp Gauges in the downstream or upstream of all Angle Drain Valves in Turbine Drain Lines, based on following reasons. a) To know the drain valve passing, Limit switches and Torque switches provided in the drain valves to monitor the drain valves position, change in which is indicative of drain leakage as well. b) The supplied Angle Drain Valves are of high quality and leakage/passing proof provided that maintenance of these valves are done properly and in a scheduled time. These angle drain valves testing is complied as per API 598 standards and seat leakage is also as per MSS SP-61 standards. Also, there is no reporting of passing of supplied Drain valves at any site by any customer. c) As a Turbine designer, we not providing any Temp. sensing devices in the drain lines in any of the Supercritical Projects and also not recommended by collaborator. Request to incorporate correction in the Specification by deleting this requirement.	Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.
124	VI / B	A-07	1 of 25	1.04.00 (d)	Critical speed of composite rotor and blade assembly shall not be within - 10% and +15% of rated speed.	Critical speed of composite rotor and blade assembly shall not be within ± 10% of rated speed. Request to incorporate correction in the Specification	Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.
125	VI / B	A-07	21 of 25	11.02.00	Complete technical data including criteria for thermal stresses, cyclic loading, thermal fatigue, together with values of thermal stresses at critical locations shall be furnished to establish the suitability of design for cyclic and two shift operation	It is clarified that the machine shall be designed for meeting the specification requirement. However, these internal design proprietary information shall not be furnished. Request to incorporate correction in the Specification by deleting this para.	Refer Amendment TGI-16 in this regard.
126	VI / B	A-07	3 of 25	1.11.00	TG Protection: Advisory trips by Operator shall be avoided..... Apart from mandatory turbine protection, these protections shall include, but not be limited to following: a. TG Bearing temperature b. TG Shaftbearing vibration c. Differential Expansion d. Low Main steam temperature e. Any other safety requirement as required	From Turbine end only alarm on Low Main Steam Temp is envisaged. Request to incorporate correction in the Specification	Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.
127	VII B	A-01	45 of 101	2.02.01 (i)	The condenser shall be designed for heat load corresponding to Valve Wide Open (VWO) conditions, 0% make-up	Bidder understand that VWO output condition 0% make-up condition is 105% of rated output. Please confirm.	Refer Amendment TGI-03 in this regard.
128	VII B	A-07	21 of 25	11.05.00	HP barrel, casing, inner and outer casings, diaphragm glands, steam valves, journal bearings, thrust bearings, turbine rotors, generator rotor, particularly end rings, shaft seals, generator bearings, hydrogen coolers, air cooled condenser system.	Bidder understand that Water cooled condenser is provided in place of air cooled condenser system. Please confirm & Request to incorporate correction in the Specification	Refer Amendment TGI-04 in this regard.
129	VII B	B-01	7 of 25	6.00.00 (15, G)	Rotor flux monitoring system: Permanently connected independent sensing unit for each Generator shall be provided along with necessary terminal equipment to detect turn to turn shorting in field winding of Generator. It shall also be suitably connected to TG MM to facilitate alarm. Also, a stand alone system for the Rotor flux monitoring system is also acceptable.	We understand that independent flux sensor is to be provided for each generator. However, flux monitoring/unavailability unit, suitable for monitoring flux sensor signal from more than one generator, can be common for both the generators.	Bidders Proposal is not acceptable. Individual flux monitoring/Evaluation unit shall be provided for each generator.
130	VII B	II-B-02	1 of 4	5.00.00	Temperature Rise: Air Cooled motors: 70deg C by resistance method for both thermal class 130(B) & 155(F) insulation.	Air Cooled motors: 70deg C by resistance method for both thermal class 130(B) & 155(F) insulation. However it is understood that for DC motors, as the class of insulation is class H, hence the temp rise shall be limited to 95 deg C.	Bidders proposal may be considered on case to case basis during the detailed engineering only.
131	VII B	B-01	7 of 25	6.00.00 (15, E)	At least six (6) numbers of dual axis optical sensor type vibration pickups at each end of overhang portion of the winding shall be provided, symmetrically located around the periphery with connection to Turbine Supervisory system for vibration monitoring and trend recording. Suitable connection between the pickups and Turbine Supervisory system for vibration monitoring shall be provided. Also a standalone system for the vibration monitoring system is also acceptable.	As Generator winding bars are tightly fitted/ bounded with each other and further suitable support has been provided to each bars. Hence, very less vibration seen in tangent direction and vibration always seen in radial direction only. Hence, as per OEM standard practice and to meet tender specification requirements, Bidder propose to provide 12 No. single axis (instead of dual axis) optical sensors each side (TE, EE side) for measuring radial vibration only.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
132	Section VI / Part-A	Sub-Section VII Ch - 2	18 of 31	19 (f)	Stator winding bars and connectors (complete set of winding bars and connectors)	NTPC to accept.	Bidders proposal is not acceptable. Complete set of winding bars and connectors for complete replacement shall be provided by the bidder.
133	Section VI / Part-A	Sub-Section VII Ch - 2	30 of 31	General Note	Unless stated otherwise a 'set', it will include the total requirement of the item for a unit module or the station as specified. Also, set for the particular equipment e.g. 'set' of bearings for a pump would include the total number of bearings in a pump. Also the 'set' would include all components required to replace the item; for example, a set of bearing shall include all hardware normally required while replacing the bearings. It is further, intended that the assembly/sub-assembly which have different orientation (like left hand or right hand, top or bottom), different direction of rotation or mirror image positioning or any other reasons which result in maintaining two different sets of the spares to be used for the subject assembly/sub-assembly, these shall be considered as different types of assembly/sub-assembly.	Bidder understand that - unless stated otherwise a "set" means items or sub-items re-quired for each type / size/ range of the assembly / sub assembly required for complete replacement in one equipment / system as the case may be. NTPC to accept.	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
134	Section VI Part-A	VII Mandatory Spares		General Query	(i) The Clauses which are not applicable as per bidder design shall not be offered, if same will found applicable during detailed engineering than bidder will supply the same. (ii) In case of repetitive requirement, bidder will supply the spares in the clause where maximum quantity is called for. NTPC to accept.	(i) Bidder to refer general note no. 3 of page 30 of 31 of Sub section VII Chapter-2 /Part-A. (ii) Bidder's understanding is not correct. All specified spares shall be supplied by the contractor.	
135	SECTION - VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard i) The Line for interconnection between 400 kV Switchyard of stage-II to stage-I Switchyard.	The transmission line is routed from outside the plant boundary as per the specification. Owing to small size of the line it will be difficult to find a suitable associate for carrying out the job during project execution. M/s NTPC is requested to exclude the same from bidder's scope.	The transmission line has to be routed within the Land boundary of LARA STPP. Bidders understanding is not correct and proposal is not acceptable. Bidder must adhere to the technical specifications.
136	SECTION - VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard ii) Interconnection of outgoing line bays of LARA-Stage-II AIS switchyard with the existing Tower of LARA-I Raigarh-Kotra line.	The above is a job of re-routing an existing line, which shall involve the work of stringing of conductors over a water reservoir and crossing a 400KV EHV D/C Line. M/s NTPC is requested to exclude the same from bidder's scope.	Bidders understanding is not correct. Bidder to comply the specifications.
137	General Layout Plan	9587-999-POC-F-001	Dwg. No. 9587-999-POC-F-001		General Layout Plan	We request M/s NTPC to please share with us the AutoCAD copy of the Layout. The Space provided for the Switchyard appears to be small with respect to the number of bays. However exact estimate can be worked out with the AutoCAD of the overall plot plan.	During Tender stage providing Auto cad drawing is not envisaged Auto Cad drawing shall be shared with successful bidder

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138	SECTION – VI, PART-A	INTENT OF SPECIFICATION	7 of 9	4.08.00	All the plant layouts shall be made in computerized 3D modelling system as detailed in Part C of the Technical Specification. ...	We understand that the approval on the drawings shall be made on the drawings sub-mitted in hard copies. The computerized 3D Model shall not be binding/prerequisite on the approvals of the submitted hardcopies of drawings. Please confirm.	Bidder understanding is not correct. Interface check in 3D is pre-requisite to approval of drawings as per specifications .
139	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	30 of 36	5.12.1 AUXILIARY OIL FILLED TRANSFORMERS AND HT TRANSFORMERS	.....have manufactured & supplied at least one number (one installation) of 16 MVA, 11kV or higher rating oil filled transformers which should have been in successful operation for a period....	We request to please consider reducing the MVA rating in the Provenness clause to enable increased participation of the vendors of the equipment	As per data available with NTPC, we understand that sufficient vendors are available as per previous NTPC Projects Experience. Proposed Provenness is inline with Previous NTPC Tenders. Hence bidder has to follow the provenness as specified in bid documents.
140	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	27 of 36	5.4.0 BATTERY CHARGER	Battery Charger ...regulator type Battery Chargers of highest offered rating or above, in at least	We request that the minimum rating may please be specified. Please clarify	Specifying Minimum rating is not feasible. Proposed Provenness is inline with Previous NTPC Tenders. Hence bidder has to follow the provenness as specified in bid documents.
141	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	29 of 36	5. 9.0 DC BATTERIES	should have manufactured and supplied at least one (1) number of highest offered rating	We request that the minimum rating may please be specified. Please clarify	Specifying Minimum rating is not feasible. Proposed Provenness is inline with Previous NTPC Tenders. Hence bidder must follow the provenness as specified in bid documents.
142	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	30 of 36	5.14 400 KV EQUIPMENTS (AIS): VI/400KV TRANSMISSION LINE.	The Bidder/Sub-vendor should have erected and commissioned at least 30KM of Transmission line of 400KV or above voltage class on Towers.	We request that owing to the small quantum of work the PQR may be revisited and the length may be kept to 1 KM and the voltage level to 220 kV.	Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
143	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	33 of 36	7.0 PROVENNESS CRITERIA FOR CIVIL & STRUCTURAL WORKS	PROVENNESS CRITERIA FOR CIVIL & STRUCTURAL WORKS: Bidder or its agency should have executed civil and steel structural works of 500 MW or higher capacity coal based/Lignite based power plant,	We understand that there is no specific Provenness requirement for the civil works of the Switchyard Scope of work. Kindly confirm.	Bidder to refer Clause no 5.14(v) subsection I-A Part A
144	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	8 of 36	4.4 Fire Detection and Protection System:	4.4 Fire Detection and Protection System: The Bidder's sub-vendor should have designed, supplied, erected and com-missioned at least one (1) fire protection system of contract value not less than INR 35.0 Million or equivalent in foreign currency (exchange rate applicable as on date of Techno-Commercial bid open-ing), in industrial installation. The fire protection system should have com-prise of:	We request you to reconsider the provenness criterion w.r.t. "contract value not less than INR 35.0 Million" for the supply of the FFS of Switchyard scope. The same may be kept as INR 4 Million. Please confirm.	Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
145	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	9 of 36	4.5 Air Conditioning System	The Bidder/ its sub-vendor should have designed, supplied, erected and com-missioned at least one (1) number of Air conditioning system having a total installed capacity of 300TR or more including stand-by chiller unit (if any), which should have included at least one chilling unit with a minimum capacity of 60TR. The system should have been in successful operation for at least one (1) year.	We request you to reconsider the provenness criterion for the Switchyard Scope of supply w.r.t "a total installed capacity of 300TR or more including stand-by chiller unit (if any), which should have included at least one chilling unit with a minimum capacity of 60TR." Following QR may be considered for Switchyard - "a total installed capacity of 30TR or more". Please confirm.	Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
146	SECTION – VI, PART-A	SUB-SECTION-I-A PROVENNESS	10 of 36	4.6 Ventilation System	Ventilation System designed, supplied, erected, and com-missioned at least one (1) number ventilation system including similar air washer unit having individual fan capacity of 80,000 Cum./Hr. or more.	We request you to reconsider the provenness criterion for the Switchyard Scope of supply w.r.t "ventilation system including similar air washer unit having individual fan capacity of 80,000 Cum./Hr. or more." Following QR may be considered for Switchyard - "ventilation system including similar air washer unit having individual fan capacity of 30,000 Cum./Hr. or more.". Please confirm	Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
147	SECTION – VI, PART-A	SUB-SECTION-IA-24 WORKSHOP, LAB, MKG EQUIPMENTS	2 of 2	Annexure-II	H ELECTRICAL TESTING EQUIPMENT Fully automatic three phase dynamic relay test kit with	Please Specify the make and model of the relay test kit.	Shall be decided during the detailed engineering only.
148	SECTION – VI, PART-A	SUB-SECTION-IBB ELECTRICAL SYSTEM / EQUIPMENTS	1 of 4	INPUT REQUIRED FOR SSO STUDIES	E. TCSC Data F. TCSC Controller Data J. Transmission Line Data K. Transmission Line Tower Details	We understand that the SSO Studies are in Scope of the Customer. The data as desired in the Input Sheet is not in the scope of Bidder. It is requested to the Customer to please arrange data from the respective utilities. Kindly confirm.	Data of equipments/systems which are not in the scope of bidder under this package may not be furnished.
149	SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	35 of 97	08.08.00	CABLE RACKS INCLUDING SUPPORTS, TRAYS AND ACCESSORIES The Contractor shall fabricate and install mounting arrangements for the support and installation of all the cables on GI angles / Cable tray supports in the trenches/ above ground. Un galvanized M.S. Cable supports shall be painted after installation. The painting shall be in conformity with stipulated in Chapter-C0.	We understand that the cable tray support system made out of Angles GIMS shall be acceptable. Kindly confirm.	Bidder shall refer to amendment Elec1-13
150	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	1 of 46		SUB-SECTION-B – 13 SUBSTATION AUTOMATION SYSTEM	The Bus Sectionalizer Bay in scope of extension of the Lara Stage-1 Switchyard shall be integrated with the Existing Bus Bar System. The Extension Switchyard in LARA-1 shall be provided with a Bus Bar Protection System separate from the System in existing LARA Stage 1 Switchyard. The new Substation at the LARA Stage -2 Station shall be provided with a new dedicated Bus Bar Protection System for Switchyard of Stage 2 only. Please confirm.	1. Bidders understanding is correct. However, Bus sectional bay shall be integrated with existing as well as new bus bar scheme of stage-II. 2. Bidders understanding is correct. 3. Bidders understanding is correct. Separate set of CUs for new dedicated bus bar protection for Stage-II extension switchyard in stage-I area and new Switchyard at Lara Stage-II area shall be considered.
151	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	12 of 15	3.08.00 D.C. Systems	With DC Health Monitoring System, it shall be possible to measure & analyze the individual cell and battery parameters so that any damage to battery shall be prevented by proactive maintenance.	We understand that the individual cell parameters shall be limited current and voltage. Please clarify	Bidders understanding is not correct. In addition to individual parameters like current and voltage, BHMS shall also be able to monitor other parameters such as Cell Temperature, load current etc. required to prevent battery damage.
152	SECTION VI, PART-C	GENERAL TECHNICAL REQUIREMENTS	16 of 119	8.03.04	Further, two Licenses of the used 3D Modelling Software (One for Engineering View and One for Site View) shall be provided along with compatible Hardware for possible review and study of the Model Files being submitted by the Bidder. Time to time.	3D model will be utilized to develop plant layouts and for interference checking internally, however, finalized drawings will be completed using AutoCad. The AutoCAD versions of the 3D models shall be provided. We request to remove any requirement of the license or the hardware as mentioned in the specification. Hardware / 3rd party software licenses will have to be arranged by customer. Please confirm.	Bidder to follow specification requirement .
153	SECTION – VI, PART-B	SUB-SECTION B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	3.4 of 6	1.02.00, 1.03.00	Neutral grounding reactor and Surge Arrester.	We understand that the 125 MVA/ is a bus reactor hence neutral grounding reactor and surge arrester will not be applicable. Accordingly, we will not be considering NGR and surge arrester in offer. Kindly confirm	NGR is not applicable for bus reactor. 400KV Surge arrester is required and is in bidders scope. Pl. refer tender SLD.
154	SECTION – VI, PART-B	SUB-SECTION B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	13 of 36	1.06.08	All CTs (except WTI) shall be mounted in the turret of bushings, mounting inside the tank is not permitted.	In case of shunt reactor, all the CTs (except the neutral CTs), are frame mounted inside the tank. Kindly accept and confirm.	In case of shunt reactor, line side CTs shall be mounted in turret of bushings. Remaining other CTs shall be as per OEM design.
155	SECTION – VI, PART-B	SUB-SECTION B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	17 of 36	1.09.00	NGR (Neutral Grounding Resistor) (As per system requirement)	Bidder understand that the specification indicated in this clause is applicable to the NGR to be supplied along with the ST- Kindly confirm.	Bidders understanding is not correct. For scope clarity, System requirement and SLD shall be followed.
156	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	1 of 46	1.00.00	Substation Automation system	New SAS system shall be supplied for LARA Stage-II GIS bays. Any integration of new bays at LARA-II AIS at LARA-II end and LARA Stage-I end with any existing SAS or integration of existing SAS with New SAS is excluded from the scope. Please confirm.	1. AIS bays have been proposed for Lara Stage-II. 2. New SAS system shall be provided for stage-II. 3. New SAS network shall be extended to existing switchyard control room as per SAS architecture. However integration of stage-I in Stage-I SAS is not required except for bus sectionaliser bay if required.
157	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	1 of 46	1.00.12	Adequate number of BCU shall also be provided for control and monitoring of all auxiliary buses of ICT/ITT and associated isolators, as applicable.	Refer SLD of 400KV Swayd 9587-999-POE-J-001, Rev-I, No ICT bay is envisaged, hence additional BCU will not be required. Please confirm.	Bidders understanding is correct. As ICT is not envisaged so additional BCU for ICT is not required.

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158	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	1 of 46	1.00.13	The interface between BCU and Control Switching Devices shall be in Bidder's Scope	CSD is non 61850 compliant and is also not shown in SAS communication architecture. Hence CSD interface with BCU shall be hardwired as required. Please confirm.	Bidders proposal is acceptable.
159	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	29 of 46	11.03.00	Islanding Scheme	Kindly note that islanding scheme shall be provided for new scope bays i.e. LARA ST-II AIS bays only. Islanding scheme for LARA ST-I bays is excluded from the scheme/scope. Please confirm.	Islanding scheme shall be provided for new scope bays i.e. LARA ST-II AIS Bays (Stage-II area+Stage-I Extension)
160	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	24 of 46	11.02.12	Bus bar Protection	The scope of Bus bar protection for LARA ST-II at Lara SH-I area shall be limited to the scope of present bays including Bus section. Any augmentation of existing bays with the new busbar protection system or vice versa is excluded from the scope. Please confirm.	Bidders understanding is correct.
161	SECTION – VI, PART-B	SUB-SECTION-B-13 SUBSTATION AUTOMATION SYSTEM	32 of 46	12.02.00 (xx)	Energy Meters	We understand that separate Metering LAN is envisaged. Kindly provide Metering Architecture as mentioned in the specification.	Pl. refer to SAS Architecture in tender drawings.
162	General				SUBSTATION AUTOMATION SYSTEM AR-CHITECHTURE - 9587-999-POE-J-003	No Large Video Screen for SAS is envisaged in the contract. Kindly confirm.	Bidders understanding is not correct. LV/SLCD of min size 65" to be provided. Bidder May refer to SAS Architecture in Tender drawings.
163	General				SUBSTATION AUTOMATION SYSTEM AR-CHITECHTURE - 9587-999-POE-J-003	Kindly provide communication architecture of Lara Stage-1 Existing SAS.	Will be provided during the detailed Engineering
164	General				SUBSTATION AUTOMATION SYSTEM AR-CHITECHTURE - 9587-999-POE-J-003	Kindly provide Existing EMS details along with Energy Metering Panel drawings and EMS architecture. Standalone Energy Metering system shall be provided for LARA ST-II. Any interfacing with existing Energy metering system is excluded from the scope. Please confirm.	1. Existing EMS details will be provided during detailed engineering if required. 2. Bidders understanding is correct.
165	General					Please clarify if the existing LT AC and DC System is sufficient to cater to the re-requirement of Lara Stage 1 Extension Bays.	Existing LT AC and DC System is sufficient to cater the load requirement of Lara Stage-1 Extension bays. Bidder shall also refer Amendment No. Elec1-08.
166	TS /SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 5 of 6.	Cl.No.-1.01.00 D.	All the data regarding material movement shall be updated in the Project Management Tool and data updation is to be automated.	We are considering a web portal for Smart Material and Manpower Management. The access link for the same may be provided in Project management tool. Please confirm.	Bid provisions shall prevail.
167	TS /SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 5 of 6.	Cl.No.-1.01.00 E.	Data regarding mobilization of manpower (agency wise, skill wise and area wise) is to be acquired using appropriate tool and is to be updated in Project Management Tool on daily basis	We are considering a web portal for capturing the data and its updation. The access link for the same may be provided in Project management tool. Please confirm.	Bid provisions shall prevail.
168	TS /SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 6 of 6.	Cl.No.-1.01.00 E.	Vendor shall provide the price for deployment of a single tracking device along with the bid, in case SCCL decides to implement additional tracking devices as per requirements of the project.	What is meaning of Single Tracking device. Does it mean one tracking device or tracking inside one zone, as one zone may have multiple tracking devices.	Single tracking device means one tracking device implemented in single zone.
169					Not found in the specifications	"Chemical Laboratory equipment", which is used for offline measurement of Air/Water samples in the plant, is not appearing in tender specification. Kindly confirm that the Chemical Laboratory Equipment is in scope of EPC contract. Also provide the list of items and their quantity so that offer could be submitted.	Chemical Laboratory Equipments for offline measurement are not in bidder's scope.
170	SECTION – VI, PART-B	SUB-SECTION-III-C-04 MEASURING INSTRUMENTS (PRIMARY & SECONDARY)	PAGE 20 OF 36	10.01.07	Carbon Monoxide (CO) Analyser Range: 0-1 PPM to 0-1,000 PPM selectable	Revision in CO analyser ranges is proposed as below Range 0-1 PPM to 0-100 PPM selectable Above proposed range is adequate for ambient air measurement. CPCB specify above ranges for CO analyzer.	Bidder to comply technical specification
171	SECTION – VI, PART-B	SUB-SECTION-III-C-04 MEASURING INSTRUMENTS (PRIMARY & SECONDARY)	PAGE 17 OF 36	10.00.00	CONTINUOUS MONITORING AMBIENT AIR SYSTEM (CAAQMS)	Kindly clarify the quantities of CAAQMS along with number of analysers in each station. We understand that 04 number AAQMS stations shall be required along with one number weather monitoring station.	AAQMS system is not envisaged in the package
172	SECTION-VI, PART-A	SUB SECTION-A	8 of 36	4.3	4.3 Induced Draft Cooling Towers 4.3.1 The bidder should have designed by itself, constructed and commissioned at least one (01) number Induced Draught Cooling Tower in RCC or Pultruded Fiberglass Reinforced Plastic(FRP) Construction of capacity not less than 13000m3/hr which should have been in successful operation for atleast one year(1) prior to the date of Techno-commercial bid opening...	We propose to revise the PQR for IDCT package as below in line with Cooling Tower PQR for Talcher project: 4.3 Induced Draft Cooling Towers 4.3.1 The bidder/ its sub vendor should have designed / got designed, constructed and commissioned at least one (01) number Induced Draught Cooling Tower in RCC or Pultruded Fiberglass Reinforced Plastic (FRP) Construction of capacity not less than 13000m3/hr which should have been in successful operation for at least one year (1). OR 4.3.2 The Bidder/ its sub -vendor should be a wholly or partially (with minimum 51% holding) held Indian subsidiary of a firm who in turn meets the requirements of clause 4.3.1 above. Further, the Bidder/ its sub -vendor on its own or along with its holding company should have executed/ be executing at least one contract involving design, construction and commissioning of at least one(1) number Induced Draft Cooling Tower in RCC/ Pultruded Fiberglass Reinforced Plastic (FRP) Construction of capacity not less than 6500m3/hr. In such a case, the Bidder/its sub-vendor shall be required to furnish a letter of technical support from Holding company for successful performance of Cooling Towers, as per the format enclosed in the bidding document. This letter of technical support should be submitted to Employer prior to the placement of order on approved sub-vendor. Notes: 1. "designed" means that tower(s) of reference plant must have been designed by the bidder's / its sub -vendor's own engineers. 2. Civil construction of IDCT by Main Plant bidder's Civil contractor under supervision of IDCT vendor, based on design & Civil drawings by IDCT vendor, who is meeting the PQR as per cl. no. 4.3.1 is also allowed. Further in this mode responsibility of complete design of cooling tower (CT), its supplies, EAC and PQC testing of Cooling Tower shall be with Cooling tower vendor only. 3. In case the reference cooling tower was designed by a party other than the Bidder himself/ its sub vendor, the Bidder/ its sub vendor shall employ a cooling tower designer who has independently designed a Induced Draught Cooling Tower, of capacity not less than 13000 Cu.M/ Hr and which should have been in successful operation for at least one (1) year. In such a case, the Bidder/its Sub vendor should furnish a letter of technical support jointly executed by it and its Cooling Tower Designer for the satisfactory performance of Cooling Towers as per the format enclosed in the bidding document. This letter of technical support should be submitted to Employer prior to the placement of order on approved sub-vendor. 4. In case the reference cooling tower was constructed by a party other than the Bidder himself/ its sub vendor, the Bidder/ its sub vendor shall employ a construction agency who has independently executed the construction works of RCC Induced Draught Cooling Tower of capacity not less than 13000 Cu.M/ Hr and which should have been in successful operation for at least one(1) year, or has constructed minimum 100m long RCC building. In such a case, the Bidder/its Sub vendor should furnish a letter of technical support jointly executed by it and the agency which is qualified for construction of Cooling Tower for the satisfactory execution of Cooling Towers construction work as per the format enclosed in the bidding document.	Bidder's proposal reviewed but not accepted. Bidder to comply with technical specification requirements.
173	SECTION-VI, PART-A	SUB SECTION-IV	6 of 80	1.01.02 (iv)	For deficiency in Average Condenser Pressure in mm Hg(abs) measured at 300mm above top row of condenser tube at 840 MW, 0% makeup; design CW temperature and design CW flow - Not more than 65 mmHg (abs)	NTPC has envisaged excessive margins for the design of condenser cooling water system. TG cycle is guaranteed for condenser back pressure of 77 mmHg (abs). However, the condenser cooling water system is specified to be designed with design back pressure for condenser is 65 mmHg, approx. 18% margin over the TG cycle guarantee back pressure of 77 mmHg. In other terms, power plant is designed for back pressure of 77 mmHg, which is equivalent to 36 deg C cooling water inlet temperature to condenser. However, the condenser is designed for 33 deg C cooling water inlet temperature i.e. there is margin of 3 deg C which is excessive. It leads to increase in sizes of all components of CW system such as condenser, CW Pumps and especially IDCT and also increase in Aux power consumption of CW pumps and IDCT by approx. 30%. Alternatively, Please note the if three (3) CW pumps are required to meet the flow required at 65 mmHg, then to meet the CW flow requirement at 77 mmHg, only two CW pumps are required to operate i.e. the auxiliary power consumption of one CW pump shall be additional, if condenser is designed at 65 mmHg and operated at 77 mmHg. It is suggested to limit the margin to a nominal value of approx. 10% i.e. the condenser design back pressure may be selected as 70 mmHg instead of 65 mmHg.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
174	SECTION-VI, PART-B	SUB SECTION-A-01	56 of 101	3.01.00 (e)	Total Head of the CW pump at rated flow: Sum of static lift from minimum water level in CW pump house sump up to the centerline elevation of hot water distribution header at Cooling Tower + 110% of friction drop in the entire CW system + pressure drop across Condenser with 2 mWC margin (minimum).	The additional 2 MWC margin in addition to 10% margin on friction drop for CW pumps head selection leads to excessive increase in Auxiliary power consumption (approx. 5%). Hence same may be removed.	Bidder's proposal reviewed but not accepted. Bidder to comply with technical specification requirements.

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SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (g)	Design Cold water temperature at cooling tower outlet - 32 deg C	NTPC has envisaged excessive margins for the design of cooling tower as below 1. Please note that condenser is designed for 33 deg C. However the cooling tower designed for cold water temperature of 32 deg C, which is approx. 24% margin in cooling tower approach i.e. 4.2 deg instead of 5.2 deg. 2. Please note that Cooling tower is designed for 10% higher flow than CW pump. 3. Please note that Cooling tower is designed with 04 nos. spare cells, which amounts to approx. 10% margin. 4. NTPC has envisaged 1 degree margin in range of cooling tower, which amount to 10% margin on heat load. This leads to excessive increase in cooling tower size, auxiliary power consumption and cost. The combined margins envisaged by NTPC are exceeding 50%, which is not a good practice.	
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (E)	Design Range - Temp. rise across condenser + 1 deg C		
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	SN, g, i, j	Design Cold water temperature at cooling tower outlet = 32 degC Design ambient wet bulb temperature (WBT) = 27 degree C Design inlet wet bulb temperature = 27.5 degreeC	Further the approach for cooling tower is 32-27.8 = 4.2 degreeC, which is a difficult approach for such a large flow cooling tower and will be prone to frequent underperformance. The specification requirement of designing the Condenser for 65 mmHg back pressure at 10% margin on CW flow for arriving at cooling tower design flow has resulted in increase of Cooling tower flow by atleast 30% over the functional requirement. These conditions have resulted in requirement of large area for cooling towers (the length required to accommodate IDCT shall be around 375 metre) and atleast 30% higher auxiliary power consumption over the functional requirement (i.e. higher by 2000 KW).	
SECTION-VI, PART-A	SUB SECTION-IV	6 of 76	1.01.02 (iv)	For deficiency in Average Condenser Pressure in mm Hg(absolute) measured at 300mm above top row of condenser tube at 840 MW, 0% makeup, design CW temperature and design CW flow - Not more than 65 mmHg (abs)		
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (c)	Quantity of water to be cooled by Cooling Towers of One Unit - CW pumps flow per unit + 10% margin	Hence it is requested to please revise the design cold water temperature at cooling tower outlet with design condenser cold water temperature i.e 33 degC.	Bidder's proposal reviewed but not accepted. Bidder to comply with technical specification requirements.
SECTION-VI, PART-B	SUB SECTION-A-15	11 of 43	3.3	Number of operating cells in the cooling tower shall not be less than eight (8). Bidder shall provide spare cells (Minimum four (4) per tower) in the cooling tower to facilitate maintenance without affecting the tower performance.		
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (c)	Heat Load (Excluding Heat of Evaporation) - As per system requirement (10% margin to be taken for CW pump flow only, however heat load to be taken as actual)	Please note that heat load is multiplication of flow and temperature rise. Hence it is not understood how the cooling tower will be designed for actual heat load as 10 % margin is envisaged on CW flow and 1 deg margin is envisaged on temperature rise. There will be combined margin of approx. 20% in heat load due to these clauses.	
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (E)	Design Range - Temp. rise across condenser + 1 deg C	NTPC may clarify.	
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 101	3.02.00 (c)	Quantity of water to be cooled by Cooling Towers of One Unit - CW pumps flow per unit + 10% margin	NTPC has envisaged excessive margins for the design of cooling tower. Please note that Cooling tower is designed for 10% higher than CW pump, which leads to excessive increase in cooling tower size, auxiliary power consumption and cost. NTPC may select Cooling tower flow same as CW pump flow.	Bidder's suggestion reviewed and it is clarified that the margin on cooling tower flow is not for CW pumps or CT thermal load, however margin on CT range is in order. Bidder to refer amendment WS1-13 in this regard.
SECTION-VI, PART-A	SUB SECTION-III	1 of 3		Terminal point for make up water system	Please note that terminal point for make up water is not defined in Terminal point in specification, however, terminal point is indicated as 10 M from raw water reservoir in Raw water reservoir layout drawing.	
SECTION-VI, PART-E	-	16	-	LAYOUT AND DETAILS OF RAW WATER RESERVOIR - 9587-001-POC-A-007 SPECIAL NOTES - THE LAYING OF INLET MAKE UP WATER PIPE LINE FROM THE TERMINAL POINT AT 10M FROM THE RESERVOIR EMBANKMENT TO RAW WATER RESERVOIR INLET STRUCTURE IS UNDER BIDDERS SCOPE	We understand that Raw water make up piping upto 10 M from Raw water reservoir embankment as shown in raw water reservoir drawing is only in bidder's scope, Beyond 10 Metre the make up pipe along with fittings shall be in scope of customer. Please confirm.	Raw water make up piping indicated in Tender drawing to both the reservoir inlets is in Bidder Scope. Bidder to refer revised Tender drawing in Amendment no D2-16
SECTION-VI, PART-E	-	61	-	Plant Water Scheme - 9587-999-POM-A-037		
SECTION-VI, PART-B	SUB SECTION-A-07	23 of 25	Annexure-I, Sl. No. 4	4. Worst condenser pressure mmHg(abs) 89	NTPC has envisaged excessive margins for the design of condenser cooling water system. Condenser is designed for back pressure of 65 mmHg. Accordingly the worst back pressure corresponding to worst cooling water inlet temperature i.e. 35 deg C shall be 77 mmHg. Hence the worst condenser pressure may be corrected to 77 mmHg.	Bidder to note that 77 mmHg Condenser Pressure is for Heat Rate, Output and other Guarantee conditions. However, 65 mmHg is limiting value for condenser pressure guarantee. Bidder to further note that worst condenser pressure is derived from condenser pressure of 77mmHg (Specified for Heat Rate, Output and other Guarantee conditions). Bidder to comply with the specification requirements.
SECTION-VI, PART-A	SUB SECTION-VI, Chapter-1	29 of 38	4.00.00 B	B Plate Type Heat Exchangers i) Gaskets = 1 Lot comprising 30% of total requirement of each type & size ii) Fasteners = 1 Lot comprising 10% each type iii) Plates = 1 Lot comprising 20% of each type	The mandatory spares for SG PHE is already covered at Specification Section-VI/SS-VII/Chapter-8/CI No. 1.00.00/sl.no. 14 b). Therefore, we understand that these spares are not applicable for SG-PHE. Please confirm. In case these are to be considered for SG-PHE then Bidder understand that the said spares are required w.r.t 1 no. PHE only.	Bidder to refer amendment no. WS1-05 in this regard.
SECTION-VI, PART-A	SUB SECTION-VI, Chapter-8	7 of 28	1.00.00 14b	b) Plate Type Heat Exchangers Quantity (i) Plate Gaskets = 150 nos each for TG ECW & SG ECW (ii) Fasteners = 01 Set for each TG ECW & SG ECW (iii) Plates = [150 nos (main plates) + 2 nos of end plates for each TG ECW & SG ECW	As these mandatory spares are part of TG Mandatory spares list and Mandatory spares for SG-ECW PHE are already given at VI/SS-VII/Chapter-1/CI. No. 4.00.00 B, therefore these spares are not applicable for SG-ECW PHE.	Bidder to refer amendment no. WS1-05 in this regard.
SECTION-VI, PART-B	SUB SECTION-G-04	98 of 227	PG Test Procedure for TG & SG Plate Heat Exchanger (PHE)	PG Test Procedure for TG & SG Plate Heat Exchanger (PHE)		
SECTION-VI, PART-B	SUB SECTION-G-04	160 of 227	PG TEST PROCEDURE FOR TG & SG PLATE HEAT EXCHANGER (PHE)	PG TEST PROCEDURE FOR TG & SG PLATE HEAT EXCHANGER (PHE)	Please clarify which procedure to be followed	PG test Procedure on Page 160 of 227 to be followed. Bidder to refer amendment no. WS1-18 in this regard.
SECTION-VI, PART-B	SUB SECTION-A-01	59 of 101	3.03.00 SN, 3c	Plate Heat Exchangers (TG and SG separate) Secondary water outlet temperature = Not more than the design hot water temperature at condenser outlet	There is neither technical reason/justification nor any technical benefit for this condition. Please note there is a difference of 3 degC in design of CW & ACW systems for design purpose only (CW design inlet temp. 33degC & ACW design inlet temp. 38 degC). In all practical / operating conditions the inlet ACW temp. and CW temp. will be same. This condition unnecessary increase the ACW flow rate (approx. 50% increase) leading to increased Aux. Power of ACW Pumps (approx. 50%).	Bidder's proposal reviewed but not accepted, bidder to comply with technical specification requirements.
SECTION-VI, PART-B	SUB SECTION-A-01	57 of 91	3.05.00 k	k) Air pre-heater wash water pumps Air pre-heater wash water pumps shall draw water from service water tank.	As per referred clause of specification APH Wash Water Pumps shall draw water from Service water tank, however as per Plant water scheme, service water pumps are taking suction from Clarified water tank.	Bidder's understanding is correct. APH Wash water pumps shall take suction from Clarified water Tank. Bidder to refer amendment no. WS1-12 in this regard.
SECTION-VI, PART-E	PLANT WATER SCHEME			PLANT WATER SCHEME 9587-999-POM-A-037, REV-A	We understand that APH wash pumps are taking suction from Clarified water tank. Please confirm.	
SECTION-VI, PART-B	SUB SECTION-A-15	32 of 43	2.05.00	Service Water System Clarified water from the clarified water tank shall be used as service water. Service water pumps shall take suction from this tank and supply water to the service water pipe network. Service water distribution shall be used for effective cleaning/washing of each area and shall also fill the service water (PVC tank of 100 liter capacity) tank provided on roof top of each building to supply water to toilets.	As per the referred clause of specification service water pumps are taking suction from Clarified water tank, however as per Plant water scheme service water pumps are taking suction from service water tank. Please clarify. In case service water tank is applicable, please provide the details like capacity, location, type etc.	Service water tank to be provided, refer sub-sec A-14, Part-B, clause XIV, datasheet page 26 of 35. Bidder to refer amendment no. WS1-19 Plant water scheme.
SECTION-VI, PART-B	SUB SECTION-A-01	60 of 101	3.05.00 h	h) Service Water System Clarified water from the clarified water tank shall be used as service water. Service water pumps shall take suction from this tank and supply water to the service water pipe network.		
SECTION-VI, PART-E	PLANT WATER SCHEME			PLANT WATER SCHEME 9587-999-POM-A-037, REV-A		
SECTION-VI, PART-B	SUB SECTION-A-15	27 of 43	1.01.00	Equipment Cooling Water system and Auxiliary cooling system shall be installed on a unit basis. The system shall also have the provision to operate common station auxiliaries such as compressor plant, compressor of mill reject system and ash handling compressors and FGD auxiliaries even with one unit all units are out of operation for which suitable arrangement shall be incorporated in the design and layout of piping system. Two independent primary cooling circuits- one for TG Auxiliaries and another for cooling of SG Auxiliaries shall be provided. However, the Secondary circuit pumps shall be common for both these systems. Station auxiliaries may be clubbed with either SG or TG ECW system. The scheme shall be as per relevant tender drawing listed in Part E of the technical specification.	Please note that DMCW system can be operated even when unit is not operating, hence only 50% flow of common station auxiliaries shall be considered in DMCW system of each unit. NTPC may confirm bidder understanding. Alternatively it is proposed to provide separate DMCW circuit for cooling of common station auxiliaries with 3x50% DMCW pumps and 3x50% PHEs. Please confirm.	Bidder's proposal reviewed but not accepted, bidder to comply with technical specification requirements.
SECTION-VI, PART-B	SUB SECTION-A-01	59 of 101	3.03.00 SN, 3c	Plate Heat Exchangers (TG and SG separate) Secondary water outlet temperature = Not more than the design hot water temperature at condenser outlet	We propose to provide separate IDCT for cooling of ACW. This will provide following advantages. 1. For operation of ACW system, CW pumps will not be required to be operated hence saving substantial aux power consumption. 2. During boiler light-up and steam-blowing milestones, only ACW is required and with this arrangement ACW will be available to complete the project milestones. Further, CW Pump house and main cooling tower are long lead packages and generally not ready for these milestones. 3. With this option, there is substantial saving in plant aux power consumption. Please confirm.	Bidder's proposal reviewed but not accepted, bidder to comply with technical specification requirements.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

187	SECTION-VI, PART-E1	-	16	-	LAYOUT AND DETAILS OF RAW WATER RESERVOIR - 9587-001-POC-A-007 SECTION C-C	Please note that there is contradiction between two clauses regarding inlet pipe to Raw water reservoir. In typical cross section, "2 NOS. 900 NB OUTER DIMETER MUW PIPE FOR STAGE-III" & "1 NOS. 700 NB OUTER DIMETER MUW PIPE FROM STAGE-II" is indicated.	Bidder to refer amendment in tender drawing D2-16
188	SECTION-VI, PART-E1	-	16	-	LAYOUT AND DETAILS OF RAW WATER RESERVOIR - 9587-001-POC-A-007 TYPICAL CROSS SECTION OF RESERVOIR EMBANKMENT AT INLET PIPE LOCATION	However in section C-C, 02 nos. 813 OD INLET PIPES are indicated. Please note that in typical cross section, Furnished Ground Level (FGL) at Terminal point is marked as RL (+) 71.00 M. However other levels marked in the drawing are much higher viz Top of embankment (Maximum RL (+) 208.00 M), Maximum water Level (+) 205.0 M), Bed Level of Reservoir (+) 195.5 M etc.	Bidder to refer amendment D2-16
189	SECTION-VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	1 OF 11	1,00.00 b)	Centralized air-conditioning system for main plant TG building These shall be one (1) central chilled water type air-conditioning plant comprising of screw chilling units, chilled water pumps, condenser water pumps, AHUs, cooling towers, etc. to cater to the A/C requirement of the areas identified for main plant areas like common control rooms, control equipment rooms, UPS/Battery charger rooms, static excitation control rooms (if applicable), SWAS room, water analysis lab, etc. of Unit # 3 and Unit # 4.	NTPC is requested to check and inform the correct FGL near TP. Following type of AC is being proposed for static excitation control rooms (if applicable), SWAS room, water analysis lab, etc. of Unit # 3 and Unit # 4 : 1) static excitation control rooms (if applicable) – Since static excitation panel room is located towards A row side of power house, customer is requested to accept dedicated Split AC/Ductable split AC/ Package AC based on actual cooling requirement for static excitation control rooms (if applicable) as routing chilled water pipe towards A row of power house from Control tower (Location of AC plant) crossing the C-D-E-F bay is not feasible. 2) SWAS room, water analysis lab, etc. – if area like SWAS room, water analysis lab, etc. located such that it may not be feasible to route AC ducts, Air conditioning of such area-as may please accepted with dedicated FCU (fan coil unit) with at least one (1) no. unit, capacity same as each working unit. 3) Please confirm.	1) Chilled water type AC shall be provided for Static excitation control room. Chilled water type system is preferred over air cooled type package AC and split AC for better operation and life. 2) AHU based system shall be provided for SWAS rooms as per technical specification. Chilled water shall not be routed inside the air conditioned area.
190	SECTION-VI, PART-B	SUB-SECTION-A-17 AIR CONDITIONING AND VENTILATION SYSTEM	1 OF 11	3,01.00 a)	Redundancy of various A/C system equipments shall be as follows: a) For Main Plant Areas (control room, control equipment room, UPS room, battery charger, static excitation control room (if applicable) SWAS room & water analysis lab) for Unit 3 & 4: i) Vapour compression type water chilling units: 3X50% ii) Chilled water pumps: 3X50% iii) Condenser water pumps: 3X50% iv) Cooling Towers: 3X50% v) AHUs: At least one (1) no. unit, capacity same as each working unit shall be provided as com-mon standby.	Control room/VFD area of AHP, FGD and ESP of unit 3 and Unit 4 are generally far away from each other with small cooling requirement in AHP area (8 to 10 TR) and to pump the chilled water for such a small load is not feasible/workable/economical. This issue has been encountered in 3x800 MW PUNE. Patents also. In view of above, it is proposed to provide dedicated Air cooled condensing unit with DX AHU/ Air cooled Package AC (based on design philosophy mentioned in tender specification clause no. 3.13.01.17) SECTION-VI, PART-B, SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA, PAGE 79 OF 101 for Ash handling control room. However, for ESP control room buildings and FGD rooms. Please confirm.	In LARA specific General layout plan (GLP), AHP control room, ASH handling VFD room are not far away from ESP/FGD control rooms. Hence, bidder to comply with technical specification.
191	SECTION-VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	1 OF 11	1,00.00 c)	Centralized air-conditioning system for Ash handling control room, ESP control room buildings and FGD control room building	Following option may also be allowed for provision of AC for office area in control tower: 1. If location is within the vicinity of main control room, Air conditioning with AC system of Main CCR/CER during detail engineering 2. If location is far from CCR/CER, dedicated AC as per clause no. 3.13.01.17, SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA, section VI, Part B during de-tail engineering Please confirm.	Office area in the control tower shall be 12 hours working when compared to CCR/CER which shall be 24 hours working. Hence, system as mentioned in technical specification shall be provided.
192	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	78 OF 101	3.13.01.17	For other areas, where A/C load is of the order of 25-60 TR, Direct Expansion (D-X) type air cooled condensing units alongwith AHUs shall be provided depending on the availability of space/ layout etc. For areas, where A/C load is of the order of 5-25TR, ductable split/package A/C shall be provided. Smaller areas which are away from the D-X type condensing unit (central chilling units which may require air conditioning upto 5 TR rating shall be served with Hi-wall Split/Cassette air conditioner units as per requirement. Above 60TR of A/C load, chilled water type centralized A/C system shall be provided.	Multiple non ductable Split A/C / cassette AC may please be allowed for buildings /Control rooms having total heat load up to 10 TR for easy Operation, maintenance, fast pace of erection and less interface issues.	Type of AC shall be provided as per technical specification requirement.
193	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	77 OF 101	3.13.01.17	In Air conditioning system the return air shall be through ducts and use of plenum space for return air shall be avoided. Further, FGD control room and ESP Control Room, office area in control tower, etc. where various floors are air-conditioned no intermediate or intervening floor are left non-air-conditioned, the space above false ceiling shall be used as return air plenum.	Please note that roof of AC areas of these buildings viz. FGD control room and ESP Control Room, office area in control tower, etc. may be exposed to ambient conditions depending on layout conditions. Also, clear gap between false ceiling and roof is generally less, restricting the usage of return air duct. However, as roof of air-conditioned Area of these buildings is provided with underdeck insulation to minimize the Air-Conditioned Load, space between the false ceiling and roof for above building / floor shall be used for return air. Please confirm.	Usage of plenum space is clearly mentioned in technical specification. Bidder to comply with technical specification requirement.
194	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	79 OF 101	3.13.01.21. A	COP of the water-cooled chiller: 	Both unit (KWR and TR) is mentioned for Chiller capacity. PI confirm the unit to be considered.	TR unit to be considered.
195	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	79 OF 101	3.13.02.3	All ventilation systems shall operate on 100% fresh air. Fan envisaged for MCC & Switchgear rooms shall be provided with pre-filters and fine filters and for other areas shall be provided with pre-filter unit.	We understand that filters are not applicable for exhaust fans. Please confirm.	Bidder understanding is correct.
196	SECTION-VI, PART-B	SUB-SECTION-A-17 AIR CONDITIONING AND VENTILATION SYSTEM	PAGE 2 OF 30	4.02.00	Chilling Unit 	Please note that most of chiller manufacturers are not manufacturing chillers with multiple compressors for capacity less than 200TR. Thus, in case the final actual capacity of single chiller works out to be less than 200TR during detail engineering, single compressor machine may please be accepted. Please confirm.	Bidder understanding is correct.
197	SECTION-VI, PART-B	SUB-SECTION-E-17	Page 1 of 3	1,01.05	Performance test of assembled compressor and Chiller assembly shall be done to check for following : i) No load air run (free run) test of all types of compressor to check FAD (Free air delivery), Noise, Vibration & Temp. rise of bearing & body.	We understand that for Air conditioning system, FAD (Free air delivery) is not applicable for Chiller. Please confirm.	Bidders understanding is correct for refrigerant based Chiller.
198	SECTION-VI, PART-E	LIST OF TENDER DRAWINGS	-	-	Tender drawing number 9587-001-POC-A-054 & 9587-001-POC-A-055 	Chiller manufacturer are also providing TE with TT as part of chiller and in such case separate TE with TT is not required and details of TE and TT shall be as per manufacturer stand-ard of chiller. Please confirm.	Most chiller manufacturers do not provide TE with TT at both inlet & outlet temperature measurement for chilled & condenser water side Bidder to comply technical specification requirement.
199	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	20 OF 76	1,01.07.01 a)	Power consumption of fans of Air washer units for TG building and fans of air filtration units for ESP and FGD buildings at its rated duty point to be arrived based on shop test	Duty factor for these equipment is not specified. Please provide.	If duty factor is specifically not mentioned, then the duty factor shall be default 1.0.
200	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	22 OF 76	1,01.07.02 b)	Power consumption at motor input terminals of working units (i.e. excluding stand-by) at its rated duty point of Chilling machines, Chilled water Pumps, Condenser water Pumps, Air handling unit (AHU) fans, for the Air conditioning system of main plant building, FGD control room, ESP control room of each units, AHP control room, Power consumption at motor input terminals of working units (i.e. excluding stand-by) at its rated duty point of compressor and condenser fans of air cooled condensing unit, Air handling unit (AHU) fans for the Air conditioning system of water system control building, switchyard control building, office area in control tower.	Duty factor for these area other than office area in control tower is not specified. Please provide.	If duty factor is specifically not mentioned, then the duty factor shall be default 1.0.
201	SECTION-VI, PART-B	SUB-SECTION-A-17	8 OF 30 & OF 30	5.01.11 & 5.02.13	Air Washer Unit Air washer units shall be provided at various elevations in TG building (AB & BC Bay). However, air washer units if required to be placed on the roof shall be provided with steel shed (open). UAF UAF units placed on the roof shall be provided with steel shed (open).	Air washer unit and UAF Units provided shall have sandwich insulation panel. In case these air washers are placed on the roof, these shall be provided with pre-painted outer skin panel. Accordingly, the steel shed over the AWU and UAF Unit is not required. same philosophy is followed in all projects including NTPC. Please confirm.	Steel shed to be provided as per technical specification requirement.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

202	SECTION – VI, PART-B SECTION-VI, PART-B	SUB-SECTION B-0 SUB SECTION-A-01	12 OF 15 78 OF 101	3.09.00 3.13.01 20	The emergency air conditioning and ventilation system requirements pertaining only to the Main Plant areas (like Control Room, Control equipment Room, SWAS Room, UPS Room) shall only be provided the DG backup During normal operation period, all the working equipment shall run on A.C. power supply. However, in case of complete black-out condition, DG sets being provided are required to cater the load of some of the air-conditioning equipment so that Main Plant Control Rooms and CER remain air-conditioned. The equipment to run on DG set are: • 1 No. Chilling machine • 1 No. chilled water pump. • 1 No. condenser water pump • 1 No. cooling tower fan • 2 nos. AHUs for CR & CER • 1 No. fresh air fan.	As per 3.13.01 20, DG back up is required only for AC equipment's however as per clause 3.09.00, DG back up is required for both AC and Ventilation system. We have envisaged DG back up for AC equipment as per clause no. 3.13.01 20 Further, as per clause no. 3.13.01 20, we understand that the AHU for UPS room located at 8.5Mtr of Power House is not to be considered under emergency operation. Please confirm.	AHU for UPS room located at 8.5Mtr of Power House shall be considered for DG backup
203	SECTION-VI, PART-B	SUB SECTION-A-17	13 OF 30	6.05.04 c)	Duct Fabrication and Supports: The ducts routed inside the buildings with larger side greater than 2250 mm shall be supported by 16mm MS rods and 50x50x3 mm MS double Angles while those below 2250 mm shall be supported by 10mm MS Rods and 40x40x3 MS angles. The duct supports shall be at a distance of not more than 2000 mm for A/C system.....	In addition to conventional duct support, wire rope support may also be accepted for supporting duct on account of speedy erection, flexibility in adjustment and good aesthetic view. Please confirm.	Bidder shall comply with technical specification requirement.
204	SECTION-VI, PART - B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	Page 13 of 14	1.03.00 59	In case of front mill arrangement, all staircase wells in TG hall C-row side, shall be pressurized and also all doors/ shutters provided this side shall have a provision of air curtains to avoid ingress of coal/ash dust from boiler side.	Air curtain shall be provided as per clause in case of front mill arrangement. Separate staircase pressurisation is not required as air curtain shall be provided on all door opening in staircase towards C row in case of front mill arrangement. Please confirm.	Bidder understanding is correct .
205	SECTION-VI, PART-B	SUB SECTION-A-16	PAGE 3 OF 7	4.03.03	Compressor shall have 25% minimum turn-down capability (at 45 deg C & 75% RH). Compressor shall be provided with IGV at the suction flange.	Bidder understand same is applicable for centrifugal compressor.	Bidder understanding is correct.
206	Section VI, Part B	A-9, Low pressure piping	10 of 20	2.12.02	For compressed air application, valve body material shall be cast carbon steel or forged carbon steel for sizes 65 mm NB & above and Gun metal for sizes 50 NB and below.	For 50 NB and below size valves, please also accept valve body MOC as carbon steel.	Bidder to please refer Clause No. 2.13.01 (d), Pg 13 of 20, Sub-section: A-09, Part-B of Technical specification, which is self-explanatory.
207	SECTION-VI PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	PAGE 79 OF 101	3.13.02	DESIGN PHILOSOPHY – Ventilation System- Hydrogen generation plant/MCC/ - 30	Please note that we have not found any technical de-tails of hydrogen Generation plant in the tender specification. In view of same we understand that the same is not in bidder's scope. Please clarify.	Bidder understanding is correct.
208	SECTION-VI, PART-B	SUB-SECTION A - 11 CONDENSATE POLISHING UNIT	05 of 16	4.05.0 C	Design temperature of service vessel and their internals/appurtenances shall take care of all operating regimes including HP-LP bypass operation and minimum 700C. Process design temperature shall be based on all operating regimes of TG cycle and minimum 520C. However, short term excursion of temperature upto 600C is also expected.	Please confirm the bidder understanding as "Design temperature of service vessel and their internals/ appurtenances shall take care of all operating regimes including HP-LP bypass operation and minimum 700degC. Process design temperature shall be based on all operating regimes of TG cycle and minimum 50degC. However, short term excursion of temperature up to 600degC is also expected."	Bidder's understanding is correct. Bidder to refer amendment no. WS1-16 in this regard.
209	SECTION-VI, PART-B	SUB-SECTION A-11 CONDENSATE POLISHING UNIT	05 of 16	4.06.00 a	One (1) common facility for regeneration of the ion exchange resins from the condensate polishers of all the turbo-generator units shall be provided utilizing three (3) tank concepts and consisting of: 1) Resin Separation & Cation Regeneration Vessel (2 sets). 2) Anion Resin Regeneration Vessel (2 sets). 3) Mixed Resin storage vessel (2 sets).	Please note that in SECTION-VI, PART-A, SUB-SECTION IIA-20 CONDENSATE POLISHING UNITS PAGE 01 OF 02 CLAUSE NO. 2.04.00 B) it is stated that "One (1) set of regeneration facilities consisting of Resin separation vessel, Cation, Anion regeneration vessel(s), Resin make-up hopper, Mixed resin storage vessels (2 nos)." Bidder understands that one (1) set of Resin Separation & Cation Regeneration Vessel, Anion Resin Regeneration Vessel & Mixed Resin storage vessel (2 Nos.), to be considered. The re-generation vessels are supplier specific and hence the vessel name shall be as per supplier recommendation. Please confirm.	Bidder to refer amendment no. WS1-04 in this regard.
210	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENNESS	PAGE 9 AND 10 OF 36	Cl. No. 4.9 Ion Exchange Demineralization Plant	In case the Bidder/its sub-vendor offers ion exchange based demineralization Plant for DM water, the Bidder/its sub vendor should have designed, supplied, erected and commissioned at least one (1) number of ion exchange based demineralizing plant, consisting of at least two (2) streams each of minimum 60 cum/hr capacity, capable of producing outlet water quality of silica and conductivity not more than 0.02 ppm as SiO2 and 0.2 microhm/cm respectively, which should have been in successful operation for at least one (1) year	Requirement of one (1) number of ion exchange based demineralizing plant, consisting of at least two (2) streams w.r.t. proneness of DM plant is stringent which will restrict the vendor's participation. In view of this requesting M/s NTPC to consider below proposed PQR/Provenness Criteria: "In case the Bidder/its sub-vendor offers ion exchange based demineralization Plant for DM water, the Bidder/its sub vendor should have designed, supplied, erected and commissioned at least one (1) number of ion exchange based demineralizing plant, consisting of at least one (1) stream of minimum 60 cum/hr capacity, capable of producing outlet water quality of silica and conductivity not more than 0.02 ppm as SiO2 and 0.2 microhm/cm respectively, which should have been in successful operation for at least one (1) year".	Bidder's proposal reviewed but not accepted, bidder to comply with specification requirement.
211	SECTION-VI, PART-B	A-24	2 OF 6	1.02.00 (2)	Emergency safety devices: The lift shall be provided with safety devices attached to the lift car frame and placed beneath the car. The safety device shall be capable of stopping and sustain-ing the lift car up at the governor tripping speed with full rated load in car.	Safety device in form of limit switches are placed below the lift car to stop and sustain the lift car. Further, safety governors are also installed on sides of car which come in operation during free fall of elevator or when speeds are higher than tripping speeds. During above mentioned situations safety governor gradu-ally hold the guiderail and bring the elevator to complete rest. Kindly provide confirmation.	Bidder to comply the specification requirement.
212	SECTION-VI, PART-B	A-24	3 OF 6	1.03.01 (d)	Bidder shall provide emergency indicator to in-dicate the location of elevator in case of elevator being stuck up between the floors through automatic flashers (both audio and vis-u-al).	There are two condition which are envisaged for stuck up of elevator: 1) If the elevator is stuck between floors in power condition, the floor indicator will be visible with a message –"Out of Service" 2) If the elevator is stuck between floors in Power-off con-dition, the floor indicator will not be available. Once power is restored the lift moves to the nearest landing & the indi-cator will get updated. Further, as per reputed / regular elevator suppliers stuck-up condition positioning of elevator cannot be indicated in either of above condition. Kindly furnish acceptance.	Bidder to comply the specification requirement.
213	SECTION-VI, PART-B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	11 of 14	1.03.00 (41)	All cranes shall be provided with approach rung ladders at least at two places. Where ever cranes can't be maintained in situ on the carriage, facility to draw them to Maintenance platforms as well as provision of suitable platforms shall be considered by the bidder.	One No. wire rope sling of suitable length shall be provided for each single girder crane to draw the crane manually to the maintenance platform. Please confirm.	Bidder to follow specification requirement .
214	SECTION-VI PART-B-QA	INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL SUB SYSTEM-BOP SYSTEMS (MECHANICAL)	PAGE 347 OF 440	25	Fire tender	Please note that we have not found any technical de-tails for Fire Tender in the tender specification. In view of same we understand that the same is not in bidder's scope. Please clarify.	Bidder shall refer Part-A of Technical Specification for scope of supply with respect to Fire Tender.
215	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENNESS	PAGE 24 OF 36	4.26-1 (f)	Provenness criteria and/or qualification requirement for vacuum belt filter - Equipment rating - 35T/hr (min.)	Bidder request Customer to consider provenness criteria for VBF Capacity as 17 T/hr (min.). Kindly confirm.	Bidder to comply with the specifications requirements.
216	SECTION – VI, PART-A	SUB-SECTION-VI CHAPTER -01	PAGE 22 OF 38	1.22.12 (2)	Mandatory Spares- Belt (1 Set)	For spare belt, Bidder shall supply wear belt or sealing belt. We are not considering the mother/drainage belt in mandatory spares. Kindly confirm.	This shall be finalized during detail engineering. Bidder to provide mandatory spares in line with specified requirements. Further, Bidder to refer clause 13.00.00 of sub section VI of section VI, part A.
217	SECTION – VI, PART-B.	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE	Page 61 of 227	TABLE-2: LIST OF EQUIPMENTS CONSIDERED FOR STATION AUXILIARY POWER CONSUMPTION	e) Mill Reject System: Compressor. Compressor: Duty Factor 1.0 (per unit power consumption shall be 50% of Power Consumption of the working compressor)	This is to bring to your notice that since pneumatic type mill reject system is not mentioned so corresponding clause for mill reject compressor shall not be applicable. Instead, bidder is considering the following clause in SECTION – VI, PART-A, SUB-SECTION-IV FUNCTIONAL GUARANTEES, f) Mill Reject System – "Mill reject mechanical type Conveying system: Duty Factor 1.0".	Bidder understanding is correct

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218	SECTION-VI, PART-A	Annexure C to IIC Contract quantity	PAGE 5 OF 24	2.04.07 Air Compressor Block and NH3 handling System Block	This block shall include Air compressor for Mill reject system. If the controller (Microprocessor / PLC based control system) is integral to compressor then suitable operator interface as per vendors practice for individual air compressor shall be provided. However, overall control and monitoring shall be through Stand Alone DDCMS. This block shall also include control of NH3 unloading, storage, transfer and heating system etc.		
219	SECTION-VI, PART-A	Annexure C to IIC Contract quantity	PAGE 9 OF 24	2.03.00 LIST OF AREAS FROM WHICH SOFT SIGNALS IS TO BE CONNECTED TO DDCMS (OTHER THAN REMOTE I/O)	4. From Air compressor (IAC, PAC, Mill Reject system) to SA DDCMS		
220	SECTION-VI, PART-B	SUB-SECTION-A-01	PAGE 83 OF 101	EQUIPMENT SIZING CRITERIA, AIR	The Service air requirement of mill reject shall not be included while sizing the compressor capacity, as separate & dedicated compressors are to be provided for the same.	This is to bring to your notice that since pneumatic type mill reject system is not allowed so corresponding clause for mill reject compressor shall not be applicable.	Bidder's understanding is correct that pneumatic type mill reject system is not specified, hence mill reject compressor shall not be applicable. Further refer Amendment C&I-1-06 in this regard.
221	SECTION-VI, PART-B	SUB-SECTION-E-26 MILL REJECT HANDLING SYSTEM(MECH)	Page 1 of 1	1.03.00 PACKAGE AIR COMPRESSOR	In addition to Hydraulic tests of pressure parts, performance test of the compressor shall be done for FAD, pressure, power consumption, as per relevant code. Noise and vibration shall also be measure.	Kindly also confirm that the references of mill reject compressor mentioned elsewhere in specification shall not be applicable.	
222	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	PAGE 59 OF 101	3.03.00 ECV System for each Unit	b Flow b. For SG ECV system- Design flow required for all SG auxiliaries + other Station Auxiliaries (Air compressors, Mill reject, Ash Handling compressors, FGD & SCR system, any other system envisaged by the bidder)		
223	SECTION-VI, PART-B	SUB-SECTION-A-15 CW SYSTEM	PAGE 27 OF 43	C) EQUIPMENT COOLING WATER SYSTEM	1.01.00 Equipment Cooling Water system and Auxiliary cooling system shall be installed on a unit basis. The system shall also have the provision to operate common station auxiliaries such as compressor plant, compressor of mill reject system and ash handling compressors and FGD auxiliaries even with one unit/ all units are out of operation for which suitable arrangement shall be incorporated in the design and layout of piping system.		
224	SECTION-VI, PART-B	SUB-SECTION-G-07	PAGE 45 OF 55	4513	EQPT AND PIPING LAYOUT OF MILL REJECT SYSTEM AND PIPING LAYOUT FROM COMPRESSOR HOUSE - MH - A	This is to bring to your notice that since pneumatic type mill reject system is not allowed so corresponding drawing for Piping Layout shall not be applicable.	Bidders understanding is correct.
225	SECTION-VI, PART-B	SUB-SECTION-A-01 EQUIPMENT SIZING CRITERIA	PAGE 98 OF 101	4.03.06 MILL REJECT HANDLING SYSTEM	Sizing grid shall be provided in mill reject pyrite hopper to remove mill reject size >40mm.	Sizing grid is not applicable for mechanical conveying type mill reject handling system.	Bidders understanding is correct.
226	SECTION-VI, PART-B	SUB-SECTION-A-22 MILL REJECT HANDLING SYSTEM	PAGE 2 OF 3	2.02.00 Metallic Conveyors	2.03.00 Data Sheet 7) Tensioning arrangement - Hydraulic/pneumatic	Screw type/ Gravity type tensioning arrangement for conveyor type mill reject system is used by some of OEMs as per their proven practice and hydraulic/pneumatic tensioning arrangement are not applicable for their system. Accordingly, these tensioning arrangements may also be allowed.	Bidder to follow specification requirement .
227	SECTION-VI, PART-B	SUB-SECTION-IID CIVIL WORKS	2 of 8	Sr. No-5c of clause no- 1.00.00	Packaged type Sewerage treatment plant (3 nos. as indicated in tender drawing General Layout Plan) and sewage pumping station including sewage pump, sump & house and connection up to sewage treatment plants (either of owner or bid-der); connection of sewage lines of all buildings under Bidder's scope to the nearest sewerage system.	1. Please confirm, whether the 3-separate or a common (1-no.) tertiary treatment facility is to be provided after the 3- decentralized units. 2. Alternatively, kindly confirm if, bidder may provide a Centralized Sewerage Treatment Plant for facilities within the plant with minimum combined capacity of min. 75 cum/day and MBBR technology shall be used for centralized sewerage treatment plant. This is in line with recent Patratu project amendment. Kindly confirm acceptance. 3. Pl. note that CI pipes are available in higher sizes- 80NB and above. Being very small capacity STP requirement, the sewerage shall be pumped/ fed through gravity as per site requirement & the pipe size are expected to be less than 80 NB. In view of above, the pipe material of HDPE/PVC may pl. be allowed. This is as accepted/approved by M/S NTPC in Panki & Patratu project. 4. Since the pumping is of very small capacity and hence no sewage pump house is required. Small submersible pump will meet the requirement. Pl. allow. 5. System requirement w.r.t. cause: complete arrangement for sewage disposal up to the sewage treatment plant including pumping facilities, may be elaborated/clarified. 6. Disposal arrangement of Treated Water after tertiary treatment from the respective STPs at 3-locations is not clear. It is envisaged that same shall be used for nearby/horticulture area/dust suppression at CHP area/suitable equivalent arrangement. Kindly inform/confirm. 7. There is no mention of EQMS in the specs. We understand that the EQMS is not to be provided.	1. 3 nos. sewerage treatment plant with 3 nos. separate tertiary treatment facility is to be provided by bidder. 2. Bidder is requested to adhere to provision of technical specification in this regard. 3. Bidder is requested to adhere to provision of technical specification in this regard. 4. Bidder is requested to adhere to provision of technical specification in this regard. 5. Complete sewerage system included Sewerage Treatment Plant, pumping facilities, RCC manholes, sewer pipeline for gravity flow and pressure flow etc. including all as per system requirement and disposal of treated water upto horticulture area. 6. Bidder's understanding is correct. 7. Bidder's understanding is correct.
228	SECTION-VI, PART-B	SUB-SECTION-A-23 LP DOSING AND OXYGENATED TREATMENT SYSTEM	2 of 4	2.00.00 Oxygen Dosing System	Oxygen Dosing System Complete Oxygen Dosing System shall be supplied and installed by the Bidder. It is proposed to dose Oxygen at two (minimum) locations in the Condensate and in Feed water circuit of each unit. I.e. one at outlet of condensate polishing Plant and another at the outlet of deaerator (suction line to feed water pumps) at each dosing locations, system shall be designed for a maximum dosage rate of 150 gpa and number of oxygen cylinders to be supplied and installed by the Contractor shall cater for one-month re-requirement. However, the dosing facilities shall have redundancy of 100% for each location per unit. The condensate and feed water flow shall be of the order of 1500 CU.M/hr for each unit or actual design flow whichever is higher.	Please note that Oxygen dosing system shall be provided with redundancy of oxygen cylinder per skid (i.e. 2 x 100%) only. The redundancy of other dosing facility is not required, hence not envisaged. Thus, with above details, 2 nos. of Oxygen Dosing System Skids per unit shall be provided.	Bidder to note that for each location per unit, skid containing equipments required for dosing like isolation/ check valves, cylinder manifold
229	SECTION-VI, PART-B & SECTION - VI, PART-E	A-01 EQUIPMENT SIZING CRITERIA & LIST OF TENDER DRAWINGS	60 OF 101	3.05.00 (i) Potable Water System & Single Line Flow & Instrumentation Diagram of Pre-Treatment Plant (9587-9999-POM-A-006)	Potable water system shall meet the drinking water required for all the plant facilities/ buildings included in Contractor's scope up to the specified terminal point. Number and Capacity of pumps shall be as follows: Capacity of potable water requirement will be 20 m3/hr (minimum) for plant. Potable Water Pumps (Colony & Plant)	Please specify following: -Capacity & Head Of Potable water Pumps (Colony & Plant). -Terminal Points.	Potable water pumps with distribution network for plant are in Bidder's scope of work, however potable water pumps for colony are not included in Bidder's scope. Capacity & Head Of Potable water Pumps shall be designed accordingly meeting the requirement.
230	SECTION-VI, PART-B	SUB-SECTION-A-14 WATER TREATMENT PLANT	22 OF 35	12.00.00 (II-A)-1- & II-(2)	Design Flow (min.)-PT-CW System-Aerator/Stilling Chamber-4100 m3/hr. + 3% for sludge & Design Flow of each clarifier (Net output) (minimum)-PT-CW System-CLARIFIERS-1850m3/hr	Design Flow of aerator/stilling chamber & clarifier is not matching. Please clarify.	Bidder's query on sizing of aerator/stilling chamber and clarifloclator reviewed and specified requirements is found in order. Bidder to comply to requirements of technical specification.
231	SECTION-VI, PART-B	SUB-SECTION-B-15	3 of 5	8.01.01	These motors shall be provided with VPI in-sulation and insulated bearing on one side and shall be suitable for Inverter duty.	Insulated bearings are generally available for motors above a particular frame size (generally 280M and above). Insulated bearings for all motors can be de-cided during detail engineering based on availability in market. We understand that RRC are not applicable for BFP-handling crane. Kindly confirm.	Bidders understanding is not correct. Bidder shall refer to clause no.20.01.00 of Part-B-03-VFD chapter in Electrical Specs+H291/H299/clarifications.
232	SECTION-VI, PART-B	SUB-SECTION-B-15	3 of 5	8.02.00 (f)	Provision for controlling the motion from operator cabin (in case of Turbine hall EOT crane) as well as remote control shall be available.	Kindly confirm.	Bidders understanding is not correct. RRC shall be provided by the bidder wherever EOT crane is envisaged.
233	SECTION-VI, PART-B	SUB-SECTION-A-01	50 OF 101	2.04.00	In addition, it shall also be possible to han-dle Generator Stator with tandem operation of two Turbine hall EOT cranes for which necessary arrangements shall be provided. In such case, the combined capacity of two EOT cranes shall not be less than 105% of weight of Generator Stator, including the weight of lifting beam with swivelling arrangement and slings.	Criteria for finalizing capacity of lifting beam for tan-dem operation of TG Hall EOT cranes has not been mentioned in tender specification. 5% margin over Generator Stator weight and slings weight has been envisaged for finalizing lifting beam capacity.	Lifting beam shall be sized by taking 5% margin over combine weight of Generator Stator, attached lugs and slings. Further, This shall be finalised during detail engineering.
234	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-11	10 OF 18	b	Master Controller for Aux. Hoist	Since cabin is not applicable for CWPV Double Girder crane, Master controller shall also not be applicable for the same.	It shall be decided during detail engineering.
235	SECTION-VI, PART-A	SUB-SECTION-I-A	11 OF 36	4.15	The Bidder/ its sub-vendor should have designed, manufactured, erected and commissioned EOT cranes of capacity 100T or more with minimum crane span of 28 meters, which is in successful operation in at least one (1) station for a minimum period of one (1) year.	Since Double Girder EOT Cranes supplied in power station are designed based on similar Indian Standard (i.e. IS 3177 and IS 807) as for any other building viz. Steel Plant (which is comparatively heavier duty w.r.t. power station), workshop sheds, manufacturing units, cement factories, of refineries etc. we understand that the word 'station' indicated in provements criteria includes crane supplied in any of the said buildings and not only power station. Please confirm.	Bidder to note that the word "station" indicated in provements criteria doesn't restrict any vendor for meeting the provements criteria as long as it meets the crane specified parameters (i.e., Crane capacity and Span) in the provements clause. Bidder to comply the specification requirement.
236	SECTION-VI, PART-A	IIA-01	21 OF 28	2.24.03	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more.	All the mentioned three clauses are contradictory w.r.t. selection of electric or manual hoist. We shall follow clause 4.02.09 of sub-section A-02/Section VI part B for selection of electric or manual hoist.	
237	SECTION-VI, PART-B	A-01	95 OF 101	4.02.09	Hoists: (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming outside the buildings: Motor driven for both travel & lift (ii) Other hoists including the hoists for han-dling Take up pulley and take up weight: Manual for both travel & lift.	Kindly confirm.	Bidder to comply the specifications requirements as specified in various chapters for the equipments in corresponding areas.
238	SECTION-VI, PART-B	A-24	6 OF 6	2.05.00	For the hoists with more than 2.0 ton lifting capacity or more than 05.0 M lift, motor op-erated hoist block for both long travel and lift shall be provided. Other hoist blocks shall be of hand operated type for both travel and lift. However, all monorails coming out of the building shall be provided with electric hoist block, irrespective of load and lift.		

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239	SECTION-VI, PART-A	IIA-01	22 of 28	2.24.03	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility.	The requirement is important w.r.t. O&M perspective. Bidder to comply with the specifications requirements.
240	SECTION-VI, PART-A	IIA-19	1 of 2	2.01.00	Suitable EOT Cranes/HOT Crane/monorail beams with hoists/Chain Pulley Blocks of adequate capacity, to meet the erection and maintenance requirements are to be provided by the vendor for the various equipment/areas. Some of the areas/equipment not covered by TG hall EOT crane are indicated below. For balance areas/equipment, not listed herein after, the requirements of Specification shall be followed. (a) Feed water heaters & deaerator. (b) Various pumps & Heat Exchangers. (c) Fans, motors, gear boxes etc., of Main Condenser, vacuum pumps, control fluid room etc. (d) Auxiliary cooling water pumps and DM cooling water pumps of ECW systems and Plate heat exchangers. (e) Central lube oil system room (f) Any other equipment. The above requirement is indicative only, the requirement given in the respective chapter is to be adhered to.	a. For erection, Feed water heaters shall be lifted to the destination floors with the help of TG Hall EOT and then dragged to their final location. For maintenance also, they can be dragged to EOT accessible area and can be handled by EOT thereafter. This is as per standard practice. As such, there is no requirement of separate hoist arrangement. For de-aerator erection, separate mobile crane will be used to lift the different parts to the De-aerator floor. Once erected, it need not be taken out. If any maintenance is required, the same can be done in situ. b. Heat exchangers can be attended at position. Hand-dling arrangement for the same is not required. However handling arrangement shall be provided for motors of the pumps wherever applicable. For balance equipments, lifting equipment shall be provided as applicable.	EOT crane is not envisaged for Feed water heaters & deaerator. However, applicable Hoists/Chain pully block for general maintenance purpose shall be provided.
241	VIA	IIA-06	08 OF 10	10.02.00	EOT CRANE FOR BOILER FEED PUMP If BFPs are provided in BC bay or are not accessible to TG hall EOT crane as per layout requirement, one (1) no of Electrically operated (Double Girder) traveling cranes for each unit with associated auxiliaries, along with electrical equipment, control & instrumentation as required and specified shall be provided in the BC bay for erection and maintenance of Boiler feed pump and their auxiliaries. The main hook capacity of each crane shall be 10% over and above the heaviest component/equipment to be handled (including lifting beam, if applicable, and slings etc.) or 25 Tonne whichever is higher. Further the EOT crane shall have necessary facilities such as lifting beam with swivelling arrangement (if applicable) and slings for erection as well as maintenance of the equipment.	As per bidders practice, erection of BFP/Drive Turbine will be done by external crane. EOT shall be provided in the BC bay for maintenance of Boiler feed pump and their auxiliaries with capacity as specified in the tender specification. Kindly confirm. Lifting beam and swivelling arrangement for BFP crane is not required hence not being considered. Kindly confirm.	Bidder understanding is not correct. BFP EOT crane may also be needed for erection/ handling of BFP/drive turbine in future. Bidder to comply specification requirement. If applicable is already mentioned regarding lifting beam and swivelling arrangement in the referred clause.
242	VIA	IIA-19	01 OF 02	2.01.00	Suitable EOT Crane/HOT crane/monorail beams with hoists/chain pulley blocks of adequate capacity, to meet the erection and maintenance requirements are to be provided by the vendors for the various equipment/areas. Some of the areas/equipment not covered by TG hall EOT crane are indicated below. For balance areas/equipment, not listed herein, the requirements of Technical Specification shall be followed. (a) Feed water heaters & deaerator. (b) Various pumps & Heat Exchangers. (c) Fans, motors, gear boxes etc., of Main Condenser, vacuum pumps, control fluid room etc. (d) Auxiliary cooling water pumps and DM cooling water pumps of ECW systems and Plate heat exchangers. (e) Central lube oil system room. (f) Any other equipment. The above requirement is indicative only, the requirement given in the respective chapter is to be adhered to.	a) As per bidders practice, Heaters are handled by TG Hall EOT in AB Bay & then dragged to their locations. As such, no separate EOT/hoist is required. In addition, one time erection of De-aerator is done by mobile crane from CD Bay. As such, no separate EOT Crane /Hoist is required. f) There is no other major equipment. Hence, no other EOT/Hoist is being envisaged.	EOT crane is not envisaged for Feed water heaters & deaerator. However, applicable Hoists/Chain pully block for general maintenance purpose shall be provided. Bidder to please also refer Section VI Part-B Sub section A-24 Clause no 2.01.00 of page 6 of 6.
243	VIB	A-13	04 OF 08	2.01.00	Note (1) : For piping systems with operating temp>=500 deg. C first layer of insulation shall be at least 75mm of ceramic fiber insulation followed by subsequent layer of LBM.	As per market availability single layer of 75 mm thickness of Ceramic Fiber is not available. Hence Two Layers of ceramic fiber with combined thickness 75mm will be provided.	Bidder to please refer the Clause 1.00.0 (b) (i) in Pg 2 of 8 of Sub Section A-13 of Part B which is self-explanatory.
244	VIE	--	01 OF 07	--	List of Tender Drawings	Kindly confirm. Bidder understands that there are no TG Building layout drawings in the bid and bidder is free to decide TG Building size, floor levels and pitching. Kindly confirm	Bidder's understanding is correct. Bidder is free to decide the layout of TG building subject to compliance of all specification requirement and approval by Owner .
245	VIA	III- TERMINAL POINTS & EXCLUSIONS)	1 of 3	1.01.00 (a)	TP for Auxiliary Steam interconnection for Auxiliary Steam Station Header with existing Stage-I with motorized isolation valve as indicated in the tender drg.	Terminal point detail for auxiliary steam interconnection with existing stage is not indicated in the tender document (plot plan). Kindly review.	Refer Amendment PIP1-08 in this regard.
246	VIB	G-03 LAYOUT PHILOSOPHY	5 of 14	1.03.00	Minimum Three (3) nos. of maintenance bays (one number at the start of first unit and two nos. between both units) shall be provided in TG building. Width of maintenance bay shall be 10.5M (minimum). Further additional bays may be provided as per system/layout requirements.	Minimum Three (3) nos. of maintenance bays shall be provided in TG building. Location of maintenance bay shall be decided based on bidder's layout arrangement.	Bidder to follow specification requirement .
247	SECTION - VI, PART-A	SUB-SECTION-IB ELECTRICAL SYSTEM / EQUIP-MENTS	PAGE 2 OF 20	1.05.01	All the Switchboards shall have minimum two (2) no of modules (2 no/s motor feeder/2 no/s transformer feeder/1 motor and 1 transformer feeder) as spares in each section. Highest rating of each motor and transformer feeder must be included in the spare.	If only motor feeders are there on a particular board/section, then only 1 no. spare motor feeder will be provided. Same is the case for spare trans-former feeder.	Bidders proposal is not acceptable. If only motor feeders are there on a particular board/section, minimum 2 no. of motor feeders shall be supplied by the bidder in each section. Bidder must adhere to technical specifications.
248	SECTION - VI, PART-A	Annexure C to IIC Contract quantity	PAGE 1 OF 24	A 1.00.00	Various types of cabinets / equipments, ECP (for mounting synchronizing relays, aux. PTs, other relays etc. shall be provided on as required basis.	ECP is not applicable. Only ECD is applicable as per cl. no. 1.14.00, Sub Sec-IB, Page 7/20. PI confirm.	Bidder's understanding is not correct. Bidder to comply technical specification
249	SECTION - VI, PART-A	SUB-SECTION-IB ELECTRICAL SYSTEM / EQUIP-MENTS	PAGE 4 OF 20	1.06.00	220V DC System for Main Plant and FGD	220V DC System for Main Plant and FGD may be provided separately. However, DC Health Monitoring Sys-tem for Main Plant (220V) battery shall only be provided as per clause 1.00.00, section-VI, Sub-section B-19, Part-B, Page 1 of 5. Kindly confirm.	BHMS is not required for FGD in case separate 220V DC systems are provided for main plant and FGD.
250	SECTION - VI, PART-B	SUB-SECTION-B-0 GENERAL ELECTRICAL SPECIFICATION	PAGE 12 OF 15	3.08.00	DC Health Monitoring Systems for Main Plant (220 V) and switchyard (220V and 48V) shall be provided to monitor the condition of each battery cell of 220V battery banks on-line on 24x7 basis.		
251	SECTION - VI, PART-A	SUB-SECTION-IB ELECTRICAL SYSTEM / EQUIP-MENTS	PAGE 6 OF 20	1.09.00	HT power cables required to feed the trans-former feeders, motor feeders and inter-stage connection.....	Any inter-stage connection (between Stage-I to Stage-II) is not envisaged in SLD. And Connection between 11KV Switchgears of two units of Stage-II in the pre-sert proposal is through Segregated Phase Busduct. Accordingly, any HT power cable for interstage connection is not envisaged. Kindly confirm.	Bidders understanding is correct.
252	SEC VI/ PART- A	II-A-24 WORK-SHOP, LAB, M&C EQUIP-MENTS	2 OF 2	ANNEXURE-II	"FOR PANELS & ELECTRICAL EQUIPMENT (THERMOGRAPHY)"	Any specification or BoQ of the equipment is not mentioned in the specification. So any equipment i.e. "FOR PANELS & ELECTRICAL EQUIPMENT (THERMOGRAPHY)" is not applicable. Kindly confirm.	Bidders understanding is correct.
253	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-IB ELECTRICAL SYSTEM / EQUIP-MENTS	PAGE 15 OF 20	1.19.00	415V switchgear feeders as indicated below (at suitable location to be decided during detailed engineering). (a) 4 Nos. MCCB-125A (b) 4 Nos. MCCB-250A (c) 4 Nos. MCCB-400 A (d) Total 6 Nos. ACB outgoing – 1000 A (in unit emergency switchgear and station ser-vice switchgear for feeding owner's loads).	We understand that a) Only un-cabled feeders shall be provided for feeding owner's loads as per the list in specification. The load of these feeders shall not be considered in system equipment (viz transformer, PMCC, MCC, Emergency DC etc) sizing. b) The quantity of the feeders indicated in the list indicate total quantity (considering both the units). Total 18 nos. feeders shall be provided for owner's load as per the list. Please confirm.	a) Bidders understanding is correct b) Bidders understanding is correct.
254	SECTION - VI, PART-B	SUB-SECTION-B-0 GENERAL ELECTRICAL SPECIFICATION	PAGE 5 OF 15	3.04.01	Station Transformer Each Station transformer shall be sized to meet the requirements of the worst case of following contingencies: Case I: Outage of One Unit transformer a) Loads served by fully loaded Unit transformer as defined above plus b) MDBFP load for one unit plus c) Meeting the station loads distributed on the respective station boards plus d) Loads due to outage of largest transformer /outgoing feeder (except station to unit/station tie feeders) connected to the bus plus e) Multiplied by no load voltage correction factor as defined at 3.04.00.	As per recent proposal with NTPC, sizing criteria for ST has been amended by NTPC and same is reproduced below Station Transformer Scheme Each Station transformer shall be sized to meet the requirements of the worst case of following contingencies: Case I: Outage of One Unit transformer a) Loads served by fully loaded Unit transformer as defined above plus b) MDBFP load for one unit, plus c) Meeting the station loads distributed on the respective station boards plus d) Loads due to outage of largest transformer /outgoing feeder (except station to unit/station tie feeders) connected to the bus plus "Since outage of only one largest transformer is to be considered (Since it is case of One UT outage), there-fore outage of another largest transformer is not ap-plicable. Hence, sizing criteria point no. (d) above is not applicable and not considered." e) Multiplied by no load voltage correction factor as defined at 3.04.00. PI confirm that above sizing criteria excluding point no. (d) for S	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
255	Part-B, Section-IV,	SUB-SECTION-B-08	2 of 7	Clause No. 2.02.00	All cables including EPR cables shall be flame retardant, low smoke (FRLS) type de-signed to withstand all mechanical, electrical and thermal stresses developed under steady state and transient operating conditions as specified elsewhere in this specification.	No application and requirements defined in specification for EPR fire survival cable. EPR fire survival cable is not applicable and not to be considered. Please confirm.	Bidders understanding is correct.
256	Part-B, Section-IV,	SUB-SECTION-B-08	5 of 7	Clause No. 4.00.05	Cables shall be supplied in steel drums of heavy construction	Steel drum shall be provided for HT power cables. All other types of cables shall be provided in wooden drums as a practice followed for all NTPC projects.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
257	SECTION VI, PART-B	SUB-SECTION-B-08 HT LT AND CONTROL CABLES	PAGE 3 OF 7	2.010.00	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated, and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150, 3Cx240 & 3Cx300 sq mm However for cable sizes upto 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable.	All LT power cables shall be XLPE insulated. Kindly confirm.	For LT power cables upto 120 sq.mm, XLPE Cables may be considered as bidders choice, however its not compulsory. PVC Insulated Cables may also be acceptable.Above 120sq.mm LT Power cables must be XLPE insulated only.
258	SECTION VI, PART-B	SUB-SECTION-B-08 HT LT AND CONTROL CABLES	PAGE 4 OF 7	4.00.01	Method of curing for 33/33 KV Cables shall be "dry curing / gas curing".	We understand that Method of curing of 19/33 KV cables shall be dry curing / gas curing Method of curing of 11 KV / 11V voltage grade cables is not mentioned in the specification. We understand that for 11 KV / 11KV voltage grade cables method of curing shall be dry curing / gas curing / steam curing . Please confirm.	Bidders understanding is correct.

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259	PART-E	Single line diagram -main plant	PAGE 1 OF 1	9587-999-POE-J-001, rev-D	Additional incomer suitable for cable termination (1250 A) for commissioning purpose.	Additional un-cabled incomer shall be provided for cable termination (1250 A) for commissioning purpose. Supply of cable is not envisaged. Kindly confirm.	Bidders understanding is correct.
260	SECTION-VI, PART-B	SUB-SECTION B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	PAGE 19 OF 21	9.00.00 b)1	Separate Switchgear Rooms shall be provided for each unit. For TG building, all HT boards shall be provided in HT switchgear room at only one floor and all LT boards shall be provided in LT switchgear room at only one floor.	All LV switchgear pertaining to power house building cannot be placed at single floor. Generally, unit, sta-son PMCCs are kept at one floor level and boiler boards are kept at other floor level. Also, AC plant swg is also kept in AC plant room. Hence, please confirm different floor levels for LV boards as per load center in power house building. Also, as per requirement very limited numbers of LT board can also be placed inside MV swgr room in case of space constraint in MV switchgear room. Moreover, in offsite area Placing MV & LV switchgear in same switchgear room is allowed as per specification. Inline with that same may please be allowed in Power House building	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
261	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	PAGE 1 OF 15	1.05.00	Allowable Voltage variation under worst operating condition: 11KV/3.3KV +/- 6%	In line with the standard practice followed in all projects engineered by Bidder, a voltage variation of +/-10% may please be allowed.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications.
262	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	2 of 15 & 15 OF 15	1.11.00	Locked rotor MVA of ID Fan and MDBFP motors shall be restricted to 75 MVA. & The ratio of locked rotor KVA at rated volt-age to rated KW shall not exceed the following (without any further tolerance): (e) Above 4000KW : 6 to 6.5	Please confirm which criteria shall be applicable for ID Fan & MDBFP.	Locked Rotor MVA of ID Fan and MDBFP Motors shall be restricted to 75MVA.
263	SECTION-VI, PART-B	SUB-SECTION B-0	5 of 15	3.04.01	Each unit transformer shall be sized for the following: a) The loads of One set of unit auxiliaries corresponding to 60% TMCR plus b) Loads due to outage of largest transformer connected to the bus plus c) SCR load requirement of 1 MVA plus d) Multiplied by no load voltage correction factor as defined at C1. 3.04.00.	Un-cabled feeder shall be provided for feeding customer's load requirement of SCR (1MVA).	Bidders proposal is acceptable only in case SCR is not in the scope of the bidder. In case SCR is in the scope of the bidder, necessary cabling shall also be in bidders scope.
264	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION & SUB SECTION-B-10 MOTORS	8 of 15 & 1 OF 4	3.06.00. (h),(a)	Power factor 415 V Uni-Directional drives is taken as 0.8 and efficiency as 0.85. & Continuous duty LT motors upto 200 KW Output rating (at 50 deg C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC-60034-30.	As per the LT motor spec, premium efficiency class-IE3 type motors are only allowed for the continuous duty LT motors. In line with this clause, value of efficiency as per IE3 efficiency class shall be considered in LT swed sizing, for uni-directional, continuous drives. P.F shall be considered 0.8 in line with specification. Please confirm.	Upto 50KW Efficiency shall be considered as per IE4, above 50 KW and upto 200KW, Efficiency shall be considered as per IE3. Powerfactor shall be considered as per technical specifications.
265	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	9 of 15	3.06.00. (m), (f)	At least one spare core shall be made available in each of the control cable.	In line with standard practice followed in all projects engineered by Bidder, spare core shall be provided in control cable for size 5C & above. Please confirm.	Bidders understanding is correct. No. of spare cores shall be as per cl 4.04.15 section-VI, Part-B-10, of Cabling, Earthing and lightning Protection chapter.
266	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	8 & 9 of 15	3.06.00. (h),(d) & 3.06.00. (k)	A spare capacity of about 10 % shall be kept for addition of loads during detail engineering-as many of the LT loads cannot be predicted during the Rating selection of the Board. & Spare capacity and Future Requirements: Each of the LV switchboards shall be de-signed for 1.1 times the required rating as a spare capacity.	In line with the standard practice followed in all projects engineered by Bidder, please note that 10% de-sign margin is already considered in LT swed. Sizing to cater to future load variations. Additional 10% spare capacity margin is not envisaged.	Pl. refer to Electrical Amendment No.Elec1-11.
267	SECTION-VI, PART-B	B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	PAGE 8 OF 36	1.05.01. (f)	LT Auxiliary outdoor transformer up to and including 2500KVA, 33KV shall have maximum losses of STAR-2 rating or better as per latest BEE guideline. The outdoor transformer up to 2500KVA, 33KV shall also comply with latest IS:1180	We understand 2500KVA outdoor oil filled transformer is allowed in line with the clause 1.05.01. (f) of transformer specification SUB-SECTION-B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING. Further, for indoor applications, LT transformers upto 2500KVA, 33KV shall be applicable. Please confirm.	Bidders understanding is correct.
268	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENESS	PAGE 27 OF 36	5.4.0	Bidder/ Sub Vendor should have manufactured and supplied at least one (1) number of static automatic voltage regulator type Battery Chargers of highest offered rating or above, in at least one (1) industrial installation, which should have been in successful operation for at least one (1) year.	As SCR based charger is applicable for tender and due to limited supplier for charger rating 500A and above (in 800MW charger rating will be more than 500A), performance for such high rating chargers are not available with charger supplier. Hence, Provenness criteria for charger may be considered as below *Bidder/ Sub Vendor should have manufactured and supplied at least one (1) numbers of static, SCR type, automatic voltage regulator type Battery Chargers of rating 500A and above, in at least one (1) industrial installations, which should have been in successful operation for at least one (1) years.	Bidders proposal is not acceptable. Proposed Provenness criteria is inline with the previous NTPC Projects. Therefore bidder must adhere to the provenness criteria as indicated in the tender documents.
269	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENESS	30 OF 36	5.12.1.1	The Bidder/Sub-Vendor should have manufactured & supplied at least one number (one installation) of 16 MVA, 11KV or higher rating oil filled transformers which should have been in successful operation for a period of at least two (2) years	The Bidder/ Sub-Vendor should have manufactured & supplied at least one number (one installation) of at least offered rating oil filled transformers which should have been in successful operation for a period of at least two (2) years.	Bidders proposal is not acceptable. Proposed Provenness criteria is inline with the previous NTPC Projects. Therefore bidder must adhere to the provenness criteria as indicated in the tender documents.
270	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENESS	30 OF 36	5.12.1.2	Bidder/Sub-Vendor should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).	Bidder/Sub-Vendor should have his own facilities for conducting all routine and type tests as per IS: 2026 (except Impulse and short circuit test).	Bidders proposal is not acceptable. Proposed Provenness criteria is inline with the previous NTPC Projects. Therefore bidder must adhere to the provenness criteria as indicated in the tender documents.
271	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENESS	30 OF 36	5.12.1.3	16 MVA, 11 KV or higher rated oil filled transformer manufactured by Bidder/Sub-Vendor should have been successfully short circuit tested.	Offered rating or higher rated oil filled transformer manufactured by Bidder/Sub-Vendor should have been successfully short circuit tested. And this short circuit conduction may not be on supplied transformer as per cl. no. 5.12.1.1 above.	Bidders proposal is not acceptable. Proposed Provenness criteria is inline with the previous NTPC Projects. Therefore bidder must adhere to the provenness criteria as indicated in the tender documents.
272	SECTION-VI, PART-B	SUB SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION	2 OF 21	2.01.04	No sub-zero level cable vault/trenches shall be provided below control building/switchgear rooms in main plant.	Some small switchgear/control panel may come at 0.0M elevation inside power House building, for which cable trench/ slit shall be permitted.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications.
273	SECTION VI, PART-B	SUBSECTION-B-11 STATION LIGHTING	10 OF 18	4.04.00	Junction box for indoor lighting shall be made of fire-retardant material. Material of JB shall be Thermoplastic or thermosetting of FRP type.	The Material of JB shall be Thermoplastic or thermo-setting or FRP type. However, the same shall not be fire retardant material. Fire retardant JBs are required in Hazardous areas however now a days the hazardous area lighting fixtures comes with Inbuilt JB so the indoor JBs are not required to be made of fire-retardant material. Please confirm.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications.
274	SECTION VI, PART-B	SUBSECTION-B-11 STATION LIGHTING	10 OF 18	4.04.00	Flexible conduit shall be water proof and rust proof made of heat resistant TERNE coated steel.	We propose to provide Electro galvanized PVC coat-ed flexible conduit. Please confirm.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications.
275	SECTION VI, PART-B	SUBSECTION-B-11 STATION LIGHTING	11 OF 18	4.08.00	Lighting fixtures shall generally be group controlled directly from lighting panel. However, in office areas, control shall be provided through switch boxes. Each switch shall control a maximum of three fluorescent fixtures.	Please note that the loading of LED fixture is very small and as a standard practice 10-15 lighting fixtures are group controlled from the switch. If 3 fixtures are controlled from a switch, there will be lot of wiring and conduiting leading to difficulty in erection and maintenance.	Bidders Proposal can be discussed during the detailed engineering only as per requirement.
276	SECTION VI, PART-B	SUBSECTION-B-11 STATION LIGHTING	11 OF 18	4.12.00	Occupancy based Passive Infra-red sensors The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be minimum 5 metres for standard room height of 3m. All the calibrated settings shall be stored in non-volatile memory of PIR sensor which shall be unaffected by power supply fluctuations. Necessary 16A contactor shall be supplied along with each sensor & shall be located inside the switch box	Please note that in case occupancy sensor is used to control the lighting fixtures, the power supply from lighting panel is extended to occupancy sensor and lighting fixtures are controlled from occupancy sensor. The outgoing feeder of lighting panel is already provided and additional 16A contactor is not required for the sensor. Further, it will not be feasible to mount the contactor near the occupancy sensor. Accordingly, it is requested to remove the requirement of 16A contactor.	Bidders Proposal may be considered as per system requirement. However it can be decided during the detailed engineering.
277	SECTION - VI, PART-A	SUB-SECTION-IIB ELECTRICAL SYSTEM / EQUIPMENTS	PAGE 7 OF 20	1.14.00	Control of Electrical System of Main Plant, EHV Breakers of Generator Bay and Balance of Plant (BOP) shall be provided from DCS with suitable ECD (Electrical Control Desk) and/or Soft HMI. The details of the same are specified in relevant sections of Control and Instrumentation.	Please confirm if ECD is required for BOP areas also.	ECD or soft HMI or Both can be provided for BOP Areas as specified in relevant sections of C&I.
278	SECTION - VI, PART-B	B-0 B-10	10 OF 15 11 OF 21	3.07.00 5.01.00	The earthing system for plant shall be de-signed for a life expectancy of at least forty (40) years, for a system fault current of 63 kA for 1.0 sec	The earthing system for plant shall be designed for a life expectancy of at least forty (40) years, for a system fault current of 50 kA for 1.0 sec as per design considered in other NTPC projects	Bidders proposal is not acceptable. Earthing System for stage-II shall be designed for a fault current of 63kA for 1 Sec.
279	SECTION - VI, PART-B	B-0	10 OF 15	3.07.00	Earthing & Lightning Protection System	Soil resistivity may please be provided for grid de-signing	Will be provided during the detailed engineering
280	SECTION-VI PART-B	SUB SECTION-B-10	3 of 21	3.01.03	Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 metre.	Bidder proposes cable trays width of 450 mm along-with 150 mm, 300 mm & 600 mm.	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
281	SECTION-VI PART-B	SUB SECTION-B-10	3 of 21	3.1.04	Cable troughs shall be required for branching out few cables from main cable route.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses specification since the specification also informs to use Slits, branch trays.)	Bidders Proposal may be considered on case to case basis as per system requirement. However it can be decided during the detailed engineering.

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282	SECTION-VIPART-B	SUB SEC-TION-B-10	4 of 21	3.02.02(F)	Cantilever arms of 320 mm, 620mm and 750 mm in length are required, and shall be as shown in the enclosed drawing	Since only 600mm, 300mm and 150mm are to be in-stalled as per technical specification, Cantilever arms of 300mm for 150mm wide tray, 450mm for 300mm wide tray and 750mm for 600mm wide cable tray shall be provided. The same is in line with other NTPC projects executed by Bidder.	Bidders Proposal is not acceptable. Bidder shall comply to technical specifications.
283	SECTION-VIPART-B	SUB SEC-TION-B-10	6 of 21	3.09.01	The cable clamps/ties required to clamp multi-core cables shall be of SS-316 material, 12mm wide, polyester coated ladder lock type.	Self-locking, Nylon ties shall be used for clamping of multicore cables	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
284	SECTION-VIPART-B	SUB SEC-TION-B-10	10 of 21	4.4.09	Wherever few cables are branching out from main trunk route troughs shall be used.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/Local Buried Pipe / Silt / Branch Trays shall be used. Please confirm. (The above is in line with other clauses specification since the specification also informs to use Sills, branch trays.)	Bidders Proposal may be considered on case to case basis as per system requirement. However it can be decided during the detailed engineering.
285	SECTION-VIPART-B	SUB SEC-TION-B-10	10 of 21	4.4.14(3)	Power and control cables for AC drives and corresponding emergency AC crDC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.	It shall be complied to the extent feasible for essential drives only	Bidders Proposal is not acceptable. Bidder must adhere to technical specifications
286	SECTION-VIPART-B	Book 3 of 5/SUB-SECTION-IIIC-13	1 of 3	3.01.02	The call stations and stand alone amplifiers shall be individually IP addressable.	FCS/ DTS or Stand Alone Amplifiers shall be IP addressable but Loud Speakers shall be of analog type. Please confirm.	Bidder's understanding is correct.
287	SECTION-VIPART-B	Book 3 of 5/SUB-SECTION-IIIC-13	1 of 3	2.00.00	POWER SUPPLY ARRANGEMENT	All Ethernet switches (where localised UPS Supply not available) shall be having distributed mini UPS having power backup which in turn shall be fed by normal Lighting socket. These Ethernet switches shall be powering POE DTS/FCS. Please confirm	OEM standard and proven practice, meeting functional requirement shall be acceptable. The same shall be finalized during detail engineering.
288	SECTION-VIPART-B	Book 3 of 5/SUB-SECTION-IIIC-13	2 of 3	4.02.00	The outdoor wall/column mounting type call station shall be dust-tight and weather proof, with appropriate protection against direct rain, ingress of dust and moisture conforming to IP-65 degree of protection as per IS/IEC:60947-1, outdoor wall/column mounting type. The in-door desk-top mounting type call station shall have a degree of protection of at least IP-32	Outdoor FCS shall be with or without handset. Please confirm	Bidder to meet spec requirement. Further detailing shall be done during detail engineering.
289	SECTION-VIPART-B	Book 3 of 5/SUB-SECTION-IIIC-13	2 of 3	4.04.00	The indoor desk mounting type call stations shall preferably be PoE powered	Indoor Desktop Station or Outdoor FCS both shall be PoE powered. Please confirm.	OEM standard and proven practice, meeting functional requirement shall be acceptable. The same shall be finalized during detail engineering.
290	SECTION-VIPART-B	Book 3 of 5/SUB-SECTION-IIIC-13	3 of 3	9.00.00	LOUDSPEAKERS	Loudspeakers analog or IP Based is not mentioned. FCS/ DTS or Stand Alone Amplifiers shall be IP addressable but Loud Speakers shall be of analog type. Please confirm.	Bidder's understanding is correct.
291	SEC VI PART- E (Tender Drgs.)	0000-999-POI-A-071A, RA		Note no.3	Bidder to ensure that 100% cores are kept as spares in all types of Fibre optic cables.	10% cores shall be kept as spares in all types of Fibre optic cables.	Proposal not acceptable. Bidder to meet spec requirement.
292	VIB	D-1-7	7	7.04.03	Backfilling in Main Power House & Boiler Area This clause is applicable in the following areas: a) Main Power House Building foundations including Auxiliary column foundations, TG foundations, BFP foundations, CW pit, CEP Pit b) Common control room building foundations (between the Main Power House Buildings) c) Boiler foundations including Mill Bunker building foundations, Coal Mill foundations. After construction of foundations for above mentioned buildings/ facilities, excavated earth between the excavation profile and the foundations, wherever backfilling is required, shall be backfilled with sand from founding level till finished ground level in the excavated profile. In case block excavation is carried out for the above mentioned areas, after construction of foundations, whole area shall be backfilled with sand from founding level till finished ground level. Sand used for filling shall be natural sand/manufactured sand, and clean & well graded conforming to IS 383 with grading Zone I to III. Backfilling with sand shall be carried out in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density.	Backfilling around foundations can be done with approved excavated material in place of sand. Now-a-days sand mining is prohibited in many states as per NGT guidelines. Wherever it is not prohibited, it is very costly. Excavated material can be used for backfilling in Main power house and Boiler area to reduce project cost. Please confirm.	Bidder's proposal is not acceptable. Bidder to comply specification requirement.
293	VIB	D-1-7	3	7.02.02 g)	During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-1.	Considering that geotechnical investigation shall be conducted at the contract stage, allowable bearing pressure will be based on finalized report and will supersede the values given in Table-1. Please confirm.	Table for NABC is superseded. Bidder to refer Amendment no D-1-01.D-1-02
294	VIB	D-1-7	4	7.02.03 ii)	The pile shall be socketed into rocky strata with minimum socket length of 5m into rock.	This restriction may be removed as length of rock socketing depends on nature of rock and it is varying for different rock conditions. Length of rock socketing shall be provided as per approved Geotechnical Investigation Report and as per codal guidelines. Please confirm.	Bidder to refer Amendment no D-1-01.D-1-02
295	VIB	D-1-7	4	7.02.03 ii)	The uplift and lateral load capacity shall be respectively restricted to 35% and 5% of the allowable load capacity in vertical compression	This restriction may be removed as lateral capacity and uplift capacity of pile is independent of pile capacity in vertical compression. Lateral and uplift capacity of pile depends on nature of sub soil strata, dia of pile etc. Hence actual value arrived as per theoretical calculation shall be used for lateral and uplift capacity of pile. Technically, there is no relation between lateral and uplift capacity of pile with pile capacity in vertical compression. Please confirm	Bidder to refer Amendment no D-1-01.D-1-02
296	GENERAL					Please furnish the topographical survey including spot level and contour in Auto cad format.	During Tender stage providing Auto cad drawing is not envisaged Auto Cad drawing shall be shared with successful bidder.
297	GENERAL					Please furnish the general layout plan in Auto cad format.	During Tender stage providing Auto cad drawing is not envisaged Auto Cad drawing shall be shared with successful bidder.
298	GENERAL					Please furnish the site levelling plan in Auto cad format.	During Tender stage providing Auto cad drawing is not envisaged Auto Cad drawing shall be shared with successful bidder.
299	VI / B	D-1-5	21 of 86	5.03.09	(i) All exposed steel surfaces (including exterior surface of mild steel flue liner in case the design does not envisage provision of thermal insulation on the exterior surface of flue liner) except sur-faces of steel wind strakes shall be painted as specified in corrosion protection clause of this specification. (ii) All steel parts embedded in concrete like Strake embedment assembly including bolts, nuts, washers, pipe sleeves and insert plate shall be galvanized as per IS-4736. The minimum weight for galvanizing shall be 610 g/sq.m and shall comply with relevant IS Codes.	As per IS 4998:2015, provision of strakes is not mentioned. Kindly check the requirement of strakes and confirm.	Strakes are not envisaged
300	VI / B	A-01	39 of 101	1.05.22.01	For Borosilicate lining, the top flue liner above the roof slab shall be made of C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 8 mm thickness with Borosilicate Glass Block Lining of minimum 38 mm thickness. The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner.	For Borosilicate lining, top flue liner above the roof slab, bidder proposes to provide 8 mm thick (minimum) mild steel with Borosil-cate Glass Block Lining of minimum 38 mm thickness and external surface of flue liner projecting over the chimney roof wrapped with 2 mm thick Titanium sheet, as per de-tailed engineering done for various NTPC FGD projects like DADR, BARH-II, Nabinagar etc. Kindly confirm.	Bidder to refer Amendment SG1 in this regard.
301	VI / B	A-01	39 of 101	1.05.22.01	For Borosilicate lining, top portion of the flue can shall be fitted with stop bar of 8 mm thick capping of Titanium / C-276 sheet to avoid any damage in between flue can and borosilicate lining. The minimum length of the capping inside the chimney shall be atleast equal to 1/4th diameter of flue liner.	For Borosilicate lining, top flue liner above the roof slab, bidder proposes to provide 8 mm thick (minimum) mild steel with Borosil-cate Glass Block Lining of minimum 38 mm thickness and external surface of flue liner projecting over the chimney roof wrapped with 2 mm thick Titanium sheet, as per de-tailed engineering done for various NTPC FGD projects like DADR, BARH-II, Nabinagar etc. Kindly confirm.	Bidder to refer Amendment SG1 in this regard.
302	VIB	SUB-SECTION-D-1-8	10 of 19	8.07	All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections.	Based on our past experience, it becomes extremely difficult to accommodate bolted field connections. It is hence requested to permit welded field connections at locations where inputs are not available initially and in Pipe Rack/Cable Racks.	Bidder to comply specification requirement.
303	VI / B	D-1-9	14 OF 30	9.11.11	Electrically operated, self-operable/closing, aluminum framed with tinted glass, sliding doors.....	Please specify the thickness of fire rated glass used for sliding door in CCR of MPH building whether it is DGU or single glass.	Bidder to refer amendment D2-13
304	VI / B	D-1-9	14 OF 30	9.11.11	The glass must be minimum 14mm clear (MADE IN INDIA) 120 min fire rated for Integrity, Radiation control (EW 120) and partially-insulation (EI 20) Non Wired Toughened Interlayered glass with a light transmission of 86% and a sound reduction of 38 dB and manufactured in UL & TÜV..... The glass shall be tested and certified for no formation of bubbles or yellowing after 5000 hours of exposure to UV radiation by TÜV Rheinland as per EN 12543-4. The base glass and finished glass must be made in India .	Bidder understands that this is a special type of glass based on customization. 14 mm thickness is rarely manufactured and used for application areas mentioned in the specification. Also it is processed by only one manufacturer. Bidder proposes to allow 11mm to 13mm thick glass as it is processed by 3 to 4 manufacturers in the market, to avoid monopoly	Bidder to refer amendment no. D2-13
305	VI / B	D-1-9	14 OF 30	9.11.11	The glass must be minimum 14mm clear (MADE IN INDIA) 120 min fire rated for Integrity, Radiation control (EW 120) and partially-insulation (EI 20) Non Wired Toughened Interlayered glass with a light transmission of 86% and a sound reduction of 38 dB and manufactured in UL & TÜV..... The glass shall be tested and certified for no formation of bubbles or yellowing after 5000 hours of exposure to UV radiation by TÜV Rheinland as per EN 12543-4. The base glass and finished glass must be made in India .	Provide thickness of DGU glass for MPH CCR BUILDING.	Bidder to refer amendment D2-13
306	VI / B	D-1-9	15 OF 30	9.12.06	Internal Glazed partition in MPH shall be Vetrotech Saint-Gobain fully glazed fire rated fixed partition with 120 minutes of integrity and radiation control (EW 120) with symmetrical..... The glass shall be Contriflam Lite 14mm (MADE IN INDIA) clear 120 min fire rated for Integrity, Radiation control (EW 120) and partially insulation (EI 20) Non Wired Facility and including UL-EU Certification and compliant to class 1(B)1 category of Impact Resistance as per EN 12600.	Bidder understands that this is a specialized glass produced by few manufacturers only. The specification 14MM thick fire rated glass is not the processor of fire rated glass except Saint-Gobain. The glass shall be Contriflam Lite 14mm (MADE IN INDIA) clear 120 min fire rated for Integrity, Radiation control (EW 120) and partially insulation (EI 20) Non Wired To avoid monopoly in the market, bidder proposes 11 to 13mm thick glass for such kind of application and to achieve the re-quired fire rating.	Manufacturers are already mentioned in the Technical Specifications. 14 mm Glass is required for fire and life safety. Bidder to comply specification requirements
307	VI / B	D-1-9	16 OF 30	9.12.06	.....The Partitions shall offer C4 level of wind resistance when tested as per EN12211 and shall provide class 4 level of air permeability as per EN 1028. The Partitions shall also be tested .....The Partitions shall have a water tightness level of 8A when tested as per EN 1027. Partition shall be of Makes - Saint Gobain, Acoror , JCI , Matrix, Tata Travels.	Bidder understands that mentioned makes are not providing complete fire rated system with test certificate and also some of them are not the processor of fire rated glass except Saint-Gobain. As it is a monopolistic item of SAINT GOBAIN. Bidder requests to provide some more glass manufacturers names to avoid monopoly in the market with the proposed glass thickness of 11 to 13 mm in place of 14 mm only as 2 hours' fire rating can be achieved by 11mm thick glass also.	Manufacturers are already mentioned in the Technical Specifications. 14 mm Glass is required for fire and life safety. Bidder to comply specification requirements

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

374	Section - VI, Part - B	Sub Section A-18,	8 of 14	Cl. No. 5.15.00	Cabling for Fire Detection & Alarm (FDA)	<p>1. Cable size of 1 Pair x 1.5 sqmm, armoured, shielded shall be used for loop wiring.</p> <p>2. Cable size of 2C x 2.5 sqmm armoured shall be used for powering various devices in loop and solenoid valves of spray system</p> <p>3. Inside buildings cables shall be laid directly on the wall with saddle spacers. No conduit shall be used for laying FDA cables.</p> <p>4. In conveyor areas, cables shall be buried along the conveyor length with HDPE conduits.</p> <p>Customer may please confirm.</p>	<p>1. Bidder proposal is also acceptable.</p> <p>2. Bidder understanding is correct.</p> <p>3. FDA cables shall be laid through conduits. The conduit shall be enclosed as per the building texture for proper aesthetic looks in rooms/areas like auditorium/conference hall/meeting rooms/lobby/reception/ etc.</p> <p>4. Bidder proposal is also acceptable.</p>
375	Section - VI, Part - B	Sub Section A-18,	10 of 14	Cl. No. 5.18.00	Multisensor detector shall be provided for return air ducts of main plant, which shall consist of intake probe, detector housing, and exhaust pipe etc. The detector shall be mounted outside the duct.	<p>Duct detectors are not considered as multisensor detectors shall be provided in the AHU room.</p> <p>Customer may please confirm.</p>	Bidder to provide duct detector as per technical specification requirement.
376	Section - VI, Part - B	Sub Section A-18,	8 of 14	Cl. No. 5.13.00	Power Supply for Fire Alarm Panels & Repeater Alarm Panel	<p>Fire Alarm Panels shall be powered from 1 no. of 230 V AC plant UPS system.</p> <p>Customer may please confirm.</p>	Each Fire Alarm Panel shall be powered from redundant power supply source (2 nos).
377	Section - VI, Part - B	Sub Section A-01,	72 of 101	Cl. No. 3.12.04.i	Alarms from these panels shall also be available to operator at fire alarm addressable panels, central monitoring station and DDCMS.	<p>Please clarify the route length from i) Central monitoring station to Proposed bidder's battery limit. ii) DDCMS to Proposed bidder's battery limit.</p>	All the systems mentioned by bidder are in the bidder's scope.
378	Section - VI, Part - B	Sub Section A-12,	8 of 11	Cl. No. 4-g, fire alarm system C-iii	Centralized PC based monitoring station with color graphics display monitor along with mini-UPS and one A4 size color laser printer shall be provided with Unit-1 FAP and to be located in Unit-1 Central Control Room.	<p>1. Please furnish the route length from Unit-1 central control room to proposed bidder's battery limit. 2. Bidder understands that unit-1 FAP mentioned is in the scope of owner please confirm.</p>	Bidder to note that unit 1 refers to first unit under this EPC package.
379	Section - VI, Part - B	Sub Section A-12,	8 of 11	Cl. No. 4-g, fire alarm system C-iv	One number addressable type repeater announcement panel in Employer's central fire station	Please furnish the route length from Employer's central fire station to proposed bidder's battery limit.	Bidder to refer GLP in tender drawing.
380	Section - VI, Part - A	Sub section -III Terminal Panel and Exclusion	1 of 3	1.05.00	Separate Hydrant and spray headers available in plant area for tapping required for Hydrant and Spray system.	<p>Please indicate the following thing :- 1. The available pressure and pipe size for Hydrant and Spray System. 2. Please indicate the location of tap off points for Hydrant and Spray from existing pipe network.</p>	<p>Details (flow, head, quantity) of existing fire water pumps is already enclosed at Annexure - III of SUB SECTION-A-18 Fire Detection & Protection System.</p> <p>Tap off points for hydrant and spray system shall be finalised during detailed engineering.</p>
381	Sec VII/Part-A Letter dated 17.12.2022	SUB-SECTION-I-A	3 of 36	3.1 (e)	<p>Equipment rating:</p> <p>Capacity not less than 1250 Ton/ hr and total developed Head not less than 320 Kg/cm2</p>	<p>Based on the operational parameters of 800 MW Utility Sets commissioned in India, we request M/s NTPC to modify the clause as follows.</p> <p>Capacity not less than 1250 Ton/ hr and total developed Head not less than 270 Kg/cm2</p> <p>OR</p> <p>Capacity not less than 1250 Ton/hr and total developed Head not less than 290 Kg/cm2 (including Booster pump head).</p>	Bidder to comply specification requirement.
382	Sec VII/Part-A Letter dated 17.12.2022	SUB-SECTION-I-A	4 of 36	3.1	The provenness criteria for equipment (PA fans, ID fans, FD fans and Booster Fans) stipulated at Sl. No. (a), (b), (c) & (h) above shall also be considered acceptable provided the rating parameters (i.e., flow, head and rated rpm) is covered within the operating regime of the respective fan performance curve of the reference plant equipment.	<p>Boiler feed pump and its matching booster pump are capable of operating at different RPM for meeting the flow and head requirement by the System. Hence M/s NTPC is requested to add Boiler Feed Pump incl Booster Pump in this clause and modify the clause as follows.</p> <p>The provenness criteria for equipment (PA fans, ID fans, FD fans , Booster Fans and Boiler feed Pump incl. Booster Pump) stipulated at Sl. No. (a), (b), (c), (h) & (o) above shall also be considered acceptable provided the rating parameters (i.e., flow, head and rated rpm) is covered within the operating regime of the respective equipment performance curve of the reference plant equipment.</p>	<p>Bidder proposal is not acceptable.</p> <p>Bidder to comply specification requirement.</p>
383	Sec VI/Part-A	SUB-SECTION-I-A	7 of 36	4.2	<p>Notes for clause 4.2.1, 4.2.2 and 4.2.3 i) For qualification under clause 4.2.1, a firm can meet the requirements stipulated under clause 4.2.1 above either singularly or collectively along with its Subsidiaries.</p> <p>In such a case, the Bidder/its sub-vendor shall be required to furnish a letter of technical support from Collaborator / Associate / Holding company along with all its subsidiaries extending support to the holding company / Associate or collaborator for complying requirements of clause 4.2.1 for successful performance of CW pumps, as per the format enclosed in the bidding document. This letter of technical support should be submitted to Employer prior to the placement of order on approved sub-vendor.</p>	<p>We understand that OR requirement mentioned under clause no 4.2.2 and 4.2.3 of CWP provenness calls for letter of technical support from collaborator/associates who in turn meets the requirements of clause no-4.2.1 as the bidder/sub-vendor has prior experience of CWP of flow 15000 m3/hr or more and not meeting qualification requirement as per clause 4.2.1.</p> <p>From above, it is clear that if a bidder/sub-vendor is qualifying under clause no-4.2.1, then the bidder/sub-vendor is not required to furnish any letter of technical support as the bidder/sub-vendor itself qualifies on its own.</p> <p>Hence this notes (i) is not required and M/s NTPC is requested to delete this requirement for bidder/sub-vendor meeting qualification requirement under clause no-4.2.1.</p> <p>Or</p> <p>customer is requested to add followings to the existing clause</p> <p>"In case the bidder/sub-vendor has already manufactured, supplied and commissioned (singularly/collectively along with collaborator) and which is in successful operation and meeting the qualifying requirement under 4.2.1 and now has fully acquired the technology from the collaborator under technology transfer agreement, letter of technical support from the collaborator can be waived off. Bidder to submit document supporting complete technology transfer.</p>	<p>Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.</p>
384	Sec VI/Part-A	Sub Sec-II/Chapter-06	3 of 10	2.02.08	Portable turbine preservation system consisting of adequate numbers of air driers including, fans, motors, filters, heater drying wheel, connecting piping's, valves, fittings etc. for preservation against corrosion of turbine during idle periods shall be provided. One number system per station shall be provided.	Turbine preservation systems are not considered for BFP drive turbine as per our standard scope of supply to NTPC projects. We presume these are specified for main Steam turbine as per our understanding.	Bidder understanding is correct.
385	Sec VII/Part-A	Sub Sec-VII/Chapter-02	8 of 31	10	Electrohydraulic assembly for governing system of TDBFP's	Electrohydraulic assemblies in governing systems are generally employed in high pressure governing systems where the control oil pressure is at 160 bar and above. The governing system valve actuator assemblies used in the TDBFPs are low pressure (8 bar) hydraulic actuators which receive only hydraulic signals generated by the IH (current to hydraulic signal) converters mounted in the console. Hence, the EH assembly is not applicable for TDBFP's	Bidder to refer General note 3 in page-30 of 31 of Part-A/Sub-Section-VI, Chapter-02/Section-VI regarding not applicable item.
386	Sec VI/Part-A	Sub Sec-VI/Chapter-02	16 of 31	15.1	One set of emergency over speed governor assembly	Electronic over speed protections 2 out of 3 voting are used for emergency protection purpose in line with latest practice followed in power industries. Spares applicable for electronic type over speed protection system will be provided against this clause. Mechanical over speed protection system is obsolete and same is not envisaged with BFP Drive Turbine.	Bidder to refer General note 3 in page-30 of 31 of Part-A/Sub-Section-VI, Chapter-02/Section-VI regarding not applicable item.
387	Sec VII/Part-B	Sub Sec-A-07	2 of 25	1.09.01 (a)	Provide Temporary & Permanent steam strainers for Emergency stop and Reheat Stop or control valves. In case there is no provision for temporary strainer, one set of strainers per unit shall be provided in addition to the permanent strainer.	As per our pre-commissioning/initial operation activities of Steam Blowing, the strainer is removed from the line and blanking fixture is used to isolate the steam turbine from steam supply. After steam blowing, the removed strainer is placed in the line again. Hence, we do not need any additional strainer for initial operation. Blanking device will be supplied by us.	As per NTPC operating experience it is observed that after steam blowing loose dirt particle may enter in turbine and may choke the strainer. So additional strainer is specified for initial operation. Bidder to comply specification requirement.
			14 of 25	6.05.04 (a), 6.05.04 (c)	Stop Valves to be provided with removable stainless steel steam strainer for normal operation and one additional strainer element shall be provided for initial operation. Stop valves to have provision for on load testing.	ATT is not applicable for this size and range of Industrial Turbines. However, we confirm that on load testing (partial stroke test) of ESV to ensure freeness is provided.	For provision of on load testing of stop valve(s), bidder to comply specification requirement.
388	Sec VI/Part-B	Sub Sec-A-07	15 of 25	6.05.06 (c)	Particle size impurities test and moisture test as detailed out for Main Turbine, is to be carried out on one oil purification system of BFP drive turbine.	The capacity of oil purifier is 2400 LPH. For this capacity the approved vendors (Alfa Laval and GEA Westfalia) have type tested for particle size and the test was approved by NTPC for the recent project. Hence this test is not envisaged.	Bidder to refer clause no 12.00.00 Sub-section A-07 Part-B, Section-VI w.r.t. Type test requirement. Bidder to comply technical specification requirement.
389	Sec VI/Part-B	Sub Sec-E-12	3 of 4	7	Full load full speed/back to back locked rotor torque test for one gearbox.	Gear box already tested for full load full speed/back to back locked rotor torque test and was approved by NTPC for earlier executed projects. Hence this test is not envisaged.	Bidder is to follow the Technical Specification requirement.
390	API 612- 6th edition deviations			10.4	Unless otherwise specified, condensing turbines shall be provided with at least two grounding brushes on the same end of the shaft.	One number grounding brush will be provided due to space constraints in the bearing housing. This is in line with all NTPC Projects.	Bidder's proposal is not acceptable. Bidder to comply specification requirement.
391	Sec VI/Part-A	Sub-Sec-IIA-06	6 of 10	6.01.00	One set of test kit for measuring oxygen content at deaerator outlet shall also be provided for the station.	Online oxygen measuring provision is being provided by Bidder. Hence, Offline test kit for measuring oxygen content at deaerator outlet is not required. Customer is requested to accept above.	Oxygen content is important operational parameter. Hence one additional set of test kit for the station for measuring oxygen content at deaerator outlet is specified to ensure the oxygen content. Hence Bidder proposal is not acceptable. Bidder to comply specification requirement.

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392	Sec VI/Part-B	Sub-Sec-A-01	49 OF 101	2.03.07	Maximum oxygen content shall be 0.005 co/lt at deaerator outlet measured as per ASTM-D-888 reference method-A or Indigo cammine method at all operating condition.	All super critical units operated in oxygenated treatment mode and hence guarantee for maximum oxygen content in feed water system is not applicable for super critical sets.	Sometimes there may be requirement of AVT operation during unit running also. In case of oxygenated treatment mode oxygen content may be more but when unit will run in AVT mode this should be less than 0.005 co/lt. So deaerator should be capable for maintaining maximum oxygen content of 0.005 co/lt at deaerator outlet. Bidder to comply specification requirement.
393	Sec VI/Part-B	Sub-Sec-A-07	11 OF 24	5.02.00 (e)	Hardened 400 series stainless steel impingement plates for flashed drain inlet from HP heaters, BFP recirculation, boiler startup drains etc.	As per bidder's experience of super critical plants, Hardened 304 series stainless steel impingement plates are also suitable for this purpose. Customer is requested to amend the clause as "Hardened 400 series or 304 series stainless steel impingement plates"	Hardened 400 series stainless steel is better material for specified requirements. Bidder proposal is not acceptable. Bidder to comply specification requirement.
394	Sec VI/Part-B	Sub-Sec-A-07	11 OF 25	5.02.00 (f)	All water spray valves, splash plates, trays, vent condenser and other elements in contact with undereated water or non-condensable gases shall be of SS-304 or SS-410	Customer is requested to modify the clause as follows Elements in contact with undereated water or non-condensable gases shall be of SS304 material / SS304 lining material. This is in line with the Deaerators supplied for all 500 MW and above projects.	SS304 lining is not acceptable. Bidder to comply specification requirement.
395	Sec VI/Part-B	Sub-Sec-A-07	10 OF 25 & 12 OF 25	5.01.00 & 5.03.00	Low Pressure Heaters and Drain Cooler : Horizontal and U-tube type with integral drain cooler. HIGH PRESSURE HEATERS HP Heaters with de-superheating, condensing and Drain cooling section.	Heaters will be provided with Desuperheating, Condensing and Drain cooling zone as per design Code requirements.	Bidder to comply specification requirement. Also, refer amendment TG1-18 in this regard.
396	Sec VI/Part-A	Sub Sec VI	2 of 3	4.00.00	All the spares (both recommended and mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.	Components designed by the OEM can be manufactured by one or more sub-vendors meeting customer's guarantee requirement as per specification. Customer is requested to accept mandatory spares supply from a vendor different from vendor who has supplied the same component for main supply.	Bidder proposal is not acceptable. Bidder to comply specification requirement
397	Sec VI/Part-A	Sub Sec VI/Chapter 1	8 of 36	1.06.00 (14)	Coal Pulverizers: 14. Filter Cartridges: 10 Nos.	We understand that this requirement is not for Planetary Gear Box for Pulverizers. Filters for gear box lube oil system is covered under clause no-1.06.00 (17.4) Customer is requested to clarify.	This shall be finalized during detail engineering based on type of system/equipment offered. Bidder to provide mandatory spares in line with specified requirements.
398	Sec VI/Part-A	Sub Sec VI/Chapter 1	7 of 36	1.06.00 (4)	Coal Pulverizers: 4. Bearings for mills: 5 Sets.	We understand that this requirement does not include the bearings for Gear Box as the bearing for gear box is covered under clause no-1.06.00 (19) Customer is requested to clarify.	This shall be finalized during detail engineering based on type of system/equipment offered. Bidder to provide mandatory spares in line with specified requirements.
399	Sec VI/Part-A	Sub Sec VI/Chapter-2	31 of 31	General note-8	General Note-8: If any item appears in more than one place (Group A, B, C) same shall be considered by the bidder irrespective of duplicity and price shall be considered accordingly	We understand that if any item is duplicated in Group-A itself, then same to be quoted only once in group A. Similar things for Group B & C also. Customer is requested to clarify.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
400	Sec VI/Part-A	Sub Sec VI	2 of 3	4.00.00	All the spares (both recommended and mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.	Components designed by the OEM can be manufactured by one or more sub-vendors meeting customer's guarantee requirement as per specification. Customer is requested to accept mandatory spares supply from a vendor different from vendor who has supplied the same component for main supply.	Bidder proposal is not acceptable. Bidder to comply specification requirement
401	Sec VI/Part-A	SUB-SECTION-I-A	Pg 3 of 36	3.1 (e)	"Capacity not less than 1250 Ton/ hr and total developed Head not less than 320 Kg/cm2"	"Capacity not less than 1250 Ton/ hr and total developed Head not less than 270 Kg/cm2" OR Capacity not less than 1250 Ton/hr and total developed Head not less than 290 Kg/cm2 (including Booster pump head)	Bidder's proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
402	Sec VI/Part-A	SUB-SECTION-I-A	Pg 4 of 36		The provenness criteria for equipment (PA fans, ID fans, FD fans and Booster Fans) stipulated at Sl. No. (a), (b),(c) & (h) above shall also be considered acceptable provided the rating parameters (i.e., flow, head and rated rpm) is covered within the operating regime of the respective is performance curve of the reference plant equipment.	The provenness criteria for equipment (PA fans, ID fans, FD fans, Booster Fans and Boiler feed Pump incl. Booster Pump) stipulated at Sl. No. (a), (b),(c), (h) & (p) above shall also be considered acceptable provided the rating parameters (i.e., flow, head and rated rpm) is covered within the operating regime of the respective equipment performance curve of the reference plant equipment.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
403	Sec VI/Part-A	SUB-SECTION-I-A	Pg 7 of 36	4.2	Notes for clause 4.2.1, 4.2.2 and 4.2.3 For qualification under clause 4.2.1, a firm can meet the requirements stipulated under clause 4.2.1 above either singularly or collectively along with its Subsidiaries. "In such a case, the Bidder/its sub-vendor shall be required to furnish a letter of technical support from Collaborator / Associate / Holding company along with all its subsidiaries extending support to the holding company / Associate or collaborator for complying requirements of clause 4.2.1 for successful performance of CW pumps, as per the format enclosed in the bidding document. This letter of technical support should be submitted to Employer prior to the placement of order on approved sub-vendor."	NTPC is requested to delete/modify the clause because of following: We understand that QR requirement mentioned under clause no 4.2.2 and 4.2.3 of CWP provenness calls for letter of technical support from collaborator/associates who in turns meets the requirements of clause no-4.2.1 as the bidder/sub-vendor has prior experience of CWP of flow 15000 m3/hr or more and does not meet the qualification requirement as per clause 4.2.1. From above, it is clear that if a bidder/sub-vendor is qualifying under clause no-4.2.1, then the bidder/sub-vendor is not required to furnish any letter of technical support as the bidder/sub-vendor itself qualifies on its own. Hence the note (i) for clause 4.2.1, is not required and M/s NTPC is requested to delete this requirement for bidder/sub-vendor meeting qualification requirement under clause no-4.2.1. OR customer is requested to add following to the existing clause "In-case the bidder/sub-vendor has already manufactured, supplied and commissioned singularly/collectively along with collaborator) and which is in successful operation and meeting the qualifying requirement under 4.2.1 and Bidder has now fully acquired the technology from the collaborator under technology transfer agreement, letter of technical support from the collaborator can be waived off. Bidder to submit document supporting complete technology transfer."	Bidder's proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.
404	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	PAGE 6 OF 11	f)	f) Fire protection for Biomass Silos Gaseous based fire protection system shall be provided for Biomass storage silos as per industry practice.	Fire Protection system for Biomass Silos in the form of Gas is not clear in the Specification. We have considered manual hydrant valve system for Biomass storage silos. Please confirm.	Gaseous based fire protection system shall be provided for Biomass storage silos complying to Indian/international codes/standards as per industry practice.
405	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	PAGE 10 OF 11	ii)	ii) Short term fire proof cable shall be provided for all coal conveyors and Biomass fire detection and protection system and inert gas protected areas.	FDPS requirement for Biomass is not clear. Please clarify.	Biomass fire detection and protection system is clearly specified in the technical specification. Bidder to comply technical specification requirement.
406	TECHNICAL SPECIFICATION SECTION - VI, PART - B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	Page 10 of 14	39; IV.	IV. Fire water pipes in main plant area shall generally be routed either on trestle or shall be supported from main plant structure, except in transformer yard area and in C-D bay, where the FW pipes shall be routed in trenches.	In Transformer yard area Fire pipes shall be routed in trenches however In C-D bay area, Fire pipes shall be routed on existing pipe racks supporting structures. Please confirm.	Bidder to follow specification requirement
407	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-18 Fire Detection & Protection System	Page 14 of 14	Annexure-II	Technical Data: Annexure-II Note: "In case of front mill configuration, fire water spray booster pumps shall not be provided if found not required during detailed engg"	In case of any mill configuration, Spray Booster pumps shall only be provided if found required during detail engg, based on pressure loss calculation. Please confirm	Technical specification requirement is clear about booster pump requirements.
408	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	PAGES OF 11	4.00.00	Further, the bidder scope of work shall include dismantling, re-erection, commissioning of any system / equipments / items of Stage - I, which are required during/ for construction of Stage - II facilities.	We understand that Fire water Pump house (FWPH) arrangement comprising of Hydrant & Spray Pumps (Motor + Diesel engine driven) & Jockey pumps shall be used from the existing Stage-I. New FWPH arrangement is not required and tap off from the existing pump house header shall be taken for fire protection of new Stage-II. In view of above dismantling works limited to the making opening in the walls of FWPH for laying the new pipe line is only to be carried out. Other than above job, no other dismantling or re-erection works are envisaged in the present scope of work. Please confirm.	Bidder understanding is correct that existing fire water tanks and pumps of stage - I shall be used for stage - II. The scope of fire water pumps shall be as per clause 4.00.00 (a) SUB SECTION-A-12 Plant utilities, Part - A of technical specification.
409	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.08.00	Four (4) nos. Vibrating feeders to feed the coal to crushers complete with drives, dust hood, all mechanical, electrical accessories and supporting structures etc.	In Flow diagram Vibrating screen feeder is shown. Kindly confirm which is to be provided, vibrating screen feeder or vibrating feeder	Vibrating feeders shall be provided. Refer Amendment No MH-1
410	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.11.00	Four numbers (4 Nos) of Belt Feeders below Crushers in Crushers House with drives, dust hoods, all mechanical, electrical accessories and supporting structures etc.	Belt feeders are more maintenance prone. So we propose usage of 2 belt feeders instead of 4 ensuring the system requirements.	Bidder may provide 04 Belt Feeders or 02 Belt Feeders complying duty requirement.
411	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.13.00	Necessary modifications of existing transfer points shall be in bidder's scope	Please provide the GA drawings of TP-4 and TP-14.	Shall be furnished to successful bidder.
412	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.31.00	One (1) No. belt vulcanizing machine for each Belt type (Steel Chord/Nylon etc) shall be provided	There are two types of belts in this contract. One NN carcass type and other one is Steel cord type. Hence we are considering 2 Nos belt vulcanizing machines (1 for NN and 1 for Steel cord). We are not considering separate belt vulcanizers based on belt widths	Bidder's proposal is acceptable.
413	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.14.00	This location of cable trestle to be carried out in EPC work	Please confirm that a period of minimum 45 days shut down shall be provided for re-routing the cable trestle	Bidder's proposal of 45 days shut down is not feasible. Intermittent shutdown of feeders/drives may be provided as per the requirement during the execution stage.

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414	SECTION VI, PART-B	A-20	Page 30 of 93	4.21.00	Maximum angle of outgoing feeder from BRU to be 20 deg	We propose maximum 23 degree as limiting value. We have working reference in NTPC, Dadri with 23 degrees	Bidder proposal shall be finalised during detail engineering.
415	SECTION VI, PART-A	IIA-15	Page 2 of 8 Page 3 of 8	1.13.00 1.15.00	1.15.00 States "All transfer points shall have separate debris disposal chute up to last operating floor." 1.13.00 states "All transfer points shall have separate debris disposal chute up to the ground floor."	Please confirm which clause is to be adopted	All transfer points shall have separate debris disposal chute up to last operating floor or up to the ground floor as applicable. The same shall be decided during detail engineering.
416	SECTION VI, PART-A SECTION VI, PART-B	IIA-15 IIA-20	Page 3 of 8 Page 54 of 93	1.16.00	Two (2) number of Stacker cum Reclaimer machines having rated stacking and reclaiming capacity. Travelling boom stacker cum bucket wheel boom reclaimer having reversible yard conveyor	Please confirm if the yard conveyor is reversible or not and stacker reclaimer shall be bi-directional or not	Reversible type stacker cum reclaimer with reversible yard conveyor complying the functional requirement is acceptable.
417	SECTION VI, PART-A	IIA-15	Page 2 of 8	1.25.00	Four (7) Nos. of suspended magnets on Conveyors complete with reject chutes, reject trolleys, supporting arrangement, and all mechanical, electrical, civil, structural works and accessories.	Please confirm if 7 Nos are required or 4 Nos are required. Reject chutes are not required for suspended magnets.	Refer Amendment No MH-3
418	SECTION VI, PART-A	IIA-15	Page 4 of 8	1.31.00	Water Pump houses & water tanks for dust suppression/ extraction, service water, cooling water and potable water system.	Ground floor of crusher house has lot of free space. Can we use this area for keeping the pumps and compressors (with proper enclosures like brick walls)?	Bidder proposal is not acceptable. Bidder to provide separate Water Pump houses & water tanks for dust suppression/ extraction, service water, cooling water and potable water system.
419	SECTION VI, PART-B	A-01	Page 93 of 101	4.02.06 iv)	The coal as received' shall contain varying percentage of fines. This may form adhesive lumps particularly during monsoon when surface moisture is at its maximum value. The sizing and selection of all equipment shall take care of above.	What is the percentage of fines in coal to be considered for design?	Bidder to consider maximum 40% fines (under 2mm) for design of chutes
420	SECTION VI, PART-B	A-01	Page 98 of 101	4.02.19	Minimum chute cross section is 1800mm x 1200mm	As per the calculation, minimum chute cross section required is 1200mm x 1200mm. In NTECL Vallur for similar capacity we have used 1200mm x 1600mm. Kindly check and confirm if we can go ahead with 1200mm x 1600mm.	Bidder to follow specification requirement.
421	SECTION VI, PART-B	A-21	Page 38 of 44	4.02.19	Building height shall take care of the following parameters: (c) In case of handling of the equipment on the side of the other equipment, ground clearance of moving equipment shall be 2500 mm (minimum).	Please confirm if this clause is exclusive for AHP or applicable for CHP as well. Specification/Tender condition calls for only AHP.	Referred clause is for AHP. Bidder to refer Sub section A-20 of Section VI for CHP.
422	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We propose to provide one no 3-way flap gates (at the discharge of 24A) instead of two nos 2-way flap gates as shown in the tender flow diagram. This gives better flexibility in terms of feeding.	Bidder's proposal is acceptable.
423	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We are not considering any dust suppression system/dust extraction system at the discharge of BCN-27 in TP-14 and receipt of BCN-26 in TP-4.	Bidder to provide dust suppression system/dust extraction system at the discharge of BCN-27 in TP-14 and receipt of BCN-26 in TP-4.
424	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	Should we consider B/F shown in TP-4 in our scope?	B/F shown in TP-4 is in Bidder's scope
425	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We understand that bidder's scopeterminates at the skirt board mounted on BCN 13A/B	Bidder to provide required skirtboard at Conveyor 13A/B.
426	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We propose head end discharge of tripper conveyors for filling the last bunker (21A/B, 22A/B)	Bidder's proposal is acceptable.
427	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	Number of crushers in the BOM/ technical datasheet is mentioned as CR-II (1 No). Kindly confirm if the quantity of crusher is 1 No or 4 Nos	Refer Amendment No MH-1
428	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	The interconnection between Biomass handling and coal handling are shown differently in plot plan and flow diagram. Flow diagram states that outgoing conveyor from biomass main storage (BMC-12) will feed to conveyor 24A/B in TP-23. In plot plan the conveyor BCN-17A/B will be getting feed from biomass conveyor/bucket elevator in BMTP. Kindly clarify the anomaly.	Biomass conveyor shall feed biomass on conveyor BCN-18A/B or onwards/subsequent conveyor(after direct and reclaim path). Refer Amendment No MH-1
429	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We are not considering any dust extraction for bunkers	Bidder's understanding is correct.
430	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	We are not considering any DFDS for bunker bay/tripper floor	Bidder to provide DFDS/CFDS for Bunker conveyor at Tripper floor.
431	SECTION VI, PART-B		Page 65 of 85	9587-001(R)-POM-A-002	Tender flow diagram	Tender flow diagram BOM/technical specification states that quantity of sump pump is 1 lot. In Part B it is mentioned " Eight (8) nos. sump pumps (sludge duty) in track hopper, two (2) Nos. sump pumps in each TP's completely or partially underground, complete with motors, local control panel, level switches, individual discharge piping fittings and valves to nearest plant drain including pipes etc. upto disposal point. " As there is no underground TP as per flow diagram, we are considering 8 Nos of sump pumps	Bidder to follow specification requirement.
432					Plot Plan	Please note that the length available for track hopper conveyor is around 560m. This length is insufficient for BCN 1AB which is feeding to crusher house. Kindly provide additional straight length for BCN 1AB conveyor and rail	Bidder to refer amendment no D2-16
433					Plot Plan	As per layout TP-17 and TP-25 are on the embankment/slope area where elevation transition is there. To keep this away from slope area, the width of stockpile has to be reduced by 5m. Hence we request client to reduce stockpile requirement from 50m to 45m.	Bidder to refer amendment no D2-16
434	SECTION VI, PART-B	A-20	Page 9 of 93	4.6.1	All buildings shall have sufficient space to accommodate all relevant equipment of Plants. Moreover, ample space shall be provided for maintenance purposes.	Is there any minimum head room requirement of crusher top cover opening? In one of the ongoing projects there was requirement of 3100mm from NTPC during drawing review. Kindly let us know if there is any specific minimum requirement	Bidder to note that minimum head room requirement of crusher top cover opening shall be as per OEM requirement based on the ease of O&M.
435	SECTION VI, PART-B	A-20	Page 3 of 11	2.02.05	External staircases shall be provided for all transfer points	In the bunker area (for Bunker TPs) Generally internal staircases are provided. Please accept the same	Bidder proposal is not acceptable. Bidder to provide external and internal staircase in Bunker TPs.
436	GENERAL	GENERAL	GENERAL	GENERAL	GENERAL	We are not considering the following in scope as they are not mentioned in tender documents and flow diagram: a) Dozer b) Pay loader c) Covered shed for stockpile d) Any Trucks required e) Coal/ash analyzer	Bidder understanding is correct.
437	SECTION VI, PART-B	A-01	Page 96 of 101	4.02.19	However, stockyard capacity in any case shall not be less than 17 days considering 800 TCU bulk density for coal	Due to layout constraint it is not possible to fit in the area requirement of 17 days. Please reduce the number of days requirement	Bidder to follow specification requirement.
438	SECTION VI, PART-B	A-20	Page 20 of 93	4.14.4	The magnetic separator units shall be supported by suitable structural member from the top by taking support from the operating floor beams with turn buckle arrangement to facilitate the necessary adjustments during operation.	We propose frame mounted IJMS arrangement which is used in NTPC North Karanpura project. This mounting arrangement is simpler and easier for maintenance compared to roof hung arrangement	Bidders proposal is acceptable.
439	SECTION VI, PART-B	G-03	Page 14 of 14	1.05.00	Drain network shall be provided to collect effluent generated from floor wash, equipment drain and process drain in TG hall/Boiler/Mill Bay/TP/ESP areas for further disposal upto final disposal point.	We are not considering this clause applicable for CHP area. That is we are not considering any dedicated drain for floor wash water from galleries/TPs etc.	Bidder's Understanding is not correct. Additionally, Bidder to refer the Chapter SUB SECTION-A-22 SEPARATION OF PLANT DRAINS FROM STORM WATER DRAINS of Section VI, Part-A.
440	SECTION VI, PART-B	G-03	Page 14 of 14	1.10.00	Adequate RCC paving to be provided around the equipment to facilitate handling with mobile cranes.	What is the width of paving required around TP/crusher house for crane movement? Is it required to provide RCC paving in the VGTU area also?	Bidder to refer the Clause 5.23.20.2 of SUB-SECTION-D-1-6, CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT, Section VI, Part B (Book 4 of 5 CIVIL WORKS), Pg 78 of 86.
441	SECTION VI, PART-B			Annexure-H		Please confirm the paving width in the sketch	Bidder to refer amendment D2-15
442	SECTION VI, PART-E	Tender Drawings	Page 14 of 85	9587-001-POC-A-005: Layout of roads		In the layout of roads, no road is shown between the stockyards (as highlighted in red). Hence we are not considering the same. Please confirm	Approach to middle stockyard is required as per functional requirement and need to be considered.
443	SECTION VI, PART-B	A-20	Page 54 of 93	1.5.0	Height of Stockpile : 10 m	Can we increase the height of stockpile to 12m? We have successfully executed NTPC project with 16m stockpile height. In case height of stockpile is increased to 12m, what is the height of wind barrier required?	Bidder to follow specification requirement. Bidder to refer Clause no 4.26.00 of Sub section A-20, Part B of Section VII.
444	SECTION VI, PART-B	IIA-15	PAGE 5 OF 8	1.33.00	Wind Barrier along with the supporting structure shall be provided all around the coal stockpile	With the given specification two permutations (one with 2 wind barriers and one with 4 wind barriers) are possible, kindly let us know which is adopted: 	Wind barrier shall be installed all around the coal stockyard (i.e 4 wind barriers). Wind barriers in between stockpiles is not in bidder's scope.
445	SECTION VI, PART-B	A-01	PAGE 95 OF	4.02.09	(i) Other hoists including the hoists for handling take-up pulley and takeup weight	Kindly confirm if Common handling arrangement for take up pulley and weight is acceptable or not. Is in the arrangement where the take up pulley frame is connected to counterweight frame by studs can we use manual hoists for lifting counterweights and take up pulley together 	Bidder to follow specification requirement.
446	SECTION VI, PART-B	A-20	Page 30 of 93	4.21.00	BOX FEEDER OR BULK MATERIAL RECEIVING UNIT OR TRUCK UNLOADING SYSTEM OR SURFACE FEEDER	Is there any requirement of storage in intake section of BRU?	Storage in intake section of BRU is not envisaged.
447	VI PART-B	D-1-5	78 of 86	5.23.20.2	"An area of 5 m width all-round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tipper area, lime storage also shall be paved. This paving will be in addition to plinth protection."	"An area of 5 m width all-round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tipper area, lime storage also shall be paved. This paving will be in addition to plinth protection. " Please confirm.	Confirmed
448	VI PART-B	D-1-5	71 of 86	5.23.06	The portion between the two rails and between rail and retaining wall on both sides shall be paved in concrete as per specification for grade slab of ground level specified elsewhere.	Please confirm whether heavy-duty paving or normal-duty paving is envisaged for this area.	Normal duty paving is envisaged for the referred area
449	VI PART-A	II-D	6 of 8	01.00.02	1.00.02 CORROSION PROTECTION The plant lies in the corrosive category C3 as per ISO 12944.	We understand that C3 category is applicable for all CHP, AHP, GHP and Biomass handling structures. Please confirm.	Bidder to comply specification requirement

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450	VI PART-B	D-1-9 & D-1-5		09.03.01 All buildings shall have minimum one toilet block each.	Clause 9.03.01 & Clause 5.23.11	5.23.11 Toilet with potable water line facilities shall be provided in each of the following locations: (A) Crusher House (Ground Floor) – (Gents Toilet – 1 No for each.) (B) In CHP/LHP/GHP Control Room building – (Gents and Ladies Toilets-1 No. each)	We are considering the toilet requirements in GHP, CHP & BHP area strictly as per Clause 5.23.11, i.e. we are not considering any toilets in other CHP, GHP, BHP structures like Transfer Points, Pump house, Pent house, Gypsum Storage Shed etc. Please confirm.	Bidder's understanding is correct
451	VI PART-A	II-A-15	3 of 8	1.14.00		Provision for interconnection (Single stream, capacity 2400 TPH) from Stage-I to Stage-I and Stage-I to Stage II by providing suitable modifications of existing system. Arrangement of CHP Stage-I to CHP Stage-II interconnection shall be done at TP-4. The cable trestle to the RHS will foul with the opening envisaged for connection of conveyor gallery. This relocation of cable trestle to be carried out in EPC work.	Please provide us with following details during proposal stage: 1. GA drawings of TP-4 2. GA drawings of TP-14 3. GA drawings of Cable Trestles fouling with proposed conveyor area.	Shall be furnished to successful bidder.
452	VI PART-A	II-D	78 of 86	5.23.20.2		An area of 5 m width all-round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tipper area, Biomass line storage silo shall be paved. This paving will be in addition to plinth protection.	We understand that maximum width of Paving to be considered beyond the extent of plinth protection, for CHP, AHP, GHP and Biomass handling structures will be 5m as per this clause. Please confirm.	Confirmed
453	SECTION – VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM / EQUIPMENTS	15 of 20	1.18.03		CHP ELECTRICAL SYSTEM b) Two (2) nos. DC MCCB Boxes shall be provided at each MCC location of DC requirement which shall receive 220V DC from the main CHP DCCB. In addition to that, one (1) no DC lighting board for emergency lighting shall be provided in each MCC rooms taking one (1) no MCCB feeder from each bus-section of CHP DCCB.	DC MCCB boxes shall be placed in MCC location where there is DC requirement only. The quantity of DC MCCB boxes shall be decided during detailed engineering.	2no. of DC MCCB boxes shall be provided in each MCC location where there is DC requirement. However, The quantity of DC MCCB boxes shall be decided during detailed engineering. In addition to that one(1) no, DC Lighting board for emergency lighting shall be provided in each MCC room taking one (1) no MCCB feeder from each bus-section of CHP DCCB.
454	SECTION – VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM / EQUIPMENTS	15 of 20	1.19.00		EMPLOYER'S REQUIREMENT In addition to above, following items required for Employer's use are also included in bidder's scope. These equipment's shall conform to technical specification requirements as stipulated in Part B for respective equipments. 1. 415V switchgear feeders as indicated below (at suitable location to be decided during detailed engineering). (a) 4 Nos. MCCB-125A (b) 4 Nos. MCCB-250A (c) 4 Nos. MCCB-400 A (d) Total 6 Nos. ACS outgoing – 1000 A (in unit emergency switchgear and station service switchgear for feeding owner's loads). 2. Following requirements of construction power for employers' office/ construction use: Construction power at 415 V at two locations with total load 100 KVA along with suitable metering arrangement at each location.	Customer to furnish employer load requirement in each switchgear room of CHP/AHP/FGD to avoid any change in transformer sizing and MCC design during DE.	1. For Points (a) to (d) only feeders are to be provided, however they shall not be considered in transformer/DG Sizing. 2. For construction power for employers office/ construction use bidder has to follow the technical specifications.
455	SECTION – VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM / EQUIPMENTS	20 of 20	1.24.00		VARIABLE FREQUENCY DRIVE (VFD) VFD shall be provided for various motors as specified elsewhere in the specifications. Medium Voltage VFD: The Variable frequency drive (VFD) system shall be of a modern proven design for similar applications in power plants/industry. The system shall be either Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum eighteen (18) pulse design. 415 V/690 V LV VFD: The Variable frequency drive (VFD) system shall be of a modern proven design for similar applications in power plants/industry. The system shall be either Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum Twelve (12) pulse design. For drives less than 100 KW Six (6) pulse can be offered meeting all other requirements.	415V/690 LV VFD shall be of 6 pulse design for drives less than & upto 200KW. 12 Pulse design shall be provided for drives more than 200KW.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
456	SECTION – VI, PART-A	SUB-SECTION-III CONTROL & INSTRUMENTATION SYSTEM	5 of 18	2.02.00		For CHP DDCMS, necessary signal exchange with Employer's existing stage-I CHP DDCMS system shall also be in Contractor's scope. For this signal exchange, the number of I/Os shall be considered as DI: 32, DO: 16 AI:8 AO:8. The exact scheme shall be finalized during detail engineering. Employer's stage-I CHP DCS/RIO panel shall be the terminal point.	Location of Employer existing CHP terminal point to be marked in plot plan. Suitable provision for Cable routing and space for location panels in Employer existing CHP shall be provided to bidder. Common plant communication protocol shall be used and same shall be communicated to Employer during detailed engineering. Any additional hardware & software required for this signal exchange in Employer existing CHP & modification of software/HMI is excluded from Bidder's scope.	For location, refer GLP. Further, bidder's understanding is not correct. only hardwired signal exchange is envisaged with stag-I CHP DCS. Further no panels shall be placed in existing CHP, hence, bidder to comply technical specification.
457	SECTION – VI, PART-A	Annexure C to IIC Contract quantity	9 of 24	1.01.00		CONTROL DESKS AND PANELS The following are the contract quantities of control desks: Arc shaped Control Desks shall be provided as mentioned below. 1. UNIT Control Room - 8m (1 per unit) 2. Unit Incharge Desk (UID)- 3m (1 common) 3. Centralized Off-site Control Room-4m (for Water System), 4m (for Ash Handling System), 3m (for FGD System) 4. CHP System CR- 4m (1 per system) 5. FGD System CR- 3m (1 per system) Note 2: (B) CD of CHP: One no. Draw out section for process side. Note-4: The following instruments shall be furnished for each Coal Handling Plant to be mounted on the draw out section of Control Desk of each Coal Handling Control Room. 1. Stop PB: 45 nos. 2. Release PB: 1 no. 3. Emergency stop PB: 1 no. (With cover)	Bidder proposes 63" LED displays and OWS with Monitor in place of Backup control desk cum MIMIC/Annunciation panel for CHP. Complete operation & monitoring of CHP can be done from the OWS by the Operator. No separate hardwired control desk with instruments (as mentioned in note-4) shall be provided. All these features shall be incorporated in HMI for operator use.	Bidder's proposal not acceptable. Bidder to comply technical specifications
458	SECTION – VI, PART-B	B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	8 OF 36	1.05.01 (g)		Outdoor oil filled transformers shall have ratings as indicated in tender SLD, 2500kVA rating is not acceptable. For indoor DTT, 2500 kVA rating is acceptable.	Bidder understands that 2500kVA rating for outdoor oil filled transformers is acceptable as per tender sld. Kindly confirm	2500 KVA Rating outdoor oil filled transformers are acceptable.
		Tender Drawings	Single Line diagram	9587-999-POE-J-001	2.F	Standard LT transformer rating to be used are indicated below: 2500/2000/1600/1000/630/500/315KVA		
459	SECTION – VI, PART-B	B-06 LT SWITCHGEARS & LT BUSDUCTS	11 OF 19	3.01.00 B		(b) SWITCHGEAR / FEEDER COMPARTMENT A separate compartment shall be provided for relays and other control devices associated with a circuit breaker. For breaker controlled motor feeders, an aux. relay shall be provided for taking Local push button station (EPB) 'normally open (NO)' contact input from field and provide potential free output to DDCMS to avoid probable mixing of switchgear control voltage with DDCMS 24V DC voltage. This aux. relay shall have 2NO/2NC contacts. Canopy shall be provided over EPB.	EPB shall be wired directly as a DI to IMC and then communication established to DDCMS through Profibus communication. No separate HW is considered between LT switchgear and DDCMS panels.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
460	SECTION – VI, PART-B	B-08 HT LT AND CONTROL CABLES	5 of 7	4.00.05 (a)		Cables shall be supplied in steel drums of heavy construction. The drum shall be designed on the basis of weight, diameter, bending radius and length of cable.	Bidder understands that Steel drum is applicable for HT power cables only and for other type of cables wooden drums is acceptable.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
461	SECTION – VI, PART-B	B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	4 of 21	3.02.05		FOR COAL HANDLING PLANT/FGD PLANT/ ESP AREA THE FOLLOWING SHALL ALSO BE APPLICABLE: a) All overhead cable routes shall be along the route of the conveyor gallery on separate supporting structures and cables shall be laid in vertical trays. b) Cable trenches shall be provided only in Switchgear/MCC rooms.	a) For Lime handling and Gypsum handling plant areas, cable routing inside conveyor gallery is acceptable based on site conditions, cable tray requirements and layout constraints. b) Kindly confirm cable trenches are acceptable in Ash handling MCC areas also.	a) Bidders Proposal is not acceptable. b) Bidders Proposal is acceptable.
462	SECTION – VI, PART-B	B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	20 of 21	9.00.00 B)		5. Cable trench/Cable vault For LT switchgear/MCC room at EL 0.0M, 1400 wide x 1400 deep cable trench shall be provided to route the cables. Horizontal cable trays shall be routed in cable trenches	Bidder understands that more wider and deep trenches are allowed based on the cable tray requirements, site conditions and layout constraints.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
463	SECTION – VI, PART-B	B-11 STATION LIGHTING	16 of 18	Annexure-A SI No.6		Avg lux level of 50 with Industrial type LED Luminaire for Cable galleries/vault	Bidder understands that illumination is not required for overhead cable rack, pipe cum cable rack.	Bidders understanding is correct. Illumination is not required for overhead cable rack or pipe cum cable rack. However, Avg lux level of 50 with Industrial LED Luminaire shall be provided for Cable Galleries/vaults.
464	SECTION – VI, PART-B	IIC-03 MAIN EGPT INST SYSTEM	2 of 2	2.00.00		Ash Dash Board Contractor shall provide Ash Dash board in AHP DDCMS for the complete ash handling system which displays the following using sensors/instruments specified in tender drawings/ elsewhere in this specification: a) Ash generated quantity (calculated value) based on coal flow from boiler and ash content input from coal analyser/manual feeding. b) Ash quantity calculated value in each of the IM Silo, Bottom ash silo, HCSD silo, Main fly ash silo, Fine ash silo, Classifier silo, Fine fly ash hopper, Coarse fly ash hopper, buffer hopper, ESP fan to third field hoppers, intermediate surge hoppers. This shall be calculated using level transmitter signal and silo/hopper dimensions and Fixed/manually fed value of ash density. c) Ash feed quantity from IM silo to conveyor. This shall be calculated using belt scale signal. d) Ash unloaded quantity from Bottom ash silo. This shall be calculated using belt scale signal. e) Ash unloaded quantity from HCSD silo, main fly ash silo and Fine fly ash silo. This shall be calculated using mass flow meter signal. f) Above shall be calculated on hourly, 8 hourly and 24 hourly basis and archived in AHP system. g) All critical status/ alarm which shall help early detection of any problem in ash execution and transportation system using sensors/instruments specified in tender drawings/ elsewhere in this specification. Necessary logic shall be developed to generate such status/ alarm.	Ash dash board shall be developed in dedicated 63" LV5 display with already available data in AHP DDCMS. No additional instruments/equipment's are envisaged other than instruments/equipment's considered in P&ID diagram.	Bidder's understanding is correct

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465	SECTION – VI, PART-A	IIC CONTROL & INSTRUMENTATION SYSTEM	11 of 18	3.01.00	Integrated monitoring of bottom ash evacuation system: 1) Contractor shall develop and implement a mimic in UNIT-BOP DDCMIS and AHP DDCMIS for integrated monitoring of bottom ash evacuation system including desludging status and relevant alarms as minimum. 2) Camera (as specified in clause F 3.00.00, Annexure C to this Sub section) shall be used to monitor ash accumulation above furnace S-panel area and in bottom ash hoppers.	Integrated monitoring of bottom ash evacuation system shall be developed in dedicated 63" LVS display with already available data in AHP DDCMIS. No additional instruments/equipment's are envisaged other than instruments/equipment's considered in P&ID diagram for bottom ash system.	Bidder's understanding is correct
466	SECTION – VI, PART-A	I-A PROVENNESS	30 of 36	5.12.1	AUXILIARY OIL FILLED TRANSFORMERS AND HT TRANSFORMERS	Provenness criteria of only 16MVA, 11KV and above transformer is mentioned. For any Aux transformers up to 2500KVA 11/10.433KV or 3.3/0.433KV (Dry or oil type), standard Provenness criteria of Bidder shall be used.	Bidders Proposal is not acceptable. Bidder must comply to the provenness as specified in the bid documents.
467	SECTION – VI, PART-A	I-A PROVENNESS	30 of 36	5.10.0	HT POWER CABLES The bidder/Sub-vendor should have manufactured and supplied following cables:	Customer to specify the time line for provenness criteria in the specification.	No time line is defined in Provenness criteria. Bidder to comply technical specifications.
468	SECTION – VI, PART-A	I-A PROVENNESS	30 of 36	5.12.1.2	Bidder/Sub-Vendor should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).	Bidder proposes that in cases where sub-vendor is not having own facilities for conducting all type tests then all Type tests required for Auxiliary transformer conducted in NABL accredited labs like CPRI/ERDA etc shall be acceptable.	Bidders proposal is not acceptable. Bidder must follow the technical Specifications.
469	SECTION – VI, PART-A	I-A PROVENNESS	26 of 36	5	PROVENNESS CRITERIA FOR ELECTRICAL EQUIPMENTS	Standard Provenness criteria of Bidder shall be followed for items where provenness criteria is not defined in the specification.	Bidders understanding is correct.
470	SECTION – VI, PART-A	Annexure C to IIC Contract quantity	7 of 24	2.14.00	Refer Appendix I (End of this annexure) to this Subsection for IO and Drive count for Employers Makeup water system , AWRs that are to be monitored and controlled by Contractor's Control system	Appendix-I is not available in NIT. Customer may please furnish the same.	The same is available in the technical specifications (refer table I-B & II-B page 22,23,24 of 24 annexure to IIC)
471	SECTION – VI, PART-A	III TERMINAL POINTS & EXCLUSIONS	2 of 3	3.01.00-3.01.04	Control & Instrumentation AWRs	All scope outside plant boundary (like AWRs) is excluded from Bidder's scope. All cables, Control system, UPS panel, 24VDC panel etc. are excluded from bidders scope.	Bidder's understanding is not correct. bidder to comply technical specifications
472	SECTION – VI, PART-B	B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	30 OF 36	2.00.00	DRY TYPE TRANSFORMER (LT INDOOR/AUXILIARY TRANSFORMER)	Bidder proposes indoor Dry type transformers for auxiliary applications such as CHP, LHP, GHP, AHP areas up to 2500KVA.	Bidders Proposal is not acceptable. Bidder must comply to the technical Specifications.
473	General				Sub-Suppliers / Makes of components (such as XLPE, PVC compounds, steel etc.) in HT/LT/Control/Instrumentation cables.	Sub-suppliers/makes of components (XLPE, PVC, steel) in HT/LT/Control/Instrumentation cables shall be as per approved cable manufacturer recommendation. Special encouragement to be given for Indian sub-suppliers as part of Make in India initiative & government guidelines.	Sub-Suppliers / Makes of components (such as XLPE, PVC compounds, steel etc.) in HT/LT/Control/Instrumentation cables as per NTPC QA Approved and meeting Sub-GR Requirements.
474	General				Type of cable used for DC application	Design requirement for DC cable not found in the NIT specification. Employer to provide the same.	For DC Cables Bidder must adhere to the technical specifications applicable for LV power cables as per the technical specifications. However separate cable for +ve and -ve cable from Battery to DCDB, Charger to DCDB and Battery charger to Battery shall be provided by the bidder.
475	SECTION – VI, PART-A	IIA-15 COAL & BIOMASS HANDLING PLANT	3 of 8	1.16.00	Stockyard Management System shall be provided complying the requirements as per C&I Annexure to sub section A-20, Part-B.	C&I Annexure to sub section A-20 is not available in the NIT. Customer may please furnish the same.	The same is available in the technical specifications
476	SECTION – VI, PART-A	IIC CONTROL & INSTRUMENTATION SYSTEM	7 of 18	2.04.5	Wireless Link: For the following system identified below, Bidder shall consider wireless link ; 4. Between AWRs system / DCS, located in AWRs control room and AHP system / DCS for operation and monitoring of AWRs system from HMI of AHP system (Operation & monitoring of AWRs system should be available from OWS located in AWRs control room, even in case of non-availability of wireless link between AWRs system / DCS & AHP system / DCS.	All scope outside plant boundary (like AWRs) is excluded from Bidder's scope. Hence wireless link between AWRs system/DCS and bidder supplied AHP system/DCS is excluded from bidder's scope.	Bidder's understanding is not correct. Bidder to comply technical specifications
477	SECTION – VI, PART-B	A-20 Coal & Biomass and Gypsum Plant	88 of 93	4.13.00	Paddle Feeders Paddle feeders shall be controlled from the local control panel suitably mounted on the unit. Requirement of operation as described elsewhere in the specification shall be complied with. Following indications shall also be provided on the local control panel: (a) Motor ON/OFF (b) Motor OIL protection operated (c) Brakes applied (if provided) (d) Digital pressure indicators of Hydraulic Power pack including those of hydraulic pump discharge, return (leakage) traverse pump discharge (forward and reverse) oil line. (f) Coal flow rate Main Hydraulic pressure of paddle feeder wheel drive system to be reduced to minimum through its control circuit during each tripping of main drive motor.	Employer to confirm the type of control envisaged for paddle feeder operation i.e. Local Relay based or PLC based.	Local control shall be provided. further, refer clause 4.02.00 ,sub section A-20 part-B
478	SECTION – VI, PART-A	IIC CONTROL & INSTRUMENTATION SYSTEM	1 of 18	1.05.00	All electrical devices like switches/ transmitters/ controllers/ analyzer/ solenoid valves which are located in the hazardous areas like hydrogen gas area, seal oil area etc. shall be made intrinsically safe by providing suitable type of transformer isolated barrier / Zener barrier of standard make & shall be provided with explosion proof enclosure suitable for hazardous areas described in National Electric Code (USA, Article 500, Class, Division-I or EN60079-14 or shall comply with the essential requirements of ATEX directives.	Bidder understands that CHP/AHPLHP/GHP are not envisaged under hazardous area and hence this clause is not applicable.	bidder to comply technical specification
479	SECTION – VI, PART-B	A-21 ASH HANDLING PLANT	40 of 44	8.03.02	Fly Ash Conveying- Overall control shall be from OWS of DDCMIS. It will have mimics for indication and control of entire ash handling system. ESP hoppers/COI AHP Hoppers etc. level high and level low indication shall be provided in HMI of AHP DDCMIS.	Bidder shall provide only Status of High/Low level indication will be made available in AHP DDCMIS from ESP DDCMIS.	bidder's understanding is not correct . There is only one DDCMIS for AHP system i.e. AHP DDCMIS. bidder to copy specification requirements
480	SECTION – VI, PART-B	A-25 (SOLAR P.V.)	7 of 12	7	...if the output of the inverter matches to the switchgear voltage and suitable for directly connection to grid without galvanic isolation, the requirement of transformer may be omitted except Main Power House building, Switchyard building and Ash Slurry Pump house. Isolation transformer has to be provided in case, the inverter manufacturer recommends for connection to grid.	In case transformer is applicable for Ash Slurry Pump house, same shall be placed nearby Ash handling switchgear building.	Bidder to comply with tender document. For Ash Slurry Pump House same shall be taken care during detailed Engineering
481	SECTION – VI, PART-B	B-0 GENERAL ELECTRICAL SPECIFICATION	6 of 15	3.04.02	Individual Transformer for CHP systems shall be sized to cater to load of single stream running in case of one feeder/transformer	Employer to confirm the sizing of CHP transformer i.e. either Single stream running at a time or both streams running to be considered.	Individual CHP transformers shall be designed to cater double stream operation even under outage of single CHP Transformer. During ST Sizing, under case-2 single stream operation load of CHP/LHP/GHP Shall be considered for sizing purpose.
482	SECTION – VI, PART-B	B-0 GENERAL ELECTRICAL SPECIFICATION	7 of 15	3.06.02 b	All ACDBs, DCDBs, Solenoid Valve DBs and MCCs located on Stacker Reclaimer, Paddle feeders and Travelling trippers shall be of Fixed Module type. All 415V Circuit breaker modules and other MCC modules shall be fully draw out type.	Bidder understands that Similar panel construction feature shall be used for CSU, LSU and DE panels for fixed Module type.	Bidders proposal is not acceptable Bidder has to comply with the technical specifications.
483	SECTION – VI, PART-B	B-0 GENERAL ELECTRICAL SPECIFICATION	7 of 15	3.06.02 d	Motor feeders below 90kW (upto 160kW for CHP conveyor motors) shall be contactor controlled. The motor feeders for 90kW & above shall be Air Circuit Breaker controlled.	Kindly confirm that for CHP Conveyor motors upto 160kW shall be Contactor controlled. Whether the same is applicable for LHP and GHP Conveyors also.	Bidders understanding is correct.
484	SECTION – VI, PART-B	B-11 STATION LIGHTING	4 of 18	3.03.01	At strategic locations in the main plant, a few lighting fixtures fed from 220V, DC supply, shall be provided to enable safe movement of operating personnel and access to important control points during an emergency, when both the normal AC and Emergency Lighting system fail. These lighting fixtures will be fed from 220V DC LDBs which in turn will be fed from DC lighting panels.	Employer to confirm if DC light/ Emergency light is applicable for Ash Handling system and its MCC buildings	Emergency DC Lighting is applicable for Ash handling system and its MCC Buildings also.
485	SECTION – VI, PART-B	B-11 STATION LIGHTING	11 of 18	4.12.00	Occupancy based Passive infrared sensors The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be minimum 5 metres for standard room height of 3mt. All the calibrated settings shall be stored in non-volatile memory of PIR sensor which shall be unaffected by power supply fluctuations. Necessary 15A contactor shall be supplied alongwith each sensor & shall be located inside the switch box	Kindly provide the list of location where these sensors to be provided.	locations of sensors can be decided during the detailed engineering only.
486	SECTION – VI, PART-B	B-11 STATION LIGHTING	17 of 18	Annexure-B	Plant Areas	Employer to include LHP & GHP system in Annexure-B	For LHP and GHP Areas bidder has to follow the DC Lighting requirements of CHP area as per Annexure-B
487	SECTION – VI, PART-B	B-11 STATION LIGHTING	17 of 18	Annexure-B 8.9	Battery Room Cable Spreader Room/Vault	Employer to confirm whether AC Emergency lighting is applicable for CHP, AHP and LHP GHP system.	AC Emergency lighting is not applicable for CHP, AHP, LHP and GHP Systems.
488	SECTION – VI, PART-B	B-11 STATION LIGHTING	17 of 18	Annexure-B	DC Emergency Lighting	Lighting is not envisaged for interconnect-ing/interplant cable rack/trustle/pipe cum cable rack.	Bidders proposal is acceptable.
489	SECTION – VI, PART-B	A-20 Coal & Biomass and Gypsum Plant B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	88 of 93	4.12.00 c)	Coal Sampling system All necessary automatic controls shall be provided for meeting the requirements of ASTM-D-2234.	Application of ASTM D 2243 is not clear. Customer may please elaborate the same.	Clause deleted. Refer Amendment No. MH-26
490	SECTION – VI, PART-B	B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	12 of 21	5.04.00 c)	Auxiliary Transformer (including LT Outdoor) Earthing (Copper Flat) : As per system requirement/ Sub section B-0/SLD	Employer to kindly clarify the type of earthing material for Transformers.	Neutral earthing of transformer shall be through CU Flat. For body earthing of transformer, cl. 5.04.00 (c) of subsection B-10 shall be considered by the bidder
	SECTION – VI, PART-B	B-10 CABLING, EARTHING AND LIGHTNING PROTECTION		5.04.00 c)	The sizes of earthing conductors for various electrical equipment's shall be as below: 415 V MCC/ Distribution boards / Transformers --- 50 x 6mm GS Flat		

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519	Sec VI,Part B	A-21	30 of 44	3.06.00	FAD of each set of working compressor at ambient condition: 1200 m3/hr (min.). Bidder to justify the same during detailed Engg.	Please clarify whether capacity of IAC to be considered as 1200 m3/hr or not	Bidder to note that Instrument air requirement for complete ash handling system is to be met from main plant compressed air system. Dedicated IAC is not envisaged for ash handling system.
520	Sec VI,Part B	A-21	23 of 44	2.12.00	Classifier Silo/Intermediate FA Silo: Flat bottom/Conical type with proven design with respect to Flowability of ash. Intermediate FA Silo shall necessarily be conical type only	Both flat bottom/conical type is mentioned and then it is specified that it shall be necessarily conical type.Please clarify. Also please confirm that silo bottom type and silo valley angle shall be selected on the basis of AHP vendor's standard engineering practice/experience.	Refer Amendment No. MH-28
521	Sec VI,Part B	A-21	39 of 44	7.12.00	The ash water pump house shall be open type.	Please confirm there is no ash water pump house building. Only ash water tank (Overground) to be considered and all the water pump shall be installed on the foundations of RCC grade slab which is open to sky.Also please clarify the extent of RCC grade slab to be considered for ash water pumps. Whether any maintenance bay to be considered on the grade slab.	Bidder to consider maintenance bay on the grade slab.
522	Sec VI,Part A	IA PROVENNESS	13 of 36	4.19.2	The systems mentioned at 4.19.2 (a) and 4.19.2 (b) above should have been in successful operation in at least one (1) plant for two (2) years and should have been installed for pulverized coal fired boiler units generating not less than 40 TPH of ash per boiler.	The systems mentioned at 4.19.2 (a) and/or 4.19.2 (b) above should have been in successful operation in at least one (1) plant for two (2) years and should have been installed for pulverized coal fired boiler units generating not less than 40 TPH of ash per boiler.	Bidder to comply specification requirement.
523	Sec VI,Part A	IA PROVENNESS	13 of 36	4.19.1	4.19.1 The Bidder(s) its Sub- vendor(s) should be supplier of ash handling system(s) and should have executed ash handling system(s) involving design, engineering, manufacturing/got manufactured, supply, erection /supervised erection and commissioning/ supervised commissioning for - (a) Wet Bottom Ash handling system (b) Pneumatic fly ash handling system for conveying (c) Pneumatic Fly Ash Transportation System (d) Complete high concentration ash slurry disposal system	As per referred clause we understand that de-packaging can be done while ordering AHP i.e. Bottom Ash system (4.19.1 (a)) can be ordered to vendor A, fly ash system (4.19.1 (b) & (c)) can be ordered to vendor B & HCSD system ((4.19.1 (d)) can be ordered to Vendor C. Request NTPC to confirm that bidder understanding is in order.	Bidder s understanding is in order
524	VIA	IB	12 of 22	ANNEXURE-IV-2	Column-3 2.0 Ultimate Analysis	Ultimate Analysis does not sum to centum. Please provide complete analysis	The revised coal & ash characteristics are to be referred. Bidder to refer the amendment SG1 in this regard.
525	VIA	IB	13 of 22	4	ASH FUSION RANGE	Kindly furnish the data for Best Coal.	The revised coal & ash characteristics are to be referred. Bidder to refer the amendment SG1 in this regard.
526	VIA	IB	12 of 22	ANNEXURE-IV-2	Range of 5 % coal supplies	Kindly furnish the range of Coal for SG design.	The revised coal & ash characteristics are to be referred. Bidder to refer the amendment SG1 in this regard.
527	VIA	IB	11 of 22	ANNEXURE-IV-1	LIGHT DIESEL OIL CHARACTERISTICS		
528	VIA	IB	18 of 22	ANNEXURE-IV-1	HIGH SPEED DIESEL OIL CHARACTERISTICS	Same Annexure number is used twice. Please update.	Annexures- IV-1 has been referred for fuel oil / Light Diesel Oils at cl. 7.00.00. Sub section-IB which is identified for both LDO & HSD.
529	VIA	IB	19 of 22	S. No. 6	CONTAMINANTS	Contaminants and the corresponding values are not properly tabulated. Kindly correct the format.	Please refer the amendment SG1 in this regard.
530	VIA	II A-01	16 of 28	2.16.11	The above Fuel oil system shall also be capable of firing High Speed Diesel Oil (HSD) on sustained basis with fuel characteristics as specified in Table 2, Annexure-IV-3, sub-section I.B, part-A, Section VI of technical specifications.	Annexure -IV-3 is not available.	The referred query clause doesn't match with the query description. However refer corresponding amendment for Annexure IV-3
531	VIA	II A-01	21 of 28	2.24.01 (b)(2)(v)	One intra scope suitable for inspection of all steam generator pressure parts.	Bidder propose to offer alternative design of video scope, which is advanced and refined version of intra scope. Customer is requested to accept both intra scope & video scope for this application. Pneumatic emergency retract drives are not envisaged for this project. As per bidders' standard practice Emergency Hand crank shall be provided, which can be engaged to move the lance manually to the home position. This is functionally equivalent to the specification requirement.	Bidder to comply with the specifications requirements.
532	VIA	II A-01	21 of 28	2.24.01 (b)(2)(v)	Four (4) nos. of pneumatic emergency retract drives with matching crank tools for each type of soot blower shall be provided.		Bidder to comply with the specifications requirements.
533	VIB	E-01	6 of 13	6.04.00	Recirculation Pump Following test shall be carried out on assembled units - Type Test: (i) Tests to establish unit functioning of pump at temp and pressure. (ii) Hot standstill and start up tests.	The pump vendors are reputed and have supplied BCW pumps across the world. The pumps supplied by them in the past for supercritical power stations are running successfully without any issue. These vendors have already substantiated their pump quality and have proven the same in the past. Please note that the Hot type test requirement is significantly impacting the production process and enduring safety issues. In view of the above, these tests shall be exempted.	Bidder's proposal is not acceptable.Bidder to follow the technical specification requirement.
534	VIA	II A-01	13 of 28	2.15.05	Seal Air Fans ...electrically operated Inlet Guide Vanes....	Offered Seal Air Fans have Inlet damper instead of inlet guide vane. Electrically operated 'inlet dampers' are envisaged.	Bidder's query is not in context as the specifications already envisages the other type as referred in the query. Bidder to comply with the specifications requirements.
	VIB	A-02	22 of 65	10.05.01. D)	Seal Air System (a) 2x100% centrifugal seal air fans with electrically operated Inlet Guide Vanes...		
535	VIA	II A-01	24 of 28	2.30.00	Specific features catering to boiler reliability... 4. Ceramic removal pads insulation to be provided in area requiring frequent insulation removal like Burner panel area and soot blower area.	1. Burner Panel / Wind box will be insulated with Ceramic Fiber Blanket in place of Ceramic Pad type insulation as the application area needs flexible type of insulation material. 2. Soot Blower area is covered with a seal box, which is filled with Castable Refractory of Gr. A and over the seal box Ceramic Blanket insulation will be installed.	The details shall be discussed based on type of burner/system offered, during detail engineering stage, to have O&M flexibility. Bidder to supply in line with specified requirements.
	VIB	A-13	7 of 8	2.03.00 (B), b)	Burner panel and Soot Blower area. - Ceramic Pad type insulation		
536	VIA	II A-01	24 of 28	2.30.00 (7)	Boiler to be provided with vacuum cleaning system network to ensure proper hygiene. In this context portable system to capture the ash around the boiler peripheral surface shall be provided along with net worked transmission of captured ash to a common location. Following specific elevations of Boiler requiring installation of vacuum cleaning arrangement in Boiler Front, Rear, LHS and RHS are also to be covered other than required areas: 1) Penthouse Floor 2) Gooseneck area floor covering both first pass and backpass. 3) Boiler Scaffolding door floor covering both first pass and backpass 4) Top wall blower air floor covering both first pass and backpass 5) Top burner top floor covering both first pass and backpass 6) Burner bottom floor covering both first pass and backpass 7) S Panel (approx.6.5 to 9M)	Customer requested to provide more details / reference of this system. Bidder understanding is to provide portable vacuum cleaners (7 Nos.) with de-dusting bin at each location.	Bidder to comply with the installation of vacuum cleaning arrangements as per the specifications requirement.
537	VIA	II A-01	24 of 28	2.30.00	8. Safety valves and critical valves to be provided with temperature & sound monitoring (may be IOT based) to detect early passing and ensure reliability. Temperature point shall be provided on these valves/lines. For control and monitoring purposes the temperature values shall be taken between 50-75 Deg. C and sound value normally less than 75 db as trigger. The necessary provision shall be accordingly provided with alarm signal in the control room. Further, following may be noted w.r.t. above scope for temperature measurement on critical valves for passing a. All valves including drain and vents in critical piping such as M.S.Stop valves and its integral bypass valves, Boiler Startup vent, M.S.Pipe drains and vents, CRH & HRH pipe drain & vents b. All master drains of SH and RH spray station. c. Drains & Vents of circulation system d. Sonic leak detection system installation in Safety valves & ERV/ 1) Installation of Sonic leak detection system installation in all SLSV and ERVs of critical piping's such as M.S. Safety Valves & ERV/ ERV, CRH SV, HRH SV & ERV/ ERV.	Safety valves with sound monitoring (IOT based) is not available. Hence safety valves shall be without sound monitoring. Safety valves & ERV with sonic leak detection is not available. Hence safety valves and ERV shall be without Sonic leak detection system	This shall be discussed during detail engineering in line with specification requirement.
538	VIA	II A-01	28 of 28		Architectural Features for Steam Generator Enclosure ...2. Provision for ventilators / glazed windows shall be made as per functional requirements. The boiler enclosure shall have flat roof with access through staircase / lift.	Pitched roof will be provided with 10 deg slope. Approach through staircase/ lift will be provided only up to ceiling platform level.	Bidder to comply with the specifications requirements.
539	VIA	IV	2 of 76	1.00.01. (g)	Instruments to be used for PG test shall be additionally supplied over and above the instruments shown in tender P&IDs. PG test equipment being supplied, installed and commissioned for each unit,shall be retained by employer after completion of PG test. Control system loop tuning required to limit the variation of parameters during performance guarantee testing shall be completed prior to PG Test / initial operation. All PG test process parameters shall be made available in DDCMIS	Steam side Parameters will be recorded through plant instruments only. Flue gas & Air side temperature measurements will be done as per grid based method (In line with Code requirement). Due to corrosive environment, keeping more number of TCs & O2 tapping probes continuously in the field may leads to failure/chocking of these instruments. Hence, as per specification, additional instruments like TCs and probes required for PG test will be supplied along with main supply. However, installation of these instruments will be done at site just before the PG test. Calibrated Flue gas analyser on returnable basis will be brought to site for measuring flue gas composition @ ECO outlet / APH Outlet offline. Calibrated Hygrometer on returnable basis will be brought to site for measuring relative humidity.	Bidder to comply technical specification
	VIA	IV	12 of 76	1.01.03.03 (i)	Test Code : As per BS EN 12952-15:2003 (By loss method based on GCV of Coal)		
	VIA	IV	12 of 76	1.01.03.03 (iii)	Test Conditions Boiler operatino with rated excess air, coal fineness and firing design coal. Correction to tested efficiency shall be applicable for variation in following parameter only: a. Ambient air temperature. b. Relative humidity of ambient air. c. Hydrogen in coal. d. Moisture in coal. e. GCV of coal. f. Percentage of ash in coal.	Correction to the tested efficiency will be as per provisions in BS EN 12952-15:2003 code. No separate correction curves will be provided.	Bidder to comply with the specifications requirements.
540	VIA	IV	14 of 76	1.01.03.03 (ix)	The Bidder shall furnish the correction curves, for Employer's approval covering the expected ranges of variations for all these parameters for the range of coal specified.		
	VIA	IV	14 of 76	1.01.03.03 (ix)			

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609	VIB	B-0	7 of 15	3.06.00	f) For protection of motors below 30kW, MPCB (only Short-circuit release) and Intelligent motor controller (IMC) with current sensing module shall be provided.	Soot blowers are fractional HP motors powered from Soot blower MCC (SBMCC). In line with our current practice for NTPC projects, bidder proposes to envisage conventional type Soot Blower MCC without Intelligent motor controller, numerical relay and associated specification requirements. Switch fuse units will be used in protection circuit of blowers in SBMCC.	Bidders Proposal is not acceptable. Bidder Shall follow the same LTT switchgear Technical Specifications for soot blower MCC also.
610	VIA	II-B	4 of 20	1.05.03	a) Communicable Numerical Relays (with IEC 61850) in all MV Switchgears & LV switchgears	Customer may please confirm.	
611	VIB	Annex-SS1	13 of 22	9.02.06	After completion of unloading of ammonia from the tank truck, the compressor must be switched off by means of a flow monitor and the unloading process completed.	As per SCR design envisaged by bidder & in line with proven practice of bidder's collaborator, Compressor is switched off based on low Pressure at Compressor inlet. Ammonia unloading operation and completion is monitored by operator. Further, since ammonia unloading line has two phase flow (liquid & vapour), flow measurement will not be reliable. Considering above points, flow monitor is not provided for switching off compressor. Customer is requested to confirm.	Ammonia flow monitoring is critical. Bidder to comply specification requirement.
612	VIA	VI-Chapter-01			Mandatory spares for SG & Auxiliaries	For mandatory spare clauses pertaining to SG & auxiliaries, whenever the spare is specified as percentage(%), tender specification does not indicate whether the spare estimation shall be percentage(%) of the total population of the plant or percentage(%) of population in one of the unit. Customer is requested to clarify and issue amendment in the specification.	Bidder has not mentioned query against specific item. Bidder to provide items in line with specification requirement which does cover the applicability.
613	SECTION – VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM EQUIPMENTS	08 of 20	1.15.00	The Employer shall provide Two Number 11kV feeders in Existing switchgear of LARA STPP-I to meet the construction power requirements along with Employer's requirements as indicated under Clause 1.13.00. The charges for the actual energy consumed by the bidder (Energy Charges Only) shall be recovered by the Employer based on prevalent rate of DISCOM and type of connection used	1) Power for the purpose of construction and commissioning may please be provided by Owner free of all charges at 415 V. 2) Also customer may provide supply point of electricity at major construction sites i.e. SG, TG area for both units	1. Power for the purpose of construction and commissioning is chargeable. 2. Employer shall Provide two number of 11kV Feeders in Existing Switchgear of LARA STPP-I. It is the bidders responsibility to extend the power supply wherever it is required.
614	SECTION – VI, PART-A	SUB-SECTION-III CIVIL WORKS	06 of 8	2.02.00	Construction water shall be the responsibility of Bidder during all stages of construction. However, construction water may be provided by Owner at one point on chargeable basis. Bidder shall arrange for further distribution/transportation to required location by their own	1) Water for construction purposes may please be provided by customer on free of all charges. 2) Customer shall provide a supply point of water at construction sites i.e. SG, TG area for both units	Bidder's request is not accepted. Bidder to comply specification requirement.
615	SECTION – VI, PART-A	SUB-SECTION-IV INTENT OF SPECIFICATION	6 of 9	4.03.00	All the first fills of consumables and one year's topping requirements of consumables such as greases, oil, lubricants, servo fluids / control fluids, gases (excluding H ₂ , CO ₂ and N ₂ for Generator) etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be supplied by the Contractor	First fill of consumables such as greases, oil, lubricants, servo fluids/control fluids, gases (excluding H ₂ , CO ₂ and N ₂ for Generator) and essential chemicals shall be supplied by Bidder till Full Load/CO ₂ whichever is earlier.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
616	SECTION – VI, PART-A	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	6 of 8	2.01.00	Development of Bidders temporary staff colony and labour colony along with toilets & fencing etc. Bidder may use green belt area on west side for Labour Colony.	Owner may please provide land free of charge for labour colony, temporary offices, fabrication yard, and storage facilities with in plant boundary. Temporary accommodation, including all fencing, water supply at two points (both for drinking and construction purposes), electricity, fuel, supply, sanitation, fire prevention and fire-fighting equipment for contractor's staff and labour free of charge.	
617	SECTION – VI, PART-A	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	6 of 8	2.02.00	Construction of following temporary facilities of bidder a) Construction office, b) Construction stores (covered) & open stores as per his requirement. c) Workshops for maintenance of construction plant and equipment. d) Material/field testing laboratory facilities and any other temporary building.	For construction of labor colony Land of 27000 SqM may please be provided by customer within plant premises/in proximity of plant premises free of all charges. Further, 75 acre space identified in GLP for bidder's storage shall be made available by NTPC III completion of facilities. Apart from this 50 acre of additional storage area may be provided by customer free of all charges.	Bidder's request is not accepted. Bidder to comply specification requirement
618	SECTION – VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	8 OF 76	1.01.01 (Note iv)	Contractor's aggregate liability to pay liquidated damages for failure to attain the functional guarantee shall not exceed Fifteen percent (15%) of the Contract Price.	Aggregate liability for liquidated damages for failure to attain the functional guarantee may please be limited to a maximum of 05% of the Contract Price	Bidder to comply specification requirement
619	SECTION – VI, PART-D	-	29 of 70	44.19.00	If any contractor worker found working without using the safety equipment like safety helmet, safety shoes, safety belts, etc. or without anchoring the safety belts while working at height the Engineer /c shall have the right to regulate the payment in accordance with provisions of SCC. Further such defaulting worker shall be sent out of the workplace immediately and shall not be allowed to work on that day. Engineer /c / Safety Officer of NTPC will also issue a notice in this regard to the contractor.	Contractor may be exempted from the penalty clause. No penalty shall be imposed on contractor as mentioned in the clause.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
620	SECTION – VI, PART-D	-	12 of 70	31.00.00	The Contractor shall have total responsibility for all equipment and materials in his custody stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the Employer Site only with the written permission of the Employer in the prescribed manner.	Watch and ward arrangement shall be taken care by contractor. However, the arrangement for a strong security set up to insulate complete project contours shall be customer's responsibility.	Bidder proposal is not acceptable. Bidder to comply specification requirement.
621	SECTION – VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM EQUIPMENTS	10 OF 20	Bullet point no.16	Dismantling of existing fencing roads, temporary sheds and building, foundations, re-routing of pipelines above the ground and below the ground available in present scope of bays is also in the scope of the bidder.	Any underground facilities to be modified/ re-routed/ dismantled may be taken care by the Owner.	Bidders proposal is not acceptable. Any underground facilities to be modified/ re-routed/ dismantled may be taken care by the bidder only.
622	SECTION-VI, PART-A	SUB-SECTION-III-01 STEAM GENERATOR AND AUXILIARIES INCLUDING ESP	1 of 28	1.03.03	Supply of all consumables (except coal oil and limestone) like chemicals for chemical cleaning, passivation, inhibition etc., Catalysts, fuel oil & coal for firing beyond declared quantity (during bid stage as per Sub Section-I, part-A), oil for line flushing, nitrogen for blanketing, consumables for air/gas tightness tests and any other consumables as may be required for above pre-commissioning/commissioning activities.	Fuel oil till Trial Run/ Initial Operation beyond predefined quantity may please be provided by Owner free of cost.	Bidder to comply with specification requirement.
623	SECTION VI, PART-B	SUB-SECTION-E-59 CIVIL WORKS	2-3 of 6	4.0 (b)	Structural steel (plates and rolled sections i.e. channels, beams & angles) conforming to IS 2062 and Reinforcement steel conforming to IS 1786 supply if in the scope of the contractor shall be procured from Primary Steel Producers (Refer NOTE below).	Procurement from BIS APPROVED SOURCES HAVING VALID BIS LICENCE may be allowed without any approval from NTPC after the award.	Bidder to meet the technical specification requirements.
624	SECTION VI, PART-B	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL	4 OF 7	10	REINFORCEMENT STEEL	Procurement from BIS APPROVED SOURCES HAVING VALID BIS LICENCE may be allowed without any approval from NTPC after the award.	Bidder to meet the technical specification requirements.
625	TECHNICAL SPECIFICATION S SECTION VI, PART-B	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL	8 OF 53	7	PLATES (SS)	Procurement from BIS APPROVED SOURCES HAVING VALID BIS LICENCE may be allowed without any approval from NTPC after the award.	Bidder to meet the technical specification requirements.
626	SECTION-VI, PART-A	Proveness Criteria	33 of 36	7		For civil work proveness criteria - subagency through consortium to be allowed. For civil work proveness criteria - work in any infrastructure project must be considered.	Bidder's Proposal is not acceptable. Bidder to comply with the Technical specification requirement.
627	SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	5 OF 9	4.02.00	Quantities for both coal and fuel oil shall be compared with the respective quantities as quoted by various bidders. The quantities over above the base value (minimum among the quoted figures for coal & fuel oil) shall be used as a leading factor and corresponding computed price (total for coal & fuel oil) shall be added to the quoted bid price for deriving the total bid price. The cost of coal & fuel oil shall be used as Rs. 1750/Ton (Rupees one Thousand seven hundred and ninety only per ton of coal) Rs. 40,000/KL (Rupees Forty Thousand per KL of fuel oil) for such purpose.	Bidder requests NTPC to delete this clause. Coal & fuel oil should be provided free of all charges during Pre-commissioning and commissioning activities and should not be a criteria for loading factor/ bid evaluation of prices.	Bidder's request for deleting the clause is not acceptable. Bidder to comply the specifications requirements. Since commissioning/initial operation activities is totally in control of bidder. Hence delay of implementation of project will not affect the consumable requirement. Any additional requirement (coal & fuel oil) which is specifically agreed by employer during the commissioning/initial operation activities due to employer's requirement/reason shall be considered.
628	SECTION-VI, PART-A	SUB-SECTION-I-A	33 OF 36	7.1	Bidder or its agency should have executed civil and steel structural works of 500 MW or higher capacity coal based/Lignite based power plant, Earth work in filling involving mechanical compaction and cutting in rock, including Main power house building and Foundation for Turbo-generator.	Civil & Structural works execution should not be linked with prior experience of TG/Bunker/other building. It should be modified in line with NTPC earlier tender enquiries / contract under execution. Therefore, bidder requests NTPC to amend the QR as follows: "In case Bidder or its agency do not meet the requirements at 7.1 and the Bidder proposes to engage agency (ies) for civil & structural works on work volume basis (except for Chimney works). Bidder or its agency (ies) should have executed such works in the past and the annual rate of execution in the reference works should not be less than eighty percent (80%) of the asking rate of such works, (structural steel fabrication & erection, RCC, and earthwork in filling involving mechanical compaction) for which it is being engaged	Bidder's Proposal is not acceptable. Bidder to comply with the Technical specification requirement.
629	SECTION – VI, PART-A	SUB-SECTION-III CIVIL WORKS	8 OF 8	2.03.00	Bidder shall use a Lay down area as shown in GLP. One area marked in GLP totalling 75 acres (approx.) are identified as laydown /preassembly area. Further, bidder to note that this 75 acres of land shall be converted into reservoir. Fencing of the laydown area in therea marked for laydown is in Owner's scope. Construction of wire fencing in the proposed laydown area shall be completed within 4 months from NDA. Contractor can do the site preparation work parallelly.	Area allocated for laydown is small and that too shall be converted into reservoir, which is grossly insufficient. Bidder request NTPC to allocate laydown area of atleast 50 Acres within plant premises over and above 75 Acres to meet the project requirement	Additional area of approximately 25 acres shall be allocated within plant premises during construction stage.
630	SECTION – VI, PART-A	SUB-SECTION- IIIA-21 (SOLAR P.V.)	1 of 1		Complete design, engineering, manufacture, inspection, supply, transportation, storage, insurance, civil work, erection, testing, commissioning and one year O&M of the grid connected rooftop Solar PV plants including all auxiliaries.	NTPC has one of the best O&M capabilities in India for power projects whereas Bidders do not have such competence. Even the system suppliers and equipment(s) supplier do not have such competency to operate the plant. Bidder requests NTPC to delete O&M services from EPC scope. Also, O&M of CCTV and CW Treatment Plant may be excluded from the scope.	Bidder to comply with specification requirement.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

663	VI / A Letter dated 09.12.2022	IV	6 of 76	1.00.02	(i) For Increase in the Guaranteed unit heat rate in kcal/kWhr at 800 MW under rated steam conditions at 77 mmHg(absolute) condenser pressure with zero make up -----Not more than 2051 kcal/kwhr (ii) For Increase in the Guaranteed unit Heat rate in kcal/kWhr under turbine throttle main steam pressure of 150 kg/cm2 (abs) and rated Main Steam and Reheat Steam temperature at 77 mmHg(absolute) condenser pressure with zero make up at 440 MW load (i.e. 55 % of rated load)----- Not more than 2185 kcal/kwhr	Unit Heat Rate estimated for rated load & conditions will behave in a predicted way and the performance will also offset accordingly at part load conditions. The same was reasonably maintained by NTPC in 2x660 MW Talcher tender where UHR limit is 2070 kcal/kWhr and 2188 kcal/kWhr at 100% and 55% load respectively. In view of above, NTPC is requested to review and modify UHR limit at 55% load to maintain parity UHR limit at rated condition.	The specified values of Unit heat rate are limiting value. Bidder to comply specification requirement.
664	General Layout Plan Single Line Diagram 400 kV Switchyard	Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POE-J-002		Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POE-J-002	General Layout Plan Single Line Diagram 400 kV Switchyard	We request you to please provide civil drawings of RCC roads, RCC drains and fencing within the existing switchyard stage-1 for estimation of dismantling and reconstruction works as per those same drawings.	Bidder to visit site to assess actual dismantling works
665	General Layout Plan Single Line Diagram 400 kV Switchyard	Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POE-J-002		Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POE-J-002	General Layout Plan Single Line Diagram 400 kV Switchyard	We request you to provide us the Structural Drawing of Tower & Beam associated with 400 kV Bus. Also please provide structure loading drawing associated with 400 kV Bus.	Drawing will be shared with successful bidder
666	General Layout Plan Topographical Survey Drawing	Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POC-F-002		Dwg. No. 9587-999-POC-F-001 Dwg. No. 9587-999-POC-F-002	General Layout Plan Topographical Survey Drawing	The FGL of Stage-2 switchyard as in the General Layout Dwg. No. 9587-999-POC-F-001 is mentioned as RL 207 meter, however in the Topographical Survey Drawing 9587-999-POC-F-002, it is mentioned as RL 208 meter. Please clarify the value to be considered.	Bidder to refer amendment no D2-16
667	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard	With respect to the works of Raigarh-Kotra line, we understand that the dismantling of conductor between the dead end tower and existing dead end gantry is not in the scope of the bidder. Please confirm.	Bidders understanding is correct.
668	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard	With respect to the works of Raigarh-Kotra line, we understand that any kind of dismantling of 400 kV equipment in the 400 kV Bays of Raigarh-Kotra line is not in the scope of bidder. Please confirm.	Bidders understanding is not correct. Bidder shall refer to Electrical Amendment No-Elec1-04.
669	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard	We understand that any stringing of conductor between the existing dead end tower and new gantry / new tower (if required) is not in the scope of the bidder. Please confirm.	Bidders understanding is correct.
670	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard	We understand that the extension of 400 kV Switchyard of stage-1 shall follow existing philosophy of CRP in SPR. Please clarify/confirm.	Bidders understanding is not correct. Bidder shall comply to the technical specifications
671	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	2.00.00	Electrical b) Terminal points of Switchyard	With respect to the 400 kV lines from the 400 kV Switchyard in Stage-1 to 400 kV Switchyard in Stage-2, we understand that any kind of dismantling/diversion of existing power lines/facility inside or outside the plant premises is not in the scope of the bidder. Please confirm.	Bidders understanding is correct for outside the plant premises for transmission line. For Inside the LARA STPP Boundary, Bidder shall refer to Electrical Amendment No.Elec1-04.
672	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Project Management Team: The team shall comprise of experience and qualified project professionals and shall be located at bidder's project management office as well as at site.	Location of Project Management team will be as per project requirement.	Bid provisions shall prevail.
673	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Training/familiarization of NTPC team with the project management tool. One nodal person to be identified for providing remote (Telephone-mail/Internet) or in-Person (wherever required) support.	Training module, will be available in the Project Management tool.	Bid provisions shall prevail.
674	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Deployment of Vendor's Staff, Workers, T&Ps deployment, and their healthiness	We are considering for deployment status of site sub-contractor's manpower and T&Ps. Please confirm.	Bid provisions shall prevail.
675	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Statutory wage payment status	We are considering for manual uploading of Statutory wage payment status in the system. Please confirm.	The data may be uploaded manually however the same shall be in an editable format supporting customizable reports and trend analysis in the project management tool.
676	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Any other information required for the project management purpose.	NTPC may please elaborate, which type of other information required.	Any additional data relevant to the project (as required) as per mutual agreement between owner and the successful bidder.
677	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	CI.No.-1.01.00 A.	Comply to the requirements of NTPC pertaining to statutory obligations and maintenance of Sequence of events/ Hindrance register.	Sequence of events/ Hindrance register will be uploaded on weekly basis in the system.	Frequency will be finalized after the award of the contract as per the requirement of the owner
678	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	CI.No.-1.01.00 B.	Project Management Tool: Should be implemented as Cloud based solution with web hosting supporting mobile Access/ Application	Mobile application will have access to only limited modules for viewing & updation purpose. Please confirm.	Bid provisions shall prevail.
679	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	CI.No.-1.01.00 B.	The access to the tool shall be role based for the security and integrity of the data. Provision for concurrent access by up to 50 users of the owner is to be ensured by the bidder	Access to Project Management Tool up to 50 users of the owner will be given as per the list of users provided by the customer.	Bidder's interpretation is correct.
680	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	CI.No.-1.01.00 B.	Should support integration with existing NTPC Systems viz C-Folder, Dreams, Pradip, Windows, Team-up etc. with proposed software solution. (APIs will be provided by NTPC, subject to security authentication by NTPC. IT team).	NTPC may please provide the complete list of their systems along with APIs to be integrated with Project management tool. Integration will be done as per the list provided.	Shall be discussed and finalized with successful bidder after award of contract.
681	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	CI.No.-1.01.00 B.	All the review meetings (Daily/Weekly/Monthly) shall be conducted on this platform and should support upload /generation of record notes. The format for the same should be customizable.	We are considering for manual uploading of record notes in the system as per the format prescribed by the customer. Please confirm.	The Project Management Tool shall have provision for conducting the review meeting, generation of record notes/manually uploading the record notes (as per the format prescribed by the customer). The data may be uploaded manually however the same shall be in an editable format supporting customizable reports and trend analysis in the project management tool.
682	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	CI.No.-1.01.00 B.	All Major T&Ps like Cranes, Earth Moving equipment, Induction Heating Machines etc. shall be monitored for deployment and healthiness	We are considering for deployment status of site sub-contractor's major T&Ps. Please confirm.	Bid provisions shall prevail.
683	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	CI.No.-1.01.00 B.	Report Generation: Capital Budgeting, Bills submission & realization and Payment confirmation to sub-vendors.	We are considering for manual uploading of RA bill submission of Bidder & realization status in the system. Please confirm.	The Project Management Tool shall have provision to generate report regarding Capital Budgeting, Bills submission & realization and Payment confirmation to sub-vendors. The data may be uploaded manually however the same shall be in an editable format supporting customizable reports and trend analysis.
684	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	CI.No.-1.01.00 B.	Allow users to configure/customize/format views, graphs, and reports.	Report generation by the system as per the format prescribed by the customer has been considered.	Bid provisions shall prevail.
685	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	CI.No.-1.01.00 B.	Any other custom reports as per the requirement and mutual agreement.	Customer may please elaborate, which type of other reports required.	Any other project related information may be made available in PMT as per mutual agreement between owner and the successful bidder.
686	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 4 of 6.	CI.No.-1.01.00 C.	Web-based output for visual monitoring on Project Management Tool.	We are considering for manual uploading of Drone based Project Monitoring reports in the system. Please confirm.	The drone video may be uploaded manually in the Project Management Tool along with drone survey report.
687	SECTION – VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 4 of 6.	CI.No.-1.01.00 C.	All the reports/Photographs/Videos are to be made available on Project management tool.	We are considering for archiving of all the reports/Photographs/Videos generated by Drone. The access link for the same may be provided in Project management tool. Please confirm.	Bid provisions shall prevail.



EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

688	VIA	I	7 of 9	4.08.00	All the plant layouts shall be made in computerized 3D modeling system as detailed in Part C of the Technical Specification.	It is clarified that for Steam generator & auxiliaries, • 3D Plant review model of boiler reflecting "as de-signed" conditions will be delivered at the end of the project • 3D model will be utilized to develop plant layouts and for interference checking internally, however, finalized drawings will be completed using AutoCad • Major equipment & sub system of the boiler will be covered in the plant modeling. • 3-D modeling will be started after completion of engineering only & not connected to any contract schedule. • Equipment drawings, data sheets, P&ID, BOD, schematics, logic diagrams, test reports and quality plan will not be attached to the 3D model. • Review model only will be submitted • Hardware/ 3rd party software licenses will have to be arranged by customer. Further, P&IDs will be created as per bidders' standard practice. These P&IDs will not be integrated with the 3D plant model	Bidder to comply specification requirement.
689	VVIC	GTR	45 of 119	28.01.00	The scope of service under training of Em-ployer's engineers shall include a training module covering the areas of Operation & Maintenance. Such training should cover the following areas as a minimum in order to enable these per-sonnel to individually take the responsibility of operating and maintaining the power station in a manner acceptable to the Employer: The scope of services under training shall al-so necessarily include training of Employer's Engineering personnel covering entire scope for the package. This shall cover all disci-plines viz. Mechanical, Electrical, C&I, QA etc. and shall include all the related areas like Design familiarization, training on product de-sign features and product design software of major equipment and systems, engineering, manufacturing, erection, commissioning, training on operating features of equipment, quality assurance and testing, plant visits and visits to manufacturer's works, exposure to various kinds of problems which may be en-counter-ed in fabrication, manufacturing erection, welding etc.	The scope of training will cover the required training at the bidders' associates works in Operating & Maintenance (Ref. Cl. 28.01.00, Sec-VI/C, GTR) only. This is limited to familiarization of various systems and equipment as well as operation of steam generators. Training in other areas viz., Training of Employer Engineering personnel (Clause 28.03.00, Sec-VI/C, GTR) are not included as these are either not covered in the scope of supply or is proprietary in nature to the Bid-der/Associate/Vendor.	Bidder to comply specification requirement.
690	VI / A	I-A	23 of 36	4.26.1.e	Application: Wet Limestone FGD application in Coal fired power plant Equipment rating: Agitator rating not less than that sup-plied for 500MW or higher size unit for similar application	Bidder request customer to change the proveness of FGD agitators as mentioned below * Bidder should have designed, manufactured, tested, supplied / commissioned at least 1 No. of Horizontal or Side Entry Agitator in either for Wet Limestone based Flue Gas Desulphurization (FGD) application or any other industrial / process application such as petrochemicals, metals, mining, sugar, paper, fertilizers etc. and the equipment should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on the date of consideration for approval but not later than one (1) year to award date of contract". Kindly accept.	Bidder to comply with specification requirement.
691	VI / A	I-A	1 of 36	--	Provenness For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the techno-commercial bid opening date of EPC package unless otherwise specified in the respective clauses.		
692	VI / A	I-A	23 of 36	4.26.1.d	Slurry Pumps Application: Wet Limestone based FGD application or ash slurry application in Coal fired power plant Equipment Rating: Flow 50 m3/hr (min.) with head 30 Me-ters of Liquid Column (min.)	Bidder request customer to change the proveness of FGD Slurry pumps as mentioned below Bidder should have designed, manufactured, tested, supplied / commissioned at least 1 No. of Slurry pump having Flow 50 m3/hr (min.) with head 30 Meters of Liquid Column (min.) in either for Wet Limestone based Flue Gas Desulphuriza-tion (FGD) application or Ash Slurry Application or any other industrial / process application and the equipment should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on the date of con-sideration for approval but not later than one (1) year to award date of contract.	Bidder to comply with specification requirement.
693	VI / A	I-A	1 of 36	--	Slurry Pumps Application: Wet Limestone based FGD application or ash slurry application in Coal fired power plant Equipment Rating: Flow 50 m3/hr (min.) with head 30 Me-ters of Liquid Column (min.)	Kindly accept.	
694	VI / B	A-05	16 of 26	7.07.06	The Waste water collection tank shall be of Steel construction with rubber lining.	The wastewater collection tank shall be of steel construction with rubber lining or vinyl ester based flake glass lining of min 3 mm thk. Kindly accept.	Bidder to refer the amendment SG 1 in this regard.
695	VI / B	A-05	16 of 26	7.07.00	Waste Water System	Kindly mention the terminal point of FGD Waste water discharge.	Refer amendment SG 1 in this regard.
696	VI / A	IIA-04	04 of 06	5.05.01	The under flow from the secondary hydro-cyclone shall be taken to the filtrate water tank. The over flow from the secondary hydro-cyclone shall be taken to 2LD System		
697	VI / B	A-05	17 of 26	7.08.03	Agitation shall be provided to prevent settlement of slurry by sufficient no. of Top entry agitators with emergency flush start system.	Bidder understanding is slurry by sufficient no of Top or Side entry agitators with emergency flush start system. Kindly accept	Bidder to refer the amendment SG 1 in this regard.
698	VI / B	A-05	17 of 26	7.08.06	Coarse--screen of suitable material at suction side of the pumps shall be provided.	Coarse screen will be provided at suction side till commissioning of slurry pump. The same will be removed after commissioning. This is based on QFGDM & current commissioning practice. Kindly accept.	Specification requirement to be complied. Further the screen can be removed (kept as spare) if the operational experience warrants the same. However, performance shall be ensured by the bidder.
699	VI / A	IV	04 of 76	1.01.01	Guarantees under Category-I Limestone Consumption rate: Bids with lime stone consumption higher than 9440 kg/hr shall not be accepted and no evaluation credit shall be given for lower consumption rate.	As per clause no: 1.01.01 of Functional guarantees, the limestone consumption rate is mentioned as 9440 kg/hr whereas as per Attachment-11, it is indicated as 8700 kg/hr. These statements are contradictory. Requesting customer / consultant to review and confirm the limestone consumption rate at Guaranteee point (TMCR-DC).	Bidder to refer the amendment SG 1 in this regard.
700	VI / A	IV	07 of 76	1.01.02	Attachment-11 Declaration of Guaranteee Parameter: Limestone consumption rate not exceeding 8700 kg/hr.		
701	TECHNICAL SPECIFICATION SECTION-VI, PART-A				General Query	Re-routing/Dismantling of power supply lines (existing) in the premises of proposed areas as listed below shall be in NTPC scope . During Site visit it is found that these facilities are interfering with the proposed facilities. 1. Track hopper area 2. Ash corridor Near Boundary wall Customer to confirm.	Bidder understanding is correct.
702	SECTION - VI / PART - E (TENDER DRAWINGS)				GENERAL LAYOUT PLAN - Dwg No 9587-999-POC-F-001	We propose to re-route the Road on the north side of crusher house towards west side of the crusher house for the following reasons 1. As per contract, bidder has to consider 8m clear height between bottom of conveyor gallery and top of road. As a result of this, the tail pulley of outgoing conveyor will be at a floor 8m above finished floor level (with the shown arrangement in the plot plan). Hence there will be unutilised 8m height inside the crusher house which is a waste. Hence if we route the road towards west side it can serve the system requirement as well as we can place the conveyor tail pulley at ground floor. 2. When the crusher house height is increasing the elevation of incoming conveyor is also increasing. As a result of this, the power consumption of this conveyor is increasing unnecessarily. This will add to the Auxiliary power consumption which is not required. Customer to confirm the shifting of road for the reason mentioned above.	Bidder to refer amendment no D2-16
703	SECTION - VI / PART - E (TENDER DRAWINGS)				GENERAL LAYOUT PLAN - Dwg No 9587-999-POC-F-001	The distance between TP-15 and Crusher house (CH-II) is less. Hence we propose 12 degree inclination at the tail end portion of conveyor 17A/B for achieving given elevation of conveyor 17A/B. Customer to confirm.	Bidder to refer amendment no D2-16
704	Plot Plan				Railway line shown below Ash silos (HCSD silo, Fine fly ash, Fine fly ash hopper, Coarse fly ash hopper)	Please confirm that railway line will be applicable only below 3 Nos HCSD silos and 1 No. Fine fly ash silo. Further also request to confirm that complete scope of railway line is excluded from this tender and shall be taken up by NTPC through other agencies.	Confirmed.
705	Plot Plan				HT transmission line near to ash pipe corridor after ash silos...	Please confirm that relocation of HT transmission lines will be done by NTPC.	Railway siding is not in bidder's scope During prebid site visit as understood that HT transmission line near ash pipe corridor is construction power line. Removal of the same is not in the scope of bidder.
706	Sec VI, Part A	VI, Chap-3	5 of 13	4.04.03	Mandatory spares for HCSD pumps	There are multiple foreign vendors who are manufacturer of HCSD pumps. Few components may not be applicable to specific vendor chosen during then course of contract. Please confirm that components as applicable to the manufacturer of HCSD pump shall be supplied.	Bidders proposal shall be finalised during detail engineering.
707	Sec VI, Part A	IV	35 of 76	1.03.09 (A)	Ash from each individual hopper section in a unit will be removed in parallel. Bottom ash and (APH Hopper + SCR Hopper + Duct Hopper) Ash from each unit shall be removed sequentially to the bottom ash slurry sump in case of Feeder Ejector employed for Ash removal from APH and Duct Hoppers. Total time for evacuating four (4) hours of ash collection from all the hoppers of (APH +SCR +Duct Hoppers) of a unit corresponding to collection rates specified shall not exceed 45 mins (including change over time.	Please confirm that functional guarantee shall not be there for ash conveying system from SCR hoppers as no ash handling system below SCR hoppers are considered.	Bidders understanding is correct. Bidder to note that Ash from SCR Hoppers shall be considered in the design of the ash handling system. The equipment like compressor, pumps, conveyors, pipe lines, storage vessels, etc shall be sized considering ash from SCR hoppers also.


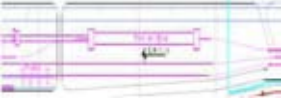
EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

708	Section – VI, part-A	SUB-SECTION-IV	5 of 76	1.01.01	CATEGORY-I GUARANTEES (x) Unit Auxiliary power consumption (x) Station auxiliary power consumption	Bidder shall provide separate Auxiliary Power consumption guarantee for both the categories (i.e., Unit & Station auxiliaries) individually. However, for LD levy purpose shortfall in actual Auxiliary Power consumption in one of the categories, if any, shall be adjusted against benefit achieved in other category, if any. Please confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
709	Section – VI, part-A	SUB-SECTION-I	5 of 9	4.02.00	These quantities for both coal and fuel oil shall be compared with the respective quantities as quoted by various bidders. The quantities over & above the base value (minimum among the quoted figures for coal & fuel oil) shall be used as a loading factor and corresponding computed price (total for coal & fuel oil) shall be added to the quoted bid price for deriving the total bid price. The cost of coal & fuel oil shall be used as Rs. 1700/ton (Rupees one Thousand seven Hundred and ninety only per ton coal) Rs. 40,000/KL (Rupees Forty Thousand per KL of fuel oil) for such purpose.	Owner is requested to remove the coal & LDO requirement from bid evaluation & instead provide limiting value for coal and LDO consumption till completion of Initial Operation which will be issued to Bidder free of cost. Please confirm acceptance.	Bidder to comply with the specification requirements.
710	Section – VI, part-A	SUB-SECTION-IV	2 of 76	1.00.01 (g)	Instruments for PG test and instruments for process control of similar applications are envisaged to be of same make and model having same accuracy level. However, instruments for PG test are also acceptable as per standard and proven practice of the contractor/OEM and in such case, instruments for process control shall be as per requirements specified in Part-B of technical specifications, instruments to be used for PG test shall be additionally supplied over and above the instruments shown in tender PSDs. PG test equipment being supplied, installed and commissioned for each unit, shall be retained by employer after completion of PG test. Control system loop tuning required to limit the variation of parameters during performance guarantee testing shall be completed prior to PG Test / initial operation. All PG test process parameters shall be made available in DDCMIS	PG test shall be performed by using special test instruments required for PG test and shall be separate from the process instruments. High accuracy dataloggers shall be used to retrieve the data and the same shall be used for performance evaluation. Accordingly Bidder request owner to kindly modify the following clause inline with earlier NTPC Talcher project :- Instruments for PG test and instruments for process control of similar applications are envisaged to be of same make and limit the variation of parameters during performance guarantee testing shall be completed prior to PG Test / initial operation. All PG test process parameters shall be made available in DDCMIS	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
711	Section – VI, part-A	SUB-SECTION-IV	51 of 76	2.02.02	No shutdown shall be allowed for installation of PG test instrument/ flow nozzle etc. Any advanced class instrument system such as those using electronic devices or mass flow technique shall be arranged by the contractor, if required. However, same shall be installed before start of initial operation of unit. For determination of primary flow to the turbine, a calibrated low Beta-ratio throat-tap nozzle assembly shall be installed permanently in condensate line prior to initial operation, same shall be also used for process control.	Bidder request owner to kindly modify the following clause inline with earlier tender of NTPC for Talcher project :- "No shutdown shall be allowed for installation of PG test instrument/ flow nozzle etc. Any advanced class instrument system such as those using electronic devices or mass flow technique shall be arranged by the contractor, if required. However, same shall be installed before start of initial operation of unit. For determination of primary flow to the turbine, a calibrated low Beta-ratio throat-tap nozzle assembly shall be installed permanently in condensate line prior to initial operation, same shall be also used for process control. "	Bidder's query regarding Talcher Specification is not correct. Bidder to comply with the specification requirements.
712	Section – VI, part-B	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE	9 of 227	3.4	Condensate flow nozzle (ASME PTC 6) will be installed by vendor Prior to initial operations. Condensate flow data will be available in DCS during performance test. All other online process instruments will be used for conducting TG Performance test. Average value of test data of the specified test period will be collected from DCS for evaluation purpose. Offline instrument will not be used during performance test. Vendor to ensure calibration validity of all instruments used for PG Test. Calibration certificates of test instruments shall be submitted to SCCL least 15 days before the conductance of performance test. Instrument Calibration to be carried out in a NABL accredited Laboratory	Bidder requests owner to modify the language as follows similar to earlier NTPC tender for Talcher 2x660 MW project (Refer Tech Amendment 2, Point no. G-04, Page 160 of 161):- Condensate flow nozzle (ASME PTC 6) will be installed by vendor Prior to initial operations. Condensate flow data will be available in DCS during performance test. All other online process instruments will be used for conducting TG Performance test. Average value of test data of the specified test period will be collected from DCS for evaluation purpose. Offline instrument will not be used during performance test.	Bidder's query is not correct. Bidder to recheck the technical specification. Bidder to comply with the specification requirements.
713	Section – VI, part-A	Sub section-I-A	4 of 36	3.1. q	Provenness criteria for critical equipment(s) and bought out items : q) Name of equipment : HP Bypass system Type of equipment : HP Bypass system for supercritical steam turbine generator sets Equipment rating : Capacity of each valve not less than 750 Ton/hr at 270 Kg/Cm2(abs) & 600 deg.C Main Steam pressure and temperature at Turbine inlet	Bidder/Sub vendor should be allowed to meet the referred steam parameters & Flow requirement through multiple projects (i.e multiple/different project references can be considered for meeting individual parameters (i.e Pressure, Temperature & Flow) provenness). Please confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
714	Section – VI, part-A	Sub section-I-A	4 of 36	3.1. q	Provenness criteria for critical equipment(s) and bought out items: r) Name of equipment: LP Bypass system Type of equipment: LP Bypass system for steam turbine generator sets Equipment rating: Capacity of each valve not less than 750 Ton/hr at pressure corresponding to 100% TMCRC condition reheat pressure (abs) & 500 deg.C reheat temperature at Turbine inlet.	Bidder/Sub vendor should be allowed to meet the referred steam parameters & Flow requirement through multiple projects (i.e multiple/different project references can be considered for meeting individual parameters (i.e. Pressure, Temperature & Flow) provenness). Please confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
715	Section – VI, part-B	Sub section-A-01	42 of 101	2.01.02. xi	Final feed water temp. at TMCRC/EMCR condition: To be optimized by bidder but not less than 305 deg C	In the specifications the lower limit for Final feedwater temperature is specified as 305 Deg.C. Though this results in a marginally better Turbine Heat Rate, but due to the adverse impact this temperature has on Boiler efficiency, it is not the ideal temperature from Unit Heat Rate point of view, which is of importance to NTPC. Being an EPC tender, we request NTPC to revise the specification clause as below: Final feed water temp. at TMCRC/EMCR condition: To be optimized by bidder but not less than 305 300 Deg.C	Final feed water temperature is based on cycle optimisation and NTPC experience in past project. Bidder to comply with the specification requirements.
716	SECTION - II (ITB)	-	42 of 44	46.1	Any Bidder (including its Collaborator /Associate /DJU Partner/ JV partner/ Consortium Member/Assignee, wherever applicable) from a country which shares a land border with India will be eligible to bid in this tender only if bidder is registered with the Competent Authority as mentioned in Special Conditions of Contract (SCC).	Latest Government of India circulars related to "Restrictions on procurement from a Bidder of a country which shares a land border with India" to be followed. Please confirm acceptance.	Provisions of Bid document shall prevail.
717	Section – VI, part-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES	4 of 76	1.01.01	ii) Unit Heat Rate at 55% TMCRC load Guaranteed Unit Heat rate in kcal/KWhr under turbine throttle main steam pressure of 150 Kg/cm2 (abs) and rated Main Steam and Reheat Steam temperature at 77 mmHg(abs) condenser pressure with zero make up at 440 MW load (i.e. 55 % of rated load)	Bidder understand that for 55% TMCRC Heat rate guarantee, One (1) TDBFP shall be in operation. Please confirm.	
718	Section – VI, part-B	SUB SECTION-A-07	5 of 25	1.18.01	c) 55% of rated load under turbine throttle main steam pressure of 150 Kg/cm2 (abs) and rated main steam temperature / rated reheat steam temp. at turbine inlet at condenser pressure of 77 mm Hg (abs) with zero make-up with one TDBFP in operation. (Heat Rate Guarantee)		Bidder understanding is correct. Bidder to further refer clause No. 1.01.03(iii) of the functional guarantee chapter/sub-section-IV/Part-A.
719	Attachment-11	-	1 of 4	2	Unit Heat rate in Kcal/KWhr at 440 MW (i.e. 55% of rated load) under turbine throttle main steam pressure of 150 kg/cm2 (abs) and rated Main steam and Reheat Steam temperature at 77 mmHg(abs) condenser pressure with zero (0%) make up shall not be more than 2185 Kcal/KWhr		
720	Section – VI, part-A	SUB SECTION-VI MANDATORY SPARES	-	-	MANDATORY SPARES	Mandatory spares which are duplicated at different clauses in Mech/Elec/C&I sections, Bidder will consider the spare as per the section where higher qty is specified. Other sections shall be ignored for the same spares. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
721	Section – VI, part-B	SUB-SECTION G-03	14 of 14	1.04.00. 5	The Bidder shall also make arrangement for storing following mandatory spares (whichever is applicable as per scope of the package) inside TG hall with access from EOT crane: a.Complete assembly of HPT module or its alternative, as applicable	Inner & outer casing of HPT is not required and not recommended; Such requirements will increase overall Project/Capital Costs as well as storage cum preservation costs. OEM can support to the Owner in future, if need related to Casing & stationary parts. hence Only HP Rotor complete assembly can be offered against this clause. Please confirm acceptance.	Bidder to comply with the specification requirements.
722	Section – VI, part-B	SUB-SECTION G-03	14 of 14	1.04.00. 5	The Bidder shall also make arrangement for storing following mandatory spares (whichever is applicable as per scope of the package) inside TG hall with access from EOT crane: b.Complete assembly of IPT module or its alternative, as applicable	Inner & outer casing of IPT is not required and not recommended; Such requirements will increase overall Project/Capital Costs as well as storage cum preservation costs. OEM can support to the Owner in future, if need related to Casing & stationary parts. hence Only IP Rotor complete assembly can be offered against this clause. Please confirm acceptance.	Bidder to comply with the specification requirements.
723	Section – VI, part-B	SUB-SECTION G-03	14 of 14	1.04.00. 5	The Bidder shall also make arrangement for storing following mandatory spares (whichever is applicable as per scope of the package) inside TG hall with access from EOT crane: f. Generator Stator/ Generator Rotor	Item (f). Generator stator is not applicable as the same is not asked in the mandatory spares list. Please confirm acceptance.	It is clarified that generator stator is not applicable. Bidder to also refer amendment No. LAY1-02 in this regard.
724	Section – VI, part-A	SUB-SECTION-VI, CHAPTER-02	2 of 31	4	LP turbine rotor last two stage moving blades along with fastening material (Clamping pieces, Rivets, snubbers, sleeves, springs, locking strips, locking pins etc. whichever are applicable) Note : a) If configuration has one LP Rotor, two sets for each stage of last two stage moving blades of both side flow is required (Total=8 sets) b) If configuration has two LP Rotors (Identical or non-identical) then one set for each stage of last two stage moving blades of both side flow is required (Total=8 sets)	In both LP1 & LP2 rotors last two stages blades are identical. Hence bidder proposes to offer "one set of one LP rotor each stage of last two stage moving blades of both side flow (Total=4 sets)" against this clause. Please confirm acceptance.	It is clearly indicated in item description that If configuration has two LP Rotors (Identical or non-identical) then one set for each stage of last two stage moving blades of both side flow is required (Total=8 sets). Bidder to comply specification requirement.




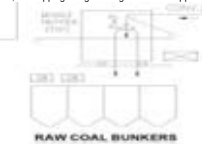
EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

725	Section-VI, Part-B	Sub-Section-A-07	5 of 25	1.16.00 (k)	However, HP bypass valve internals/trim shall also be designed to withstand wet steam entry during cold start-up case.	Usually, HP Bypass valves are not designed for wet steam entry. Bypass valve manufacturers would prefer dry steam through valves to avoid damage to the valves. Hence it would be practical to avoid entry of wet steam to the valves altogether. Hence request customer to delete this requirement of designing HP Bypass valves for wet steam.	Bidder to refer amendment No. TG1-14 in this regard.
726	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	17	HP control valve (Set of all internals required to complete one valve assembly except valve body) : 1 No of each type. (If Valves are similar then only one No)	Please clarify whether Bonnet to be included or it is excluding Bonnet.	Bonnet to be also provided. Bidder to comply with the specification requirements.
727	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	18	HP control valve servomotor complete assembly : 1 No. of each type (If servomotors are similar then only one No)	Bare hydraulic actuator without Yoke and accessories will be offered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder to please note that HP control valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), trip solenoids, ATT solenoids and its position feedback transmitter, limit switches.
728	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	21	LP Bypass control valve (Set of all internals required to complete one valve assembly except valve body) : 1 No.	Please clarify whether Bonnet to be included or it is excluding Bonnet.	Bonnet to be also provided. Bidder to comply with the specification requirements.
729	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	22	LP Bypass control valve servomotor complete assembly: 1 No.	Bare hydraulic actuator without Yoke and accessories will be offered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder to please note that LP Bypass control valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), fast opening/closing device (if applicable) and position feedback transmitter.
730	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	23	LP Bypass stop valve (Set of internals required to form one valve assembly except valve body) : 1 No.	Please clarify whether Bonnet to be included or it is excluding Bonnet.	Bonnet to be also provided. Bidder to comply with the specification requirements.
731	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	24	LP Bypass stop valve servomotor complete assembly : 1 No.	Bare hydraulic actuator without Yoke and accessories will be offered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder to please note that LP Bypass stop valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), fast opening/closing device (if applicable) and position feedback transmitter.
732	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	28	Spray water injection valve for HP Bypass system complete assembly including actuator, yoke and its control. : 1 No.	Please clarify this to be only water injection control valve and not water injection stop valve	Bidder to refer amendment No. TG1-10 in this regard.
733	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	6 of 31	29	Control fluid pump assembly including motor and complete coupling : 1 No.	Please clarify whether this spare is related to HPU of HP LP Bypass system pump-motor assembly or Main Turbine control fluid pump	Control fluid pump assembly including motor and complete coupling mentioned here is for Main Turbine governing oil supply system. Bidder to comply with the specification requirements.
734	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	12 of 31	xxvii.	Seal kit for Electrohydraulic actuators for HP and LP bypass system : 2 Sets of each	By pass system does it mean all valves in HP & LP i.e. HP & LP Steam control valve, LP steam stop valve, HP & LP spray control valve and HP spray stop valve. Please clarify.	The requirement against this clause is both for HP&LP Bypass system. Bidder has to provide seal kit for all electrohydraulic actuators (Steam as well as spray valves) as per the quantity specified. Bidder to comply with the specification requirements.
735	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	12 of 31	2 (ii)	Soft packing like gaskets/pressure seal/sealing ring, gland packing rings for HPSV, HPCV, HPCV BYPASS VALVE, HP BYPASS SPRAY STOP & CONTROL VALVE, IPSV, IPCV, LP BYPASS SV, LPBYPASS CV : 2 Sets for each kind of valve	What is the difference between HPCV and HP Bypass valve? Under rest of the clause when HP control valve was specified it was treated as HP bypass valve. Please clarify.	Bidder's understanding is not correct. HPCV means main turbine control valve. Bidder to comply with the specification requirements.
736	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	23 of 31	4.00.00, A (4)	High pressure hoses for HPBP, High Pressure LPBP etc : 2 complete sets	It is not mentioned as HP & LP bypass system. Hence hoses only applicable to HP BP actuator-controls will be provided. LP BP will be treated as both LP stop and control valve. Hence hoses only applicable to LP BP actuator-controls will be provided. Please confirm acceptance.	Bidder to refer amendment No. TG1-12 in this regard.
737	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	24 of 31	5.00.00	PROCESS CONNECTION PIPING (FOR IMPULSE PIPING/TUBING, SAMPLING PIPING/TUBING AND AIR SUPPLY PIPING AS APPLICABLE)	Bidder understands that this requirement is not applicable to Tubing/ fitting coming on hydraulic actuators, Field Tubing and Fittings of Hydraulic Power Supply Units of HP-LP Bypass system. Please confirm acceptance.	Bidder's understanding is correct.
738	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	5 of 31	26	HP Bypass Valve complete assembly : 1 no.	Bare stem valve excluding complete servomotor assembly offered against this clause. Please confirm acceptance.	Complete HP Bypass valve with all internals and valve body excluding servomotor/Actuator ,yoke assembly, controls and feedback transmitters to be supplied. Bidder to comply with the specification requirements.
739	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	23 of 31	4.00.00 A (2)	a. Electro-Hydraulic Converter/Servo unit/proportional valve for LPBP b. Blocking unit for LPBP (as applicable) c. Position feedback transmitter for LPBP d. Positioner for LPBP 1 set	Please clarify LP BP means only LP bypass stop & control valve or it is inclusive of LP bypass spray control valve also.	LP BP means complete set of valves in LP Bypass system including stop valve, control valve & spray control valves.
740	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	23 of 31	4.00.00 A (3)	a. Electro-Hydraulic Converter/Servo unit/ proportional valve for HPBP b. Blocking unit for HPBP (as applicable) c. Position feedback transmitter for HPBP d. Positioner for HPBP 1 set	Please clarify HP BP means only HP bypass control valve or it is inclusive of HP BP spray control valve & HP BP spray block valve.	HP BP means complete set of valves in HP Bypass system including HPBP control valve, spray block & control valves.
741	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	24 of 31	4.00.00 (F)	(i) Solenoid valves in the Electrohydraulic governing & protection circuit of main turbines, BFP turbines, HPBP & LPBP : 10 % or 1 no of each type and model whichever is more	Please clarify HPLP BP means only HPLP bypass control valve or inclusive of other valves like HP BP spray control valve, HP BP spray block valve & LP bypass spray control valve also.	Bidder's understanding is not correct. Quantity envisaged is 10% of total quantity of each type of solenoids for complete HPBP/LPBP system being supplied in this package.
742	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	8 of 31	VI (1)	Complete drip pump assembly with coupling sets (Without Motor) : 1 no	Bare pump assembly without canister will be offered against this clause. Please confirm acceptance.	Canister is not required, however coupling requirement is clear and shall be provided.
743	Section – VI, part-A	SUB SECTION-VI, MANDATORY SPARES	8 of 31	V (5&6)	DRIVE TURBINE OF BFP : Auxiliary Control valve complete assembly : 1 No. Auxiliary control valve servomotor complete assembly : 1 No.	Not applicable in our design & also no equivalent spare has been envisaged. Please confirm acceptance.	In case the specified item is not applicable, equivalent mandatory spares pertaining to the offered design shall be supplied by the bidder.
744	Section – VI, part-B	SUB SECTION-B-02, Motors	3 of 4	7.10.00	3.3/6.6 KV motors shall be offered with dust tight phase segregated double walled (metallic as well as insulated barrier) Terminal box.	Alternately Elastomold type Terminal box should also be accepted as per OEM standard proven practice. The same was accepted in recent tender of NTPC for Talsar 2x800 MW project. Please confirm acceptance.	This shall be finalised during the detailed engineering.
745	Section – VI, part-B	SUB SECTION-A-07, STEAM TURBINE AND AUXILIARIES SYSTEM	16 of 25	6.05.09 (d)	In case bidder offer extraction steam to BFPT arrangement as per BOX-B of tender P&ID of extraction steam to BFPT, then the pressure regulating valves in the CRH and Auxiliary steam line shall necessarily be electro hydraulically operated.	As per tender P&ID, separate electro hydraulically operated control valves in auxiliary steam and CRH steam line to BFPT is shown. Bidder proposes to supply common control valve in Auxiliary steam and CRH steam line to BFPT as per OEM standard practice followed in earlier projects. Accordingly, bidder will provide proven scheme for Auxiliary / CRH steam supply to BFPT.	Bidder to comply with the specification requirements.
746	Dwg. No. : XXXX-999-POM-A-008 (Extraction Steam P&ID for BFP Turbine)	-	-	-		-	-
747	Dwg. No. : XXXX-999-POM-A-007 (Extraction Steam P&ID for Heaters)	-	-	-		As per tender P&ID, extraction steam tapping for BFPT prior to power operated NRV. Bidder proposes to take extraction steam tapping for BFPT after power operated NRV as per their standard practice followed in past executed projects. Accordingly, bidder will provide updated scheme for extraction steam supply to BFPT. Please confirm acceptance.	Bidder to comply with the specification requirements.
748	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-G-01 OPERATING CAPABILITY OF PLANT	2 OF 4	1.03.00	To make unit capable of continuous two shifting operation, the number of hot start ups shall be increased from 4000 numbers specified elsewhere to 6700 numbers without changing cold and warm start up as well as daily N1 (minimum 13400 cycles in total design life) and N2 (minimum 6700 cycles in total design life) requirements as defined above.	Bidder request owner to kindly modify the number of Hot startups to a realistic number. 6700 numbers seem to be considerably higher.	Bidder to comply with the specification requirements.
749	Section – VI, part-A	IIA-06 TURBINE GENERATOR AND AUXILIARIES	2 OF 10	2.01.03	TSR analysis to be carried out by the successful Bidder for any additional requirements which shall be met by Bidder.	Kindly elaborate the TSR analysis requirement.	It is transient speed rise analysis which is specified to be carried out with respect to over speeding and turbine design. Bidder to comply with the specification requirements.

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Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

750	SECTION-VI, PART-A	Coal + Biomass flow diagram (drg No.9587-0018-POM-A-002, Rev.A)	PDF 65 of 85 5 of 8	Note-8 2.03.00	All conveying stream for biomass shall be working. No stand by stream has been envisaged. From truck tippler up to storage silo, One additional biomass stream shall be kept as future provision. Space and interface provision for one (1) additional stream of Truck Tippler, BRU/Surface Feeder and Bucket Elevator shall be kept for future eventuality.	As per referred clause regarding future provision, Bidder understands that for future provision of biomass feeding following needs to be considered by the Bidder: 1. Ramp to be constructed considering for both truck tippler. 2. BRU station / building to be sized considering two nos BRU unit & feeding system. 3. Bucket elevator supporting arrangement shall be considered from silo for two nos bucket elevator. 4. Silo is to be designed for two stream of conveyor feeding (One is for Sl-II + One future stream) 5. There will be common silo for present as well as future stream. 6. DE / DS / Host requirement is not considered for future provision. 7. Silo downstream equipment shall be common for present as well as future stream. Bidder requests Owner to confirm point wise above considerations.	Bidder's understanding for Sl. No 1 to 7 is correct. Further, Bidder to refer Amendment No. MH-2.
751	Pat-E1	General Layout Plan	PDF 9 of 85			As per General layout plan, Biomass conveyor is to be fed to conveyor 18A/B. However, as per flow diagram, biomass conveyor is to be fed to conv. 24A/B at TP-23. Bidder requests Owner to confirm the location of biomass feeding.	Bidder to refer Amendment No. MH-1.
752	SECTION-VI, PART-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	PDF 9 of 85	1 of 8 1.04.00	There shall be one (1) no. track hopper for handling of coal received in Indian railways BOBR rakes. The track hopper shall be 300 m long (length excluding machinery hatches) and of 6000 MT coal capacity with machinery hatches at both ends.	As per Part-E1, General layout plan, track hopper length is 260 m (length excluding machinery hatches). However, as per SECTION-VI, PART-A, SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT, Clause No. 1.04.00, The track hopper shall be 300 m long (length excluding machinery hatches). Bidder requests Owner to confirm the length of track hopper excluding machinery hatches.	Bidder to refer Amendment No. D2-16.
753	Part-E1	General Layout Plan	PDF 9 of 85			Bidder would like to clarify that location of Crusher house is not feasible to reach conveyor considering rail way track, pent house & 300 meter as well as 260 meter of track hopper length Bidder requests Owner to relook & allow us to use a part of green belt area for fitment of crusher house & downstream arrangements.	Bidder to refer Amendment No. D2-16.
754	SECTION-VI, PART-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	PDF 65 of 85	4 of 8 1.25.00	Four (7) Nos. of suspended magnets on Conveyors complete with reject chutes, reject trolleys, supporting arrangement, and all mechanical, electrical, civil, structural works and accessories Suspended Magnet = 5 Nos	Said clauses are contradictory regarding number of suspended magnet. Bidder requests Owner to confirm.	Bidder to refer Amendment Sl. No. MH-3.
755	SECTION-VI, PART-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	PDF 65 of 85	4 of 8 1.31.00	Complete dust suppression system for control of fugitive dust in track hopper, transfer points (including Biomass transfer Point), crusher house, coal stock yard complete with pump houses, water tanks, pumps, drives, hoisting arrangements, piping, valves etc. electrical, accessories, civil, structural and architectural works as briefly specified below.	Bidder understands (one working) Dust extraction system shall be considered for Biomass transfer points.	DS system at BRU area/ BMTP area/ Biomass storage silo building shall be provided as specified. Bidder to comply with the specification requirements.
756	SECTION-VI, PART-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	PDF 65 of 85	6 of 8 2.07.00	Two numbers (2 Nos) of Mechanical Extractor & Biomass Feeder below each limestone storage silos with drives, dust hoods (for Feeder), all mechanical, electrical accessories and supporting structures etc to feed the Biomass to downstream conveyors.	Bidder requests Owner to provide detail specification of mechanical extractor.	Bidder to refer Amendment No MH-7.
757	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	PDF 65 of 85	93 of 101 4.02.06 (f)	For the purpose of volumetric computation, bulk density of coal shall be taken as 800 kg/m ³ and for biomass 600 kg/m ³ and blending ratio of Biomass with Coal is 20 % (by weight). Therefore, for calculation of belt conveyor capacity for their drives and drive motors KW requirement and sizing (volume calculations) of chute, hoppers etc., the above bulk density shall be considered. For all other purpose (viz) for stresses/load structures, torque calculations of bucket wheel of Stack Reclaimer, loading of VF tables, sizing of actuators, calculation of plugged chute, Hoppers loads etc., the bulk density of coal shall be taken as 1100 Kg/m ³ .	Bidder requests Owner to provide bulk density of biomass to be considered for all other purpose (viz) for stresses/load on structures, torque calculation.	For Coal (Biomass/ (Coal & Biomass) conveyors, the bulk density shall be taken as 1100 Kg/m ³ for stresses/load on structures, torque calculation.
758	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	PDF 65 of 85	96 of 101 4.02.12	No. of days of crushed coal storage based on BMCR Design coal consumption at 100% PLF: Bidder to maximize the coal stockyard storage capacity by utilizing the available space. However, stockyard capacity in any case shall not be less than 17 days considering 900 Tcum bulk density for coal Also, in case of uni-directional stacker cum reclaimer, yard conveyor may be elevated near head end to accommodate take-up above ground.	Bidder understands that No. of days of crushed coal storage based on BMCR Design coal consumption at 85 % PLF instead of 100 % Please confirm acceptance.	Bidder to comply with the specification requirements.
759	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	PDF 65 of 85	98 of 101 4.02.19	Chutes: Minimum clear cross section of chute: 1800 mm X 1200 mm (inside both ways) for Coal Handling plant	Bidder would like to clarify that Minimum chute cross section of one side of chute is guided by belt width and other side by maximum lump size and flow rate. For 1800 mm belt width, 2640 TPH design capacity and 400 mm max lump size, Minimum chute cross section shall be of 1250 X 1200 mm. Bidder requests Owner to relook and provide flexibility to select chute size by the Bidder their own.	Bidder to comply with the specification requirements.
760	SECTION-VI, PART-B	SUB-SECTION-A-20 Coal & Biomass and Gypsum Plant	PDF 65 of 85	7 of 93 4.03.04	Wire rope shall be of pre-formed type, hemp cored, regular lay 6/36 construction with a breaking strength of 160 -175 kgf/ sq. mm. Reverse bend of ropes is not acceptable. Minimum number of falls of rope shall be four (4). All running shafts and wheels shall be fitted with ball / roller bearings with a rated life not less than 20 years based on equivalent running time as per IS:3938.	As per manufacturer recommendation, steel cored wire rope is superior than hemp cored and used for hoist applications widely. Bidder requests Owner to accept.	Bidder's proposal is acceptable.
761	SECTION-VI, PART-B	SUB-SECTION-A-20 Coal & Biomass and Gypsum Plant	PDF 65 of 85	30 of 93 4.21.00	The Box Feeder should be a robust, proven, above the ground for unloading from trucks / self-tipping trucks or from loader shovels. The unit should be designed for rapid intake and temporary live storage of material before transferring on to the crusher house. The intake and onward discharge capacity to be 200 TPH per Box Feeder.	The intake and onward discharge capacity to be 240 TPH per Box Feeder. Bidder requests Owner to relook the requirement.	Bidder's understanding is correct. The intake and onward discharge capacity shall be 240 TPH per Box Feeder.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
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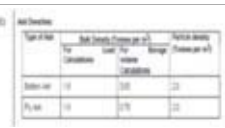
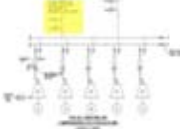
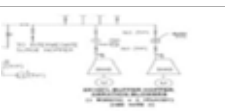
762	SECTION-VI, PART-B	SUB-SECTION-A-20 Coal & Biomass and Gypsum Plant	54 of 93	1.2.0	DATA SHEET: STACKER CUM RECLAIMER Type : Travelling boom stacker cum bucket wheel boom reclaimers having reversible yard conveyor	Bidder understands that reversible type stacker cum reclaimers can also be considered with reversible yard conveyor for developing of CHP layout as an alternate complying with functional requirement. Kindly confirm.	Reversible type stacker cum reclaimers with reversible yard conveyor complying the functional requirement is acceptable.
763	SECTION-VI, PART-B	ANNEXURE 10- SUB-SECTION-A-20 Coal & Biomass, Limestone and Gypsum Plant	3 of 11	2.1.15	Coal conveying tunnels shall be provided with fire escape at every 50 m in case of tunnel length exceeds 100m.	Bidder understand said clause is not applicable for Track hopper & machinery hatch areas. Please confirm	Referred clause is for coal conveying tunnels and not applicable for Track hopper & machinery hatch areas. However fire escape provision at both end of Track hopper & both side of machinery hatch areas with interconnecting platform (crossover) between two staircases shall be provided by the bidder.
764	PART-B	SUB-SECTION-G-07	46 & 47 of 55	MDL , SL No.4603 , 4647	GA OF EOT CRANE (INCLUDING TECHNICAL DATA SHEET) FOR CHP WORKSHOP BUILDING GA OF CHP WORKSHOP BUILDING CUM OFFICE	Bidder understands that there is no requirement of CHP workshop cum office building in this tender. Kindly confirm Bidder's understanding. If required, please furnish detail requirement of the same with equipment, crane capacity etc.	Bidder's understanding is correct.
765	General Query				In motion weigh bridge	Bidder understands that there is no requirement of In Motion weigh bridge. Please confirm.	Bidder's understanding is correct.
766	SECTION-VI, PART-B Part-E1	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA Coal + Biomass flow diagram (Fig No.9587-001R-POM-A-002, Rev.A)	94 of 101 PDF 65 of 95	4.02.06	 Capacity of Belt feeder, Crusher, vibrating feeder, Paddle feeder = 1200 TPH	Design capacity & margin selection criteria stipulated in Section-VI, Part-B, Sub Section-A-01 Equipment Sizing Criteria, Clause no. 4.02.06 for belt feeder, crusher, paddle feeder & vibrating feeder are not matching with capacity indicated in Coal flow diagram. Bidder requests Owner to confirm.	Refer Amendment No. MH-1.
767	General Query					Please furnish Biomass flow analysis report for silo design. Else Owner is requested to provide following material characteristics & source of limestone for flow analysis. 1) Cohesive strength 2) Wall Friction 3) Compressibility 4) Permeability 5) Segregation Tendency	Bidder to refer Annexure IV-7B of Sub section IB (PROJECT INFORMATION) for specification of Biomass.
768	SECTION-VI, PART-E	TENDER DRAWINGS (COAL + BIOMASS FLOW DIAGRAM)	-	DRG.NO-9587-001(R)-POM-A-002, Rev-A		As per flow diagram, following points are not cleared. 1) DE/DS system at BRU, BMTF area is not indicated. 2) DE system & DS system both are indicated in Biomass storage silo building Owner to please check & clarify where DE system & DS system to be considered and which type of DE/DS has to be considered.	Bidder to note that DS system at BRU area/ BMTF area/ Biomass storage silo building shall be provided as specified in scope. Bidder to comply with the specification requirements.
769	SECTION-VI, PART-E	TENDER DRAWINGS (TYP CROSS SECTION FOR ALL DOUBLE CONVEYOR GALLERY FOR CHP)	-	DRG.NO-9587-001-POM-A-051, Rev-A		Bidder understands that Pipe sizes for SW, PW & DS system as indicated here are tentative. All pipe sizes will be selected as per design requirement. Owner to please confirm Bidder's understanding.	Bidder's understanding is correct.
770	SECTION-VI, PART-A	SUB-SECTION-IA-15	PAGE 5 OF 8	1.34.00	Compressed air system (pipes, valves, fitting etc) with suitable flow & pressure for opening doors of eight numbers of BOBR Wagon Doors at one time, with tapping along the length of Track Hopper at three locations, shall be provided.	Bidder requests Owner to provide value of air flow & pressure at tapping point for designing the capacity of compressor	Complete compressed air system (01W+01S compressor) for opening doors of eight number of BOBR wagon at one time shall be designed by the Bidder meeting the system requirement as per criteria given as a minimum.
771	SECTION-VI, PART-E	TENDER DRAWINGS (COAL + BIOMASS FLOW DIAGRAM)	-	DRG.NO-9587-001(R)-POM-A-002, Rev-A		As per flow diagram, ventilation system is indicated in Bunker building but type of Ventilation system is not mentioned in specification. Bidder understands that roof extractor type ventilation system shall be applied here as per standard practice. Owner to please confirm Bidder's understanding.	Roof extractor type ventilation system in Bunker building shall be provided by Bidder.
772	SECTION-VI, PART-A	III	-	-	TERMINAL POINTS & EXCLUSIONS AND OWNER'S INPUT	Bidder understands that railway siding is not in bidder's scope of work. Owner is requested to confirm bidder's understanding.	Bidder's understanding is correct.
773	SECTION - VI, PART A SECTION - VI, PART B SECTION - VI, PART B, SUB SECTION	IV A A-01 A-14	39 OF 76 64 of 101 22 OF 35	1.03.14 3.06.00.4 12.00.00 II-A 15.00.00 E)	Guaranteed effluent TSS at the outlet of each Coal Slurry Settling Pond during storm water (design) flow condition of 1000Cu.M/hr Coal handling plant run-off water treatment system a) Two (2) numbers of Coal Slurry Settling (CSSP) Ponds (minimum size of 40m x 8m x 3m deep) of RCC Construction shall be provided. - b) Two (2) numbers (2x50%) (2W) Clarifier Feed pumps (CSSP area... Coal settling System (CSSP) (Stilling Chamber) Capacity 2200 m3/hr + 3% for sludge Clarifiers Capacity : 2200 m3/hr Capacity of each pond of CSSP 1100 cum (Min.)	As Clarifier water system is considered for treatment of decanted water from CSSP, we understand that size of CSSP shall be considered as Two (2) numbers each of 40m x 8m x 3m deep. Actual flow rate based on maximum intensity of rainfall and runoff coefficient are not needs to be considered. Owner is requested to confirm bidder's understanding.	CSSP sizes specified are minimum requirement. Bidder to design system considering maximum intensity of rainfall and runoff coefficient.

774	SECTION-VI / PART-E	Tender Drawings	-	Dir. No. 4540-001-POM-A-037	Coal decanted water Pump house is shown in flow diagram 	Bidder understands that no pump house is envisaged for Coal decanted water Pumps, as decanted pumps shall be kept open as per executed projects with NTPC. Owner is requested to confirm Bidder's understanding.	Bidder's understanding regarding pump house is correct, however canopy to be provided over pumps area.
775	SECTION-VI / PART B	A-21 ASH HANDLING PLANT A-01 EQUIPMENT SIZING CRITERIA	1 of 44 92 of 101	1.01.00 NA	Water Impounded Bottom Ash Hopper Data Sheet i) Temp. of bottom ash for calculating cooling water requirements : 1050 Deg C ANNEXURE-I GUIDELINES FOR ESTIMATING COOLING WATER QUANTITY FOR BA HOPPER T1 = Temperature of bottom ash in hopper =1050° C (1922° F)	NTPC to note that this temperature should be maximum anticipated as per the Boiler OEM. However refractory shall be designed for 1050 Deg C. Kindly confirm.	Bidder's understanding is correct. BA hopper refractory shall be designed considering minimum 1050 Deg C temperature as specified.
776	SECTION-VI / PART B	A-21 ASH HANDLING PLANT	30 of 44	3.08.00	Dry Ash unloader, Conditioned Ash unloader, Telescopic chute: Capacity range : 40-100 TPH during open Truck/Bulker loading through Condition ash unloader / Dry Ash unloader 40-300 TPH for Rail Wagon Loading through Dry Ash unloader	Owner to note that being a single unloader for rail/ truck, Capacity range shall be decided by OEM during detail engineering based on their proven practice. Kindly confirm.	Bidder to comply with the specification requirements.
777	SECTION-VI / PART B SECTION-VI / PART A	A-01 EQUIPMENT SIZING CRITERIA IIA-16 ASH HANDLING SYSTEM	88 of 101 10 of 15	4.01.02 (K) 1.01.07	(K) Ash Storage silos The fly ash storage silos shall be at a pitching suitable for filling of ash into BOXN/BCCW/BTAP/BCFC wagons. (I) The pitching of ash silo and overall arrangement of hydro-mix conditioner units, telescopic chutes, air slides etc shall facilitate simultaneous loading of seven wagons (BOXN/BCFC/BCCW/BTAP) from four number of RCC Silos. Suitable arrangement for Control of movement of Telescopic spout shall have to be provided in all three X-Y-Z directions to facilitate loading of ash into Wagons. While loading ash in wagons, top lids of wagons need to be accessed. For ensuring safety while accessing the top of wagon, a suitable platform at approx. height of 4.5-mtrs above railway track all along the length of track in silo area shall be provided Suitable arrangement for Control of movement of Telescopic spout shall have to be provided in all three X-Y-Z directions to facilitate loading of ash into BCFC and BTAP Wagons during loading of Ash and to facilitate simultaneous loading into Wagons from all the Silos.	Owner to note that it is not feasible to consider all type of wagon to decide of silo pitching as there are variation in the dimensions of various wagons. Hence, Owner is requested to provide the dimensional sketch of all types of wagon to decide the silo pitching along with clarification/amendments to keep all Bidder at par.	Type of the railway wagon(BOXN/BCCW/BTAP/BCFC) specified are of standard dimensions by Indian Railway. Bidder shall decide the pitching of fly ash silos considering simultaneous loading in wagons as specified during detail engineering.
778	SECTION-VI / PART A SECTION-VI / PART B	IIA-16 ASH HANDLING SYSTEM A-21 ASH HANDLING PLANT	12 of 15 13 of 15 44 of 44	1.02.00, iv 1.02.02.02 9.02.00, 1)	Bottom ash overflow water pipe.....Overflow transfer pipes to transfer clear water from surge tank to over ground water sump of ash water pump house, by gravity flow. For the purpose of water supply to the ash handling system, water pumps taking suction from over-ground RCC sump shall be installed in the ash water pump house. Water supply to ash water pump house shall be tapped from following sources BA overflow transfer hopper / tank level measurement, Seal water tank level measurement, Silo level measurement, over ground water tank.....	Ash water sump location based on layout feasibility (i.e. semi over ground or above ground) as the clarified ash water from settling tank to surge tank and from surge tank to ash water sump shall be transferred by gravity. Hence, Bidder understands that ash water sump shall be semi over ground. Kindly confirm Bidder's understanding.	Bidder to comply with the specification requirements.
779	SECTION-VI / PART A SECTION-VI / PART B PART E	IIA-16 ASH HANDLING SYSTEM A-21 ASH HANDLING PLANT A-01 EQUIPMENT SIZING CRITERIA	3 of 15 35 of 45	1.01.05 5.01.00 4.00.00 4.01.04	(C) Common System For Jet Pump/ Scraper Conveyor system a. Six (6) Nos. of horizontal bottom ash slurry transportation pumps as maintenance standby.) b. Six (6) lengths of bottom ash slurry transportation MS pipelines to Dewatering Bins (vi) Twelve (12) nos. solenoid operated pneumatically actuated knife edge gate valve at the suction and discharge of bottom ash slurry transportation pumps. 5.01.00 HORIZONTAL CENTRIFUGAL PUMPS 4. BAHF Water pump: 2 working + 1standby. ASH DISPOSAL PIPING AND ACCESSORIES Type : a) 20 Ink. Cast basalt lined MS at rail/road crossings. b) ERW/SAW pipes of from Combined/ BA slurry pump house to Mine void/Ash dyke. Standby arrangement for Ash handling system Combined Ash Disposal System- <u>Two pump streams operating with One pump stream as operating standby per unit.</u> Independent pipelines for each pump stream Three Numbers ash slurry pumps and three numbers BA HP Pumps indicated in flow diagram.	There is mismatch in the referred clause of specification regarding the total quantity of bottom ash transportation pumps & piping. In this regard Bidder understands the followings: 1) Total three (3) nos. (one working for both units + One operating standby + one maintenance standby) shall be provided for both the units considering sequential operation of bottom & coarse ash removal from both units. 2) Total three (3) MS pipelines 9.5 mm thick from BA slurry pumps house to dewatering Bin shall be provided for both the units. 3) Six (6) nos. solenoid operated pneumatically actuated knife edge gate valve at the suction and discharge of bottom ash slurry transportation pumps. 4) Total two nos. (1W + 1SB) BA HP pumps shall be provided for both the units considering sequential operation of bottom & coarse ash removal from both units. Kindly confirm Bidder's understanding.	Bidder to note that dedicated Bottom Ash slurry pump house for each unit shall be provided by the Bidder. With reference to Bidders query for SI. no 1 to 4, Bidder to comply with the specification requirements. Bidder shall also refer Amendment No Mh-9 and Mh-24.
780	SECTION-VI / PART A	IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	35 of 76	1.03.09	Ash Handling Plant: (i) In case bidder offers intermittent type bottom Feeder Ejector employed for Ash removal from APH and Duct Hoppers/Total time for evacuating four (4) hours of ash collection from all the hoppers of APH + SCGR (Duct Hoppers) of a unit corresponding to collection rates specified shall not exceed 45 mins, including change over time. The total time for evacuating four (4) hour collection of bottom ash from a unit corresponding to collection rates specified shall not exceed 85 minutes including the (5) minutes time required for starting, stopping, sequential change over from one unit to second unit and water flushing of the system for the following two conditions and with 25 mm wear on the diameter of the throat section of the jet pumps: 1) Maintained water level mode. 2) Complete draw down mode by totally emptying the hopper of all water and ash with the make-up valve closed. Jet Pumps b) Rated Capacity (M ³ /hr): Three (3) nos. pumps shall evacuate 4 hr. collection of bottom ash in 85 minutes, incl. 5 minutes time for start/stop/changeover/flushing etc. with a minimum 25 mm wear on the diameter of throat.	In view of sequential slurry disposal of unit#1 & unit#2, Owner is requested to update the cleaning time for Bottom ash & coarse ash accordingly as presently 85 min & 45 Min is specified by which sequential operation is not feasible. Owner to check & confirm the evacuation time for BA & CA suitably.	Bidder to note that dedicated Bottom Ash slurry pump house for each unit shall be provided by the Bidder. Not to exceed time/Maximum time for cleaning Bottom ash and Coarse ash is specified, Bidder to decide clearing time during detail engineering.
781	SECTION-VI / PART A SECTION-VI / PART B	IIA-16 ASH HANDLING SYSTEM A-21 ASH HANDLING PLANT	3 of 15 39 of 44	1.01.05 7.12.00	(C) Common System For Jet Pump/ Scraper Conveyor system (ix) Two (2) numbers pendant controlled electrically operated overhead travelling crane for bottom ash transportation pumps as specified, complete with runway rails, necessary rail clamps, bolts, splice bars and stops for each of the runway. B) ASH SLURRY PUMP HOUSE i) The Combined Ash slurry pump.....three sides of PH shall be kept open. ii) For maintenance of the equipments in the pump house pendant controlled electrically operated overhead traveling crane shall be used.	There is mismatch in referred clause, however it understood that BA slurry pump house shall be common for both the units. Hence, Bidder understands that one (1) no. crane shall be provided instead of two (2) nos crane as specified. Kindly confirm Bidder's understanding.	Dedicated Bottom Ash slurry pump for each unit shall be provided by Bidder. Accordingly handling arrangement shall be provided as specified.

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782	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	5 of 15	1.01.05	(E) Dewatering Bin system : a) Nine (9) nos. dewatering storage bins (3 nos. for each unit and 3 nos standby) for safe and reliable operation and maintenance of dewatering bins.	There is mismatch in the dewatering bin quantity, Owner to check also we understand no standby is required from system point of view.		
	SECTION-VI / PART B	A-21 ASH HANDLING PLANT	11 of 15	1.01.08	Combined High concentration Slurry Disposal (HCSD) System (b) Two (2) numbers secondary crushers (1Working +1 Standby) at the outlet of each Belt weigh feeder to discharge the bottom ash to Mixing tank shall be provided, total 12 numbers for both units.	Owner to confirm the final numbers of dewatering Bin and secondary crushers to be considered.	Bidder to provide Nine (9) Numbers Dewatering Bins (3 nos. for each unit and 3 nos common standby) wherever specified. Refer Amendment No. MH-10 and MH-11.	
	Part E	9587.001(R)-POM-A-025 & 026	15 of 44	1.12.00	DEWATERING BINS 1.0 Numbers required : 3 NO PER UNIT/ Out of three (3) nos.dewatering bins provided for each unit, one(1) no. shall be under filling, one (1) no. shall be under decantation. Nine (9) Numbers DWB indicated in flow diagram.		Bidder to provide Two (2) numbers secondary crushers (1Working +1 Standby) at the outlet of each Belt weigh feeder to discharge the bottom ash to Mixing tank shall be provided, total 12 numbers for both units as specified.	
783	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	4 of 15	1.01.05 (C)	(vii)	In case of intermittent type bottom ash handling system, two lengths of APH and duct hopper ash slurry transportation MS pipelines with basalt lining (One no. independent pipe line for each intermediate ash slurry tank) complete with basalt lined pipe bends, flanges, elbows, gaskets, nuts, bolts, structural steel supports and other accessories as specified and as required, from the outlet of Coarse ash slurry transportation pumps to the Ash Slurry Sump. Necessary fittings, valves etc. shall be provided as specified and as required.	There is mismatch in the specification and flow diagram regarding the pipe quantity from coarse slurry pumps to main ash slurry pump.	
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-025				Individual pipes from coarse ash pump is indicated in the flow diagram.	In this regard, Bidder understand that there shall be One no. independent pipe line from coarse ash slurry pump to ash slurry sump.	Bidder's understanding is correct. Refer Amendment No. MH-1.
784	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	7 of 15	1.01.06	Dry Fly Ash Transportation system from Buffer Hoppers to Ash Classifier System (d) Four (4) lengths of cast iron/MS pipes for each unit for fly ash transportation from buffer hoppers to Classifier Block including pipe rack, platforms, access stairs and other associated supporting steel structure and other accessories as required. Six (6) pipes from Buffer Hoppers to Ash Classifier System is indicated in the flow diagram.	There is mismatch in the specification and flow diagram regarding the pipe quantity from Buffer Hoppers to Ash Classifier System.		
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-027 & 029					In this regard, Bidder understands that there shall be four (4) lengths of cast iron/MS pipes for each unit for fly ash transportation from buffer hoppers to Classifier Block shall be provided.	Refer Amendment No. MH-13.
785	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	7 of 15	1.01.06	(C) Common for Fly Ash Conveying System (Both Pressure & Vacuum) (iv) Pipe support structures for all Ash conveying lines to be provided. Pipe lifting and shifting arrangement in pipe rack must be provided.	Owner is requested to clarify in detail which type of lifting & shifting arrangement in pipe rack needs to be provided.	Bidder to provide monorail at suitable locations for lifting & shifting arrangement.	
786	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	8 of 15	1.01.06	(D) ASH CLASSIFICATION AND BAGGING SYSTEM (f) Eight (8) nos. Pump tanks/Air lock tank for each coarse ash hopper and four (4) nos. of pump tanks/air locks tank for fine ash hopper for transportation of coarse fly ash and fine fly ash respectively, to silos provided for dry fly ash storage silos meant for Road and Rail loading. Provisions shall be provided to convey & store Fine Ash to another Coarse Fly ash Silo in addition to Fine Fly Ash Silo. Twelve (12) nos. Pump tanks/Air lock tank for each coarse ash hopper are indicated in the flow diagram.	There is mismatch in the specification and flow diagram regarding the pump tank/air lock tank below coarse ash hopper.		
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-029					In this regard, Bidder understand that Eight (8) nos. Pump tanks/Air lock tank for coarse ash hopper shall be provided	Kindly confirm Bidder's understanding.
787	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	8 of 15	1.01.06	(D) ASH CLASSIFICATION AND BAGGING SYSTEM (m) Required lengths of cast iron/MS pipes (at least two standby lines for two units) for coarse fly ash conveying from coarse fly ash hoppers to three fly ash storage silos located in the fly ash silo complex. Required lengths of cast iron/MS pipes for fine fly ash conveying from Fine fly ash hoppers to Fine fly ash storage silo. (g) The ash transportation capacities from the coarse ash hopper to the silos must be designed considering zero classification also. Six (6) nos. pipe stream from coarse ash hopper and two (2) nos. pipe stream from fine ash hopper to HCSD cum FA silo / Fine FA silo are indicated in the flow diagram.	Owner is requested to specify the total number (working + standby) pipe stream from coarse ash hopper / fine ash hopper to HCSD / Fine FA silo.		
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-029						Refer Amendment No. MH-1 and MH-17.
788	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	9 of 15	1.01.07	Dry Fly Ash Storage System (c) Pitless type Weigh Bridge for rail loading below dry fly ash silos (minimum seven numbers) complete with all electrical, controls, civil and structural works for weight of rail Wagons during filling.	Bidder understands that there shall be total three (3) nos. pitless type weigh bridge for rail loading shall be provided considering the three nos. HCSD cum FA silo instead of seven nos. as specified.	Bidder to comply with the specification requirements.	
						Kindly confirm Bidder's understanding. Also, Bidder understands that rail loading from fine ash silo is not envisaged. Kindly confirm Bidder's understanding.	Bidder's understanding is not correct. Rail loading from fine ash silo shall be provided by the bidder.	
789	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	10 of 15	1.01.07	Dry Fly Ash Storage System (i) Eight (8) numbers of twin shaft paddle type/rotary drum type hydro-mix conditioner units along with drive motor, rotary feeder, Two (2) number for each silo, along with associated water piping and valves, for unloading the conditioned fly ash into trucks. One number opening from each silo for the open truck disposal is indicated in the flow diagram.	There is mismatch in the specification and flow diagram.		
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-027 & 029					In this regard, Bidder understands that total four (4) numbers of twin shaft paddle type/rotary drum type (i.e. one no. for each silo) shall be provided.	Kindly confirm Bidder's understanding.
790	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	10 of 15	1.01.07	Dry Fly Ash Storage System (e) Four (4) numbers of Dry fly ash unloaders from each dry fly ash storage silo along with rotary feeders, telescopic chutes and other accessories as specified and as required. Three number opening from each HCSD cum FA silo and two number opening from fine FA silo for the closed truck disposal is indicated in the flow diagram.	There is mismatch in the specification and flow diagram.		
	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-027 & 029					Owner is requested to confirm the total quantity of dry ash unloader below each silo needs to be considered.	Refer Amendment No. MH-1 and MH-19.
791	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	12 of 15	1.02.00	e) All ash water and seal water piping from Owner's terminal points to all the equipments and sumps complete with fittings, valves, strainers, flanges, gaskets, nuts, bolts, hangers, supports, flushing nozzles, agitating nozzles, etc. as specified and as required.	Bidder understands that there shall not be any interference with Owner's terminal points, hence, referred clause is not applicable.	Bidder's understanding is correct.	
792	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	8 of 15	1.01.06	(D) ASH CLASSIFICATION AND BAGGING SYSTEM (e) The fine ash and coarse ash after classification shall be stored in separate RCC hoppers, fine ash hopper and coarse ash hopper respectively. The capacity of the fine ash hopper and coarse ash hopper shall be 600 Tonnes each. Classifier Silo/Intermediate FA Silo Material of construction : MS plates, IS:2062 min 10mm thick, Min 3 mm thick SS liner as per SS 409 M410 at conical portion of silo	There is mismatch in the specification for MOC of fine ash & coarse ash hopper.		
	SECTION-VI / PART B	A-21 ASH HANDLING PLANT	23 of 44	2.12.00			Owner is requested to confirm the MOC of classifier silo, fine ash hopper and coarse ash hopper.	Refer Amendment No. MH-15.
793	SECTION-VI / PART E	Dwg No. 9587.001(R)-POM-A-025 & 026	NA	NA	Setting Tank & Surge Tank	Two Nos. separate individual setting tank & Surge Tank for BA overflow system & Overflow of Dewatering Bin has been shown in flow diagram. Also specification (SECTION VI / PART-A / SUB-SECTION-IIA-16 ASH HANDLING SYSTEM) is not much clear for the same. Bidder proposed to consider one number setting & one no. surge Tank for BA overflow & Dewatering Bin system. Owner is requested to confirm the Bidder's understanding.	Bidder to comply with the specification requirements.	

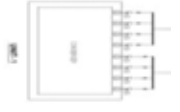

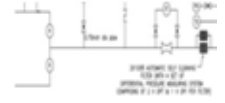
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784	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	7 of 15	1.01.06	(D) ASH CLASSIFICATION AND BAGGING SYSTEM (b) Suitable numbers of ash classifier as required shall be provided to meet the requirement. The ash classifier shall be of proven design for similar application. Efficiency of the Classifier shall be 95% minimum. No standby classifier shall be required. Classifier 1 no/ Unit	Bidder understands that total two no. (both Working) classifier along with accessories for both the units shall be in Bidder's scope. Kindly confirm Bidder's understanding.	Bidder's understanding is correct.
785	SECTION-VI / PART E Dwg No. 9587-001(R)-POM-A-025	NA	NA	NA		Purpose of this figure as indicated on flow diagram is not clear. Owner to clarify the purpose of the same.	Refer Amendment No. MH-1.
786	SECTION-VI / PART B	A-01 EQUIPMENT SIZING CRITERIA	87 of 101	4.01.02		Volumetric ash density for coarse ash (Eco hopper, APH, SCR & Duct hopper) is not specified in the tender specification. Bidder understand that same shall be 0.75 ton/m3, kindly confirm Bidder's understanding.	Bidder's understanding is correct.
797	SECTION-VI / PART E Dwg No. 9587-001(R)-POM-A-028	NA	NA	NA		Branching connection for Eco hopper, SCR hopper, APH hoppers, Duct hopper & Intermediate Surge hopper has been shown from conveying air compressor in flow diagram. In this regard, Bidder understands that pneumatic conveying is not envisaged for said hopper as per specification (SECTION VI / PART-A / SUB-SECTION-IIA-16 ASH HANDLING SYSTEM) hence, branching connection is not applicable. Kindly confirm Bidder's understanding.	Bidder's understanding is correct. Refer Amendment No. MH-1.
798	Part - E	9587-001(R)-POM-A-027	NA	NA		Branching connection for intermediate Surge hopper has been shown in flow diagrams. Bidder understands that surge hopper is not applicable in this project, hence branching connection is not required. Kindly confirm Bidder's understanding.	Bidder's understanding is correct. Refer Amendment No. MH-1.
799	SECTION-VI / PART-A / SUB-SECTION-A-12	SUB SECTION-A-18 Fire Detection & Protection System	4 of 11	4.00.00	Fire Water Source Existing fire water storage tanks and pumping system provided in Stage-I shall be used for fire water requirements for Stage-II also. For this purpose, fire water mains (Hydrants & Spray) shall be interconnected at multiple locations suitably. For the existing Stage - I fire water pumps details please refer Annexure- III.	Owner is requested to provide the list of terminal point along with flow, pressure and pipe size of water available at each terminal point. Also, please provide existing fire protection system network/layout.	Details (flow, head, quantity) of existing fire water pumps is already enclosed at Annexure - III of SUB SECTION-A-18 Fire Detection & Protection System. Tap off points for hydrant and spray system shall be finalised during detailed engineering.
800	SECTION-VI / PART-A / SUB-SECTION-A-12		5 of 11 6 of 11	4.00.00 4.00.00	b) Any other area/building in the scope of the Bidder and required to be protected with hydrant system. c) Any other equipment/system in the scope of the Bidder and which requires MWV spray protection.	Bidder understands that fire protection of any other area or building within plant boundary for Stage-II facilities shall be in Bidder's scope. Kindly Confirm Bidder's understanding.	Bidder's understanding is correct.
801	SECTION-VI / PART-A / SUB-SECTION-A-12		6 of 11	4.00.00	f) Fire protection for Biomass Silos Gaseous based fire protection system shall be provided for Biomass storage silos as per industry practice.	Bidder understands Gaseous fire protection system shall be design based on the NFPA 2001, considering total flooding and actuation of the same shall be done based on the Heat/CO detector installed inside the Silos. Please confirm our understanding is correct.	Gaseous based fire protection system shall be provided for Biomass storage silos complying to NFPA 2001 or any other Indian/international codes/standards as per industry practice.
802	SECTION-VI / PART-A / SUB-SECTION-A-12		6 of 11	4.00.00	g) Control System for Fire Detection & Protection (c) Below & above false ceiling areas of all air conditioned rooms of TG building, ESP/FGD/AHP control building, Switchyard building, water system control building, CHP control room, VFD rooms, return air ducts of inert gas protected areas, owner's construction office and other auxiliary control rooms/office spaces/stores/etc. of the power plant.	Bidder understands that Owner's Construction offer is not in Bidder's scope of work, hence, fire detection system for the same is not applicable. Please confirm the Bidder's understanding.	Bidder's understanding is correct.
803	TECHNICAL SPECIFICATIONS SECTION-VI PART B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	70 of 101	3.12.01 (i)	General Design Criteria i) The fire protection system shall consist of fire water storage tanks, fire water pumping system, fire water hydrant and spray system serving the whole station Fire Water Source Existing fire water storage tanks and pumping system provided in Stage-I shall be used for fire water requirements for Stage-II also. For this purpose, fire water mains (Hydrants & Spray) shall be interconnected at multiple locations suitably. For the existing Stage - I fire water pumps details please refer Annexure- III.	There is contradictory between two Clauses, Bidder understands that fire water storage tanks and fire water pumps are not applicable for stage-II as the water is available from stage-I tanks & pumps at terminal points. Hence, Please confirm Bidder's understanding and delete the requirement of storage tank and pumps wherever mentioned in the specification.	Bidder's understanding is correct that existing fire water tanks and pumps of stage - I shall be used for stage - II. The scope of fire water pumps shall be as per clause 4.00.00 (a) SUB SECTION-A-12 Plant utilities, Part - A of technical specification.
804	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-18 Fire Detection & Protection System	1 of 14	2.00.00 3.00.00	HYDRANT SYSTEM Hydrant system shall consist of hydrant pumps , pressurization arrangement, water mains network, hydrant valves, landing valve, water monitors, hoses, branch pipes, nozzle, hose boxes, central hose houses etc. HVV AND MWV SPRAY SYSTEM It shall consist of spray pumps , pressurization arrangements, water mains network, deluge valves, alarm valves, flow switches, isolation valves, Y-type strainers, spray nozzles/projectors, spray nozzles piping network, detection system, instrumentation, local control panels, cables etc.	As per Cl. No. 1.03.00 Fire Water Source (page no. 1 of 14), Bidder understands that existing pumping unit shall be used for stage-II project, hence, the hydrant pumps & spray pumps mentioned in referred clauses 2.00.00 & 3.00.00, of sub section-A-18, Part-B, is not applicable. Kindly confirm Bidder's understanding.	Bidder's understanding is correct that existing fire water tanks and pumps of stage - I shall be used for stage - II. The scope of fire water pumps shall be as per clause 4.00.00 (a) SUB SECTION-A-12 Plant utilities, Part - A of technical specification.
805	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-18 Fire Detection & Protection System	2 Of 14 14 of 14	3.04.00 Annexure-III	Criteria for taking two (2) spray pumps in service: While designing the HVV/MWV spray system for crusher house, cable galleries TG Building & ESP Building where flow of one spray pump of 410m3/hr may not be adequate, operation of two (2) spray pumps shall be considered.	As per Annexure II for stage-II facilities, only 1 no motor driven spray booster pump is envisaged, hence, Bidder understands that two pump operation shall be considering 1 no motor driven spray booster pump and 1 no engine driven spray booster pump to meet the requirement as specified in referred clause 3.04.00 of sub section-A-18, Part-B. Kindly confirm Bidder's understanding.	Criteria for two (2) spray water pumps is for main spray pumps not for spray booster pumps.
806	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-II D CIVIL WORKS	5 of 8	26	26. Civil Works associated with fire detection and fire protection system Civil, structural, architectural works for fire water tank foundation, fire water pump house including Switchgear/MCC & Control room , fire water booster pump house & control room, foam system including foam system shed & control room, deluge valve housing, pedestals for pipes, concrete encasement of pylon pipes (within filled up gravel portion) used for HVV spray system for protection of transformers, railroad crossing of fire water trench etc, civil works associated with buried pipes & crossing etc.	Bidder understands Fire water pump house including Switchgear/MCC & Control room is not applicable as the same shall be used from Existing, hence, construction of new building is not applicable. Please confirm Bidder's understanding.	Bidder to refer Amendment No. D2-18.

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807	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	6 of 11	4.00.00 (d)	Automatic fire detection cum medium velocity water (MVW) spray system and associated civil works like DV housing, pedestal, etc. for the following as per the detailed specifications in Part-B technical specification: 4) Fuel oil pump houses	Bidder understands that fire protection & detection system is envisaged for stage-II pressurising fuel oil pump house only as the unloading fuel oil pump house is not in scope of work for stage-II. Kindly confirm Bidder's understanding.	Bidder's understanding is correct.
808	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	76 of 101 79 of 101	3.13.00 3.13.02	AIR CONDITIONING AND VENTILATION SYSTEM Summer : 44°C DBT & 25.5°C DBT Monsoon : 31 DBT /27.7°C WBT Winter : 12.2°C DBT / 6.6°C WBT DESIGN PHILOSOPHY – Ventilation System Point - 2 (Note - 1) : Dry bulb temperature during summer season is 43 degC. The criteria which gives higher number of air changes/ higher quantity of air of either of condition (Cl. 1 or 2) flow shall be selected.	As per clause 3.13.00, summer ambient temperature is 44°C whereas as per clause 3.13.02, summer ambient conditions are 43°C. Owner is requested to clarify which temperature to be followed by Bidder for designing Air Conditioning & Ventilation System.	Summer ambient temperature shall be 44°C for Air conditioning & Ventilation system. Please refer amendment No. PU1-1.
809	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA SUB SECTION-A-17 AIR CONDITIONING AND VENTILATION SYSTEM	78 of 101 12 of 30	3.13.01 6.04.03	DESIGN PHILOSOPHY - Air conditioning system 15) For air handling unit (AHU) serving main plant control area, where microprocessor based equipment are located, the dehumidified air shall be filtered at three different stages i.e. pre (coarse) filter followed by fine filter followed by HEPA filter before discharge to conditioned space. For all other areas, AHU's shall be provided with two stage of filtration i.e. pre and fine filter. All fresh air supply fans shall also be filtered using pre and fine filter. Absolute Filter / Hepa Filter 8) Location : At the discharge of each individual AHUs for Control Equipment Room / Control room /UPS & battery Charger Rooms.	Referring to clause 3.13.01, HEPA filters are considered to be provided only for AHU serving main plant CCR and CER room. For AHU serving other areas including UPS and battery charger room, HEPA filters are not required. Please confirm Bidder's understanding.	HEPA filters to be provided as per technical specification requirement.
810	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA SUB-SECTION-A-20 Cool & Biomass and Gypsum Plant	79 of 101 73 of 93	3.13.02 2.01.03	DESIGN PHILOSOPHY – Ventilation System For all equipment cooled areas shall be as follows: i) Minimum air changes per hour in engine/ mechanically ventilated areas shall be as follows: a) General areas : 10 b) Control areas : 20 ii) Hygiene generation plant/MCC/ Switchgear rooms and Battery rooms other areas where gaseous fumes/ vapours are generated : 30 Ventilation System Mechanical Ventilation System 1. Underground Areas : Minimum 15 supply air changes and minimum 7 exhaust air changes per hour i. Other Areas : Minimum 10 supply air changes per hour ii. Pressurized Ventilation System: Minimum 15 supply air changes per hour C. Air Conditioning System: Adequate number of air changes to maintain uniform temp. & humidity as specified elsewhere	Ventilation rates differ in these two clauses for general areas above ground. Bidder understands that for building / area under Cool & Biomass and Gypsum plant ventilation rates as mentioned in respective clause shall be applicable (as per clause 2.01.03) and for all other areas ventilation rate shall be provided as depicted clause 3.13.02 under ventilation system design philosophy. Please confirm.	Bidder's understanding is correct.
811	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-A-12 PLANT UTILITIES	02 & 03 of 11	2.00.00	VENTILATION SYSTEM c) E.S.P. Control Room Building (Non-A/C areas) Minimum One (1) no. of Unitary Air Filtration (UAF) unit (of metallic construction-modular type) of minimum capacity 75,000 m3/hr. with all accessories, 1 No. DIDW centrifugal fan, 1 No. circulating water pump, etc. as detailed out in technical specification shall be provided for each unit. d) FGD Control Room Building (Non-A/C areas) Minimum One (1) no. of Unitary Air Filtration (UAF) unit (of metallic construction-modular type) of minimum capacity 75,000 m3/hr. with all accessories, 1 No. DIDW centrifugal fan, 1 No. circulating water pump, etc. as detailed out in technical specification shall be provided	In case, FGD control room building is clubbed with ESP control room building, separate UAF unit for FGD control room building is not required. UAF shall be provided for ESP control room building, which covers FGD switchgears also. Please confirm Bidder's understanding.	If ESP & FGD control room buildings are clubbed, evaporative ventilation system (UAF system) shall be provided for non-A/C areas (MCC/Switchgear/Cable Vault, etc.) of combined ESP & FGD control room building(s) accordingly. Further, evaporative ventilation system (UAF system) shall also be provided for non-A/C areas (MCC/Switchgear/Cable Vault, etc.) pertaining to FGD system in any other separate/common electrical/ control building(s).
812	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-17 AIR CONDITIONING AND VENTILATION SYSTEM	8 of 30 9 of 30	5.01.11 5.02.13	Air Washer Units : Air washer units shall be provided at various elevations in TG building (AB & BC Bay). However, air washer units if required to be placed on the roof shall be provided with steel shed (open) Unitary Air Filtration UAF units placed on the roof shall be provided with steel shed (open).	As per specifications, AWU and UAF shall be double skin construction with galvanized / pre painted sheets. All components are housed inside the cabinet. With this type of construction, additional shed to cover the equipment are not required. Please confirm bidders understanding	Shed to be provided as per technical specification.
813	SECTION-VI, PART-B	SUB SECTION-A-17 AIR CONDITIONING AND VENTILATION SYSTEM	8 of 30	5.02.02	Unitary Air Filtration The housing/ casing of air washer unit shall be double skin construction	Bidder understands that air washer referred in mentioned clause shall be read as UAF. Please confirm.	Bidder's understanding is correct.
814	SECTION - VI, PART - B SECTION - VI, PART - B	SUB-SECTION A - 11 CONDENSATE POLISHING UNIT SUB SECTION - G-04 STANDARD PG TEST PROCEDURE	2 of 16 105 of 227	2.08.00 2.4	In no case, the regeneration levels cannot be lower than the values indicated below: a) Cation resin : 125 kg of 100% HCl per cubic meter of resin b) Anion resin : 160 kg of 100% NaOH per cubic meter of resin S.No. REGENERANT QUANTITY (Kgs) 1. Hydrochloric acid (100%) 125 kg x design cation resin volume (M3) 2. Sodium hydroxide (100%) 160 kg x design anion resin volume (M3)	Please confirm if the regeneration level as 125 kg/m ³ for Cation and 160 Kg/m ³ for Anion is mandatory or bidder can select a higher regeneration level to suit the system requirement.	Specified regeneration levels are minimum requirement. Higher level may be selected as per system requirement.
815	Section-VI, Part-A Part-E	SUB SECTION- IA-10 WATER TREATMENT PLANT P&ID of pre-treatment Drg No. 9787-999-PCM-A-006.	3 of 12	1.01.04	c) Alum Solution preparation & dosing system consisting of.... f) PAC dosing system consisting of required...	Discrepancy observed in referred clause & P&ID regarding alum & PAC dosing in PT plant. As per specification both alum and PAC mentioned whereas as per P&ID, only alum dosing is shown. Owner to note that Alum and PAC, both are coagulants – hence, Bidder understands that two coagulants are not required, and dosing shall be considered as per P&ID only. Kindly confirm Bidder's understanding.	Provision of both alum & PAC dosing to be kept as per specification. Details shown in P & ID are minimum requirement. All systems and equipment to be provided as per specification.
816	Section-VI, Part-B Section-VI, Part-B	A-01 EQUIPMENT SIZING CRITERIA A-14 WATER TREATMENT PLANT	64 of 101 06 of 35	3.06.00 3.10.00	a) One (1) number RCC waste service water sump (WSWS) in two (2) sections shall be provided for collection of waste service water. Service water effluents and other plant effluents from various areas of the plant shall be routed to this waste service water sump. Facility shall be provided to collect free oil from these sumps to MS Oil drum and oil skimmers (2 nos.). Portable oil Centrifuge (1x100%) of suitable capacity shall be provided for reuse of oil. Oil skimmer (2x100%) Oil centrifuge (2x100%)	Discrepancy observed regarding the number of oil Centrifuge in referred clauses. Owner is requested to confirm the numbers of oil Centrifuge are to be considered and issue an amendment accordingly.	2x 100 % oil centrifuge to be provided. Bidder to refer amendment no. WS1-01 in this regard.
817	Section-VI, Part-B	A-01 EQUIPMENT SIZING CRITERIA	7 of 35	3.10.00	Chemical dosing (Alum & lime) shall be provided for these Tube settlers/Lamella clarifiers in the chemical house.	Lime dosing system for WSWS plant details are not mentioned in the tender specification. Owner is requested to specify the lime dosing tank and pump requirements.	Being an EPC package, Bidder to design Lime & Alum dosing system for WSWS plant as per system requirement.
818	TECHNICAL SPECIFICATIONS SECTION-VI, PART B	Water treatment plant A. Pre-treatment system	62 of 101	3.06.00	Anti-scalant handling, storage, and dosage system with bulk storage for one(1) month's storage with design dose. Anti-scalant preparation tanks (2) with motorized agitator, capacities of both tanks together shall be sized to prepare and store 1 day requirement of Anti-scalant, Anti-scalant dosing pumps (2x100%).	Antiscalant bulk storage tanks are not indicated in P&ID. Owner is requested to check and confirm the requirement of antiscalant bulk storage tank.	Antiscalant bulk storage tanks are required for CW treatment and also for RO based DM plant.
819	TECHNICAL SPECIFICATIONS SECTION-VI, PART B	Water treatment plant A. Pre-treatment system	62 of 101	3.06.00	i) Anti-oxidant handling, storage, and dosage system with bulk storage for one(1) month's storage with design. Anti-oxidant preparation tanks (2) with motorized agitator, capacities of both tanks together shall be sized to prepare and store 1 day requirement of Anti-oxidant, Anti-oxidant dosing pumps (2x100%).	Anti-oxidant bulk storage tanks are not indicated in P&ID. Owner is requested to check and confirm the requirement of anti-oxidant bulk storage tank.	Anti-oxidant bulk storage tanks are required for RO based DM plant.

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820	TECHNICAL SPECIFICATION SECTION-VI, PART-A TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION A - 11 CONDENSATE POLISHING UNIT TECHNICAL SPECIFICATION SECTION-VI, PART-B	1 of 2 5 of 16	2.04.00 4.06.00	One (1) set of regeneration facilities consisting of Resin separation vessel, Cation, Anion regeneration vessel(s), Resin make-up hopper, Mixed resin storage vessels (2 nos) etc. 1) Resin Separation & Cation Regeneration Vessel (2 sets). 2) Anion Resin Regeneration Vessel (2 sets). 3) Mixed Resin storage vessel (2 sets).	There is a discrepancy between Part – A and Part – B regarding number of regeneration facilities. Owner is requested to check and confirm the number of regeneration facilities.	One(1) set of Regeneration facilities to be provided, Bidder to refer amendment no. WS1-04 in this regard.	
821	TECHNICAL SPECIFICATION SECTION-VI, PART-B	Chemical Preparation Tanks Chemical Preparation Tanks	7 of 16 8 of 16	4.06.00 5.03.00	5) Two (2) acid measuring tanks of adequate capacity to hold acid for two (2) regenerations. Each tank shall be adequate to hold chemical for 125% of one regeneration--	Discrepancy observed regarding tank capacity. Owner is requested to check and confirm the capacity of measuring tanks needs to be considered.	Bidder's query is not clear. However, two(2) acid measuring tanks each of adequate capacity to hold chemical for 125% of one regeneration is to be provided in line with technical specification.	
822	TECHNICAL SPECIFICATION SECTION-VI, PART-A Part:E	SUB-SECTION IA-20 CONDENSATE POLISHING UNITS Dig No. 9587-899-POM-A-013	1 of 2 -	2.02.00 -	Two (2) x 50% capacity back washable type cartridge pre-filters for each unit shall be provided for the commissioning period, start-up period as first cleaning step as well as normal continuous operation, complete with automatically operated by-pass, associated piping, pumps (with at least one stand-by), pneumatically operated valves etc. No pre filter shown in P&ID of CPU.	Discrepancy observed in the scope of pre-filter between referred clause of tender specification and P& ID. Owner is requested to check and confirm the scope of pre filter for CPU.	Two (2) x 50% capacity back washable type cartridge pre-filters for CPU are in bidder's scope of work.	
823	Section -VI, Part-B	Sub Section A-01 SUB-SECTION-D-1-5	48 of 101 53 of 86	2.02.03 (10) 5.18.01.05	Design pressure for CW Piping, Valves, fittings, COLTCS, equipment on the CW line etc. : Vacuum (0.1 kg/cm2(abs)) and 5 kg/cm2(g) Following shall be considered for design of C.W. ducts: c. Expected vacuum conditions as arrived from transient analysis	There is discrepancy between two clauses related to Design vacuum to be considered for CW piping. For Design Vacuum pressure for CW piping, valves, fittings, COLTCS, equipment on the CW line etc. shall be as arrived from transient analysis Owner is requested to confirm.	Bidder to comply with the specification requirements.	
824	Section -VI, Part-B	Sub Section A-01	56 of 101	3.01.00 (e)	Total head of the CW pump at rated flow : Sum of static lift from minimum water level in CW pump house sump up to the centerline elevation of hot water distribution header at Cooling Tower + 110% of friction drop in the entire CW system + pressure drop across Condenser with 2 mWC margin (minimum).	a) Bidder understands that 110% friction drop in the entire CW system means 10% margin to be considered for friction drop in CW piping and fittings only. Please confirm bidder understanding. b) 2 mWC margin on condenser pressure drop will result CW pump running will not be at duty point. Owner may please note that there is already a margin of 1 MWC in the form of difference of min water level and max water level in CW sump. Further, there is margin of 10% on friction loss. Therefore, enough margins are already available in the CW Pump head. Hence, Customer may please review the additional requirement of 2 MWC margin on the CWP head.	a) Bidder's understanding on friction drop is correct. b) Bidder's proposal reviewed but not accepted. Bidder to comply with the specification requirements.	
825	Section -VI, Part-E	Scheme of Circulating water system		9587-899-POM-A-059		As per flow diagram, Owner has indicated four inlet and four outlet connection from Each condenser. Alternatively, depending upon condenser design, bidder can provide two inlet and two outlet connection from each condenser. Please confirm bidder understanding.	Bidder's understanding is correct. The scheme shall be finalised during detailed engineering in line with bidder's standard practice.	
826	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB SECTION A-15 CW SYSTEM	10 OF 43	3.1	The tower shall be of single inlet , cross flow or counter flow type with type of fills as specified in technical data sheets.	The tower shall be of single or double inlet, cross flow or counter flow type. Owner is requested to confirm.	Technical specification requirement is clear about single inlet type with option of cross-flow or counterflow tower. Bidder to comply the requirements of technical specification.	
827	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB SECTION A-15 CW SYSTEM	11 OF 43 11 OF 43	3.3 3.4	Bidder shall provide spare cells (Minimum four (4) per tower) in the cooling tower to facilitate maintenance without affecting the tower performance. The water distribution basin and piping system shall be so designed that when any two cells (other than standby cells) are out of operation for maintenance etc. the remaining cells shall be capable of handling the full quantity of water as indicated in technical data sheet.	Discrepancy found between tender clauses. As per our past executed project we understand that only two (2) spare cells to be required for each cooling tower in case of single inlet cells. Owner is requested to confirm.	Bidder's query on discrepancy is not correct, Technical specification requirement is clear, bidder to comply.	
828	TECHNICAL SPECIFICATION SECTION – VI, PART-A TECHNICAL SPECIFICATION SECTION-VI, PART-B TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION IA-11 CW SYSTEM SUB SECTION IA-11 CW SYSTEM SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	1 of 3 1 of 3 54 OF 86	1.01.01 (08) 1.01.01 (13) 5.18.01.05	Carrying out transient analysis. Minimum twenty (20) nos of Automatic air release valves (ARVs) of 200 mm NB (minimum) size along with its isolation valves for CW system. Necessary stub connection in CW duct for mounting ARVs Suitable tap-offs shall be provided in the duct to connect CW blow down, ACW tapping etc. Based on the transient analysis, sufficient number of stub connection shall be provided in the duct to fix air release valves.	As per specification location of installation and number of air release valves shall be decided as per transient analysis only. Owner is requested to confirm.	Number of ARVs shall be based on transient analysis, subject to minimum of 20 numbers, bidder to comply with the specification requirements.	
829	PART E-1	9578-999-POM-A-038 P&I diagram of Equipment cooling water system				2 recirculation lines indicated as follows: a. From Primary DMCW pump suction header to discharge header b. From PHE discharge header to Primary DMCW pump suction header	Only one recirculation line is needed. Please confirm which line to be kept. Owner is requested to confirm.	P & ID is clear about system requirement. Bidder to comply with the specification requirements.
830	PART E-1	9578-999-POM-A-038 P&I diagram of Equipment cooling water system				Flow transmitter is indicated on Secondary (ACW) Cooling Water pump discharge side. Flow indicators are also indicated in branch connections.	Only flow transmitter on Secondary (ACW) Cooling Water pump discharge side is needed. Flow indicators on individual branches to be deleted. Owner is requested to confirm.	Bidder to comply with the specification requirements.
831	SECTION – VI, PART-A	A-12	4 of 11	3.00.00 (i)	Electrically operated overhead traveling type crane of minimum 8 tonne capacity (capacity of crane shall be 25% above the weight of the heaviest equipment to be lifted during operation and maintenance work), in air compressor building for handling of various equipments.	For compressor house EOT crane, bidder request to consider only 10% margin above the weight of the heaviest part to be lifted during maintenance instead of 25% margin and minimum 8 tonne capacity. Owner is requested to confirm bidder's understanding.	Crane capacity shall be as per technical specification requirement.	

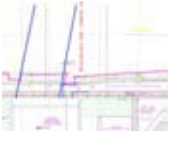



EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

832	SECTION-VI, PART-B SECTION-VI, PART-B SECTION-VI, PART-B SECTION-VI, PART-C A-01 A-01 A-05 GTR	95 of 101 99 of 101 23 of 26 5 of 119	4.02.09 4.04.09 14.09.00 7.02.00	Hoists Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling takeup pulley and takeup weight - same as above - Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Lifting devices i.e. hoists and chain pulley jacks, etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.	Discrepancy observed in referred clauses. Hence, Bidder understands that manual hoist to be considered for item weighing 500 kg to 2000 Kg and electrical hoist for item weighing more than 2000 Kg or more than 10.0 m lift. Owner is requested to confirm bidder's understanding.	Bidder to note that the items covered under SSA-05 are also governed by the cl. 14.09.00 of the same sub-section i.e. A-05 of part-B of the technical specifications.
833	SECTION – VI, PART-B A-01	70 of 101	3.11.00	Common Technical Requirement for systems like CW System, MuW, ECW, WTP, Auxiliary Water pumps, etc. a) Cranes & Hoists should be sized to handle heaviest component to be handled with 25% margin (with minimum capacity if specifically indicated elsewhere for any system/equipment) and should comply to IS- 3177/HS: 3938 (as applicable).	Bidder proposed to consider 10% margin above the weight of the heaviest part to be lifted during maintenance instead of 25% margin. Owner is requested to confirm.	Bidder's request reviewed but not acceptable, bidder to comply with the specification requirements.
834	SECTION – VI, PART-B A-07	18 of 25	7.01.00(xv)	Storm Brakes: 2x50% storm brakes, one each at each end of the bridge, shall be provided for each crane. Storm brakes shall be designed for wind velocity as indicated in "Criteria for wind resistant design for structure and equipment", Sub-section – D-01 / Civil Works/ Part-B/ Section-VI.	Storm brakes are not envisaged in turbine building based on Indoor installation of EOT crane. Please confirm and update.	The storm brake requirement is based on safety and past experiences. Bidder to comply with the specification requirement.
835	SECTION – VI, PART-B A-24	6 of 6	2.01.00	Suitable EOT Crane/HOT Crane/Monorial beams with hoists/Chain Pulley Blocks of adequate capacity, to meet the erection and maintenance requirements are to be provided by the vendor for the various areas/equipment. Some of the areas/equipment not covered by TG hall EOT cranes are indicated below. For balance areas/equipment, not listed hereinafter, the requirements of Specification shall be followed. (a) Feed water heaters & deaerator (Applicable Hoists/Chain pully block for maintenance purpose shall be provided). (b) Various pumps & Heat Exchangers. (c) Condenser Water Boxes (Iron & steel), (Applicable if hinged type water box not envisaged) (d) CW Butterfly Valves (e) Vacuum Pumps (f) Control Fluid Room (g) Auxiliary cooling water (clarified) pumps and DM cooling water pumps of ECW systems. (h) Central Lube Oil System room. (i) Any other equipment. The above requirement is indicative only, the requirement given in the respective chapter is to be adhered to.	As per recent NTPC project clarification, EOT crane is not envisaged for Feed water heaters & deaerator. However, applicable Hoists/Chain pully block for general maintenance purpose shall be provided. Owner to confirm.	EOT crane is not envisaged for Feed water heaters & deaerator. However, applicable Hoists/Chain pully block for general maintenance purpose shall be provided.
836	SECTION – VI, PART-B B-15	3 of 5	8.03.00	Radio remote Control of EOT Crane.	Radio remote control is envisaged for main cranes i.e. TG EOT and BFP EOT crane.	Bidders understanding is not correct. Radio remote control shall be provided for all EOT Cranes.
837	SECTION – VI, PART-D ERECTION CONDITIONS OF CONTRACT 2 OF 72	3.04.00	3.04.00	Marking On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.	On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be marked by usage of permanent paint. Customer is requested to note this clarification.	Bidder to meet/ follow the technical specification requirement. This shall be tied-up accordingly during detailed Engineering & finalization of QP with the successful bidder.
838	SECTION – VI, PART-D ERECTION CONDITIONS OF CONTRACT 3 OF 72	6.01.00	6.01.00	..... Each steam and water tubes shall be blown with compressed air and shall be subjected to ball test before erection to ensure that no obstructions exist.	Bidder understands that sponge test may also be accepted in place of ball test at site. Sponge test is a safe working practice and used in NTPC previous projects also. Owner is requested to confirm acceptance.	Ball pass is carried out at shop after fabrication of tubular product to ensure the obstruction /cleanliness inside the panel/Cul due to excess penetration of weld & bend area However, at site, sponge test is carried out with compressed air inside the tubular product if no further action is carried out at site before erection.
839	SECTION – VI, PART-D ERECTION CONDITIONS OF CONTRACT 30 OF 70	44.21.00	44.21.00	I. Chain pully block shall not be used for loads more than 2 (Two) tonne.	Bidder requests owner to allow use of chain pulley blocks for loads upto 10T	Bidder to comply with the specification requirements.
840	SECTION – VI, PART-B BOOK 2 OF 6 – ELECTRICAL B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	7 of 36	1.05.01, b, ii)	ST. The 2 x 100%, centrifugal or axial in line oil pumps (out of which one pump shall be standby) shall be provided with each radiator bank. Measures shall be taken to prevent maloperation of Buchholz relay when both oil pumps are simultaneously put into service. The pump shall be so designed that upon failure of power of supply to the pump motor, the pump impeller will not limit the natural circulation of oil. An oil flow indicator shall be provided for the confirmation of the oil pump operating in a normal state. An indication shall be provided in the flow indicator reverse flow of oil/loss of oil flow.	Bidder suggest to modify the clause as below since the same is only applicable to ST above 130 MVA rating. * ST (above 130 MVA): The 2 x 100%, centrifugal or axial in line oil pumps (out of which one pump shall be standby) shall be provided (if OFAF cooling is applicable to ST) with each radiator bank. Measures shall be taken to prevent maloperation of Buchholz relay when both oil pumps are simultaneously put into service. The pump shall be so designed that upon failure of power of supply to the pump motor, the pump impeller will not limit the natural circulation of oil. An oil flow indicator shall be provided for the confirmation of the oil pump operating in a normal state. An indication shall be provided in the flow indicator reverse flow of oil/loss of oil flow.	Bidder to refer amendment No. Elec1-01 in this regard.
841	SECTION – VI, PART-B BOOK 2 OF 6 – ELECTRICAL SUB-SECTION B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	4 of 21	3.02.02 f)	Cantilever arms of 320 mm, 620mm and 750 mm in length are required, and shall be as shown in the enclosed drawing. The arm portion shall be suitable for assembling the complete arm assembly on to component constructed of standard channel section. The back plate shall allow sufficient clearance for fixing bolt to be tightened with tray in position.	Bidder propose to consider additional size of 450 mm for cantilever arms. Owner may please review, and update specification as follows: *Cantilever arms of 320 mm, 450mm, 620mm and 750 mm in length are required, and shall be as shown in the enclosed drawing. The arm portion shall be suitable for assembling the complete arm assembly on to component constructed of standard channel section. The back plate shall allow sufficient clearance for fixing bolt to be tightened with tray in position.	Bidders proposal of 450mm cantilever arm is not acceptable. Bidder to comply with the technical specifications.
842	SECTION – VI, PART-B BOOK 2 OF 6 – ELECTRICAL SUB-SECTION B-05(A) MV SWITCHGEAR	6 of 7	3.00.00 h)	Wireless temperature monitoring system to be provided and same shall be integrated to DDCMIS/ separate HMI. Temperature sensor shall be installed in all relevant joints, contact joints etc. as per the standard OEM Practice, however Position of such sensors shall be decided at the time of detailed engineering.	Owner is requested to specify the exact number of measurement points/panel and panels (incoming or outgoing) at which measurement is required.	Technical details are already specified in the clause referred. Further, other details shall be finalized during detailed engineering. Further, please Refer amendment No. Elec1-02 in this regard pertaining to LT Switchgear.
843	SECTION – VI, PART-B BOOK 2 OF 6 – ELECTRICAL SUB-SECTION B-06 LT SWITCHGEARS & LT BUSDUCTS	13 of 19	3.11.00	Wireless temperature monitoring system to be provided and same shall be integrated to DDCMIS/ separate HMI. Temperature sensors shall be installed in all relevant joints, contact joints etc. as per the standard OEM Practice, however Position of such sensors shall be decided at the time of detailed engineering.	As per bidder's past experience and industry practice, wireless temperature monitoring system is generally not provided for LT switchgears since the switchgear design is type tested. Hence, Owner is requested to remove the requirement of wireless temperature monitoring system for LT switchgears.	Bidder to refer amendment No. Elec1-02 in this regard.
844	SECTION – VI, PART-E TENDER DRAWINGS Drg.no. 9587-999-POE-J-001 Rev.D	-	Notes no- C)	SLD Notes no- C) 415V System buses are provided with Manual Live Changeover with Check Synchronisation as well as automatic slow changeover	Normally, the referred clause is applicable to ACB IC and BC only. Owner may please review, and issue amendment as follows: * Note C) to be read as- 415V SYSTEM BUSES WITH ACB IC & BC ARE PROVIDED WITH MANUAL CHANGEOVER WITH CHECK SYNCHRONISATION AS WELL AS AUTOMATIC SLOW CHANGEOVER. *	Bidder's understanding is correct.
845	SECTION – VI, PART-B GENERAL ELECTRICAL SPECIFICATION SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION SUB-SECTION IIB ELECTRICAL SYSTEM / EQUIPMENTS	11 of 15 13 of 20	3.08.00 1.16.08	An ageing factor of 1.25 shall be considered. Lara stage-II is proposed to be directly connected to an ISTS pooling station (through 85km 400KV transmission line) which has HVDC converter station and lines for power evacuation. So, Bidder shall provide the necessary inputs (during any stage of the project execution) as required for carrying out necessary Sub-Synchronous Oscillation studies for establishing the effects of HVDC converter station on the Turbine & Generator including studies related to modal oscillations and torsional stress on TG Shaft without any financial and time implications to NTPC. Tentative list of inputs are indicated in Annexure-A. In addition to the inputs mentioned in Annexure-A, any requirement of additional inputs for conducting the SSO studies shall be provided by the bidder at any stage of the project without any time and financial implications to NTPC. Any necessary protection/modifications required in the plant for mitigation of unwanted effects evident through the above study for safety of the plant equipments shall also be in Bidder's scope.	Bidder understands that the ageing factor of 1.25 shall be applicable to Ni-cd battery. The ageing factor shall be 1 for plantie type battery as per standard practice and OEM & IEEE recommendation. Owner may please confirm. Bidder would like to clarify that any modification of the plant equipment is not envisaged. Also if any equipment/filters required to guard unwanted frequency, the same shall be placed in the receiving end substation of the power evacuation line. Owner may please note that there is no space available within plant area to accommodate any equipment/filters at Lara power plant. In view of the above, Bidder suggest to modify the clause as below: * Any necessary protection/modifications limited to change in relay setting required in the plant for mitigation of unwanted effects evident through the above study for safety of the plant equipment shall also be in Bidder's scope *	Bidders understanding is not correct. Ageing Factor of 1.25 shall be considered for both Ni-cd and Lead acid battery as per the NTPC Past Projects Experience. So Bidder must adhere to the technical specifications.
847	SECTION – VI, PART-A SUB-SECTION IIA-21 (SOLAR P.V.) SECTION – VI, PART-B SUB-SECTION A-25 (SOLAR P.V.)	1 of 1 1 of 12	- 1.1	Scope of Work: Determination of optimal grid connected roof-top Solar PV power plants capacity on different buildings of this package. Determination of Optimal grid connected solar PV systems for all sheds (Car parking etc.) of this package. Determination of optimal grid connected roof-top Solar PV power plants capacity on all the Buildings/shades of power plant	Bidder requests Owner to specify list of building/sheds on which the rooftop solar PV plant shall be installed.	Buildings and Sheds where roof top Solar is to be installed shall be determined during detailed engineering.
848	TECHNICAL SPECIFICATION SECTION – VI, PART-B B-17: SWITCHYARD	4 of 97	1.01.30	In LARA Stage-I (2X800MW) the existing 400KV Switchyard is provided with QUAD BERSIMIS ACSR conductor as main Busbar for Bus#1, Bus #2. The equipment interconnection is with 4" IPS Al. tube. The existing 400KV switchyard is of one and half breaker scheme with 1-type configuration as shown in the single line diagram 9587-999-POE-J-002 associated with LARA TPP Stage-II (2X800MW).	Owner is requested to share as-built layout indicating Stage-I interfaces and space available for extension including surrounding facilities.	This shall be finalised during the detailed engineering.
849	TECHNICAL SPECIFICATION SECTION – VI, PART-B B-17: SWITCHYARD	5 of 97	1.01.30 (v)	The cable trenches, cable trays & supports, accessories, Roads, drains required for present scope of bays and its interconnection to existing cable trenches, sump pit, drains and to existing storm water drain.	Owner to kindly share existing drawings to estimate the extent of cable trenches, cable trays & supports, accessories, Roads, drains. Also, bidder understands that interconnection is in Bidder's scope, however modification and strengthening of existing facilities are not in Bidder's scope.	This shall be finalised during the detailed engineering. Necessary Modifications and strengthening of existing facilities if required for completion of the system shall also be in the bidders scope.
850	TECHNICAL SPECIFICATION SECTION – VI, PART-B B-17: SWITCHYARD	5 of 97	1.01.30 (vi)	Dismantling of existing fencing, Roads, Foundations, Re-routing of Pipe lines above the ground & below the ground available in the present scope of Bays in the scope of Bidder.	Owner to kindly share existing drawings to estimate the extent of dismantling and relocation works.	This shall be finalised during the detailed engineering.
851	TECHNICAL SPECIFICATION SECTION – VI, PART-B B-17: SWITCHYARD	5 of 97	1.01.30 (ix)	Supply & laying of power, control cables, Screen cable, Fibre optic cable and cabling between Contractor supplied equipment and Owner supplied equipment, etc. from owner feeders, panels and from present scope of panels to existing panels to complete the system is in the scope of Bidder.	Bidder understands that these cables shall be laid in the existing cable raceway and no new cable raceway envisaged in the existing area.	Bidder's understanding is not correct. Bidder shall lay the cables under this contract in new cable raceway only.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

852	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	5 of 97	1.01.30 (x)	Power, Control cables, screen cable, fibre optic cable and cabling among Bidder/ Contractor supplied equipment, panels etc	Bidder understands that cables routed in the existing area shall be routed in the existing cable raceway and no new cable raceway envisaged in the existing area.	Bidder's understanding is not correct. Bidder shall lay the cables under this contract in new cable raceway only.
853	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	5 of 97 3 of 97	1.01.30 (x) 1.01.21	The owner will provide Two (2nos) 415 AC feeders in existing SWGR / MCC/ AC Boards & Two (2nos) 220V DC Feeders for 415V, 220V DC requirement for the Present scope of Bays as The feeders for Stage-II requirement . The Bidder shall indicate the rating of Feeders during detailed Engg stage. The Bidder shall provide SWGR/ MCC/ AC Boards & DC Boards for further distribution of 415V AC supply, 220V DC supply for the requirement of Present scope of Bays and these Boards shall be placed in Existing LARA Stage-I SWYD panel room. Two nos. of suitable separate power supply from existing LT switchgear shall be provided to each AC kiosk to cater power supply to panels and AC separately.	Bidder understands that in addition to the feeders as per clause 1.01.30 (x), Owner will provide two nos. of suitable separate power supply from existing LT switchgear to each AC kiosk as per clause 1.01.21. Also, Owner to kindly provide as-built layout of existing LARA Stage-I SWYD panel room to ensure space availability and cable estimation purpose. Bidder understands that cable trays in the existing LARA Stage-I Switchyard panel room shall be utilised for the Stage-II extension cables. No new cable raceway is envisaged in the Stage-I Switchyard panel room. Kindly confirm.	1. Bidder understanding is not correct. Owner shall provide the feeders only as per Clause No. 1.01.30. The Bidder shall provide SWGR / MCC/ AC Boards & DC Boards for further distribution of 415V AC supply, 220V DC supply for the requirement of Present scope of Bays and these Boards shall be placed in Existing LARA Stage-I SWYD panel room. Bidder has to extend the power supply to AC Kiosks in stage-I Area from the MCC under the bidders scope. Bidder to refer amendment No. Elec1-06 in this regard.
854	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	3 of 97	1.01.20	75mm thick base layer of M5 grade PCC shall be provided over the prepared sub grade in the present scope of switchyard bays & area of Stage-II switchyard ----- A final layer of minimum 75mm thickness of stone aggregate of 40mm nominal size shall be spread uniformly over PCC layer ----- considering the type of weeds found in the vicinity.	There is discrepancy in both referred clauses. Kindly clarify the discrepancy.	Clause no. 1.01.20 is applicable for switchyard at Stage-II area. Clause no. 1.01.30 is applicable for switchyard of stage-II in Stage-I area.
			5 of 97	1.01.30 (x)	Entire area of Switchyard of Present scope of bays shall be provided with broken stone .....40mm nominal size shall be spread uniformly		
855	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	4 of 97	1.01.22	The cable trenches from control room to switchyard shall be designed to cater as required for bays indicated in SLD. The contractor shall construct the common sections suitably of appropriate sizes upto common points so that the same can be extended in future.	Owner to kindly clarify the requirement of future expansion of cable trench.	Future expansion shall be considered as per Future Bays shall be considered as per SLD.
856	Section-VI, Part-B	B-17: SWITCHYARD	35 of 97	8.09.01 & 8.09.02	Hot dip galvanised ladder type cable trays of adequate width are to be provided for cables in the control room building, out door, above ground cable tray arrangement. Aux. power cables are to be laid on the top tray and DC control cables in bottom trays. Cable trays shall be designed to carry cables load without bending and proper tray supports shall be provided at every 1 mt interval.	Bidder understands that cabling shall be done in line with clause 09.08.00, hence this clause is not considered. Please confirm.	
	Section-VI, Part-B	B-17: SWITCHYARD	41 of 97	9.08.00	Cabling in the control room shall be done on ladder type cable trays with supports at an interval of 2000mm. All interpole cables (both power & control circuit) for equipments shall be laid in cable trenches/G.I. Conduit Pipe of NB 50/100mm which shall be buried in the ground at a depth of 300mm.		Bidder's understanding is not correct. proper tray supports shall be provided at every 1 mt interval. Bidder has to follow the clause 8.09.01 and 8.09.02 only.
857	Section-VI, part-B	B-0 GENERAL ELECTRICAL SPECIFICATION	3.04.02	5 of 15	Adequate number of auxiliary transformers shall be provided to meet the demand on 11KV, 3.3 KV and 415V systems under most onerous conditions, with the criteria that each 3.3KV / 415 V switchgear / MCC / DB shall be fed by 2x100% or 3 X 50 % transformers feeders or as per feeding arrangement as shown in tender SLD, and these shall be rated to carry the maximum load including owner's load (if applicable) expected to be imposed.	Bidder understands that Owner's load, if any, as identified in cl. No. 1.19.00 of Section-VI, Part-A, Sub Section-11B are to be considered.	Bidder's understanding is correct.
858	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-11B ELECTRICAL SYSTEM EQUIPMENTS	10 of 20	1.16.03	Contractor shall make earth resistivity measurements at site (based on four electrode method) and design the earthing grid as per IEEE: 80 (Latest edition) and gravel filling of switchyard. Earthing of all switchyard equipments and its connection to earthing grid and also connection of switchyard earthing grid with the main plant earthing grid. Earthing pit as per IS:3043 as required.	For bay extension at stage-I, bidder understands that underground earth mat is already available. Only above ground earthing will be in the scope of bidder. Further, Bidder understands that DSLP and lighting for the Bus sectionalizer bay & for tie line connecting Stage-I expansion bay with raigarh-kotra line gantry, will be in the bidder's scope. Owner may please confirm.	Underground earth mat is not available for stage-I Bay extension. So Bidder has to consider underground earth mat also. 2. Regarding the DSLP and lighting for the bus sectionalizer and tie line bay connectif stage-I expansion bay with raigarh-kotra line gantry shall also be in Bidders scope only. Bidder's understanding is correct.
	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	4 of 97	1.01.26/1.01.30 (x)			
859	Part-E1-Tender drawing				Dwg. No. 9587-999-PCC-F-001, General Layout Plan	Bidder understands that power supply for load centres located far from Stage-II but nearer to stage-I load center (like FOPH or any other area) can be drawn from any existing stage-I switchgear. Please confirm.	Supply can be drawn from Existing switchgear after installation of additional panels for feeding power supply to Stage-II LT Loads subjected to the space and transformer capacity margin availability.
860	Part-E1-Tender drawing				Dwg. No. 9587-999-PCC-F-001, General Layout Plan	Bidder understands that dismantling or re-routing of any EHV/HT/LT lines passing through Lara-II power plant area including boundary, Ash pond, etc., if required, shall be in Owner's scope. Please confirm	Bidders understanding is not correct. dismantling or re-routing of any EHV/HT/LT lines passing through Lara-II power plant area including boundary or anything else, etc., if required, shall be in bidders scope. Bidder to refer amendment No. Elec1-04 in this regard.
861	Part-E2-Tender drawing				Dwg. No. 9587-999-PCE-J-001, 400KV Switchyard Single Line Diagram	400KV switchyard bus surge arrestors shall be provided, if required, as per insulation coordination study, which will be submitted to Owner for approval during detail engineering. Owner may please confirm	Insulation coordination study is not required. Technical parameters for LA are as : 338KV, 20KA Class-4. Minimum no. of LAs to be provided are shown in the SLD.
862	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	2 of 21	2.01.05	The cable vault/ cable spreader room space below the HT/ LT switchgear room, Control Rooms, unit control equipment room, Programmer room, UPS, Charger & Battery Rooms, Boiler MCC room shall have 800 mm wide and 2.1 m high movement passage all around the cable trays in the cable vault/ cable spreader room for easy laying/ maintenance of cables.	Please note that at the junctions where multiple tray crosses each other, it will not be feasible to meet the height of 2.1m at such crossing portions Hence, bidder requests Owner to allow for the lower movement passage height at such locations. At such locations, clear height shall not be less than 1.6 mts. Owner may please accept.	Bidder's proposal is not acceptable. Further, This shall be discussed during detailed engineering.
863	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION B-10 CABLING, EARTHING AND LIGHTNING PROTECTION	19 of 21	9.00.00 (b) (1)	Separate Switchgear Rooms shall be provided for each unit. For TG building, all HT boards shall be provided in HT switchgear room at only one floor and all LT boards shall be provided in LT switchgear room at only one floor	Due to space constraint in LT switchgear, bidder requests Owner to allow to locate 220V DCDB in HT switchgear room since 220V batteries will also be located in the HT switchgear room. Owner may please confirm.	Bidder's proposal is acceptable.
864	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	7 of 15	3.06.00 (b)	All ACDBs, DCDBs, Solenoid Valve DBs and MCCs located on Slacker Reclaimer, Paddle feeders and Travelling trippers shall be of Fixed Module type. All 415V Circuit breaker modules and other MCC modules shall be fully draw out type.	Bidder request Owner to allow socket blower DB to be located on the Boiler platform as per OEM practice with DOP of IP-55. Owner may please confirm.	Bidder's proposal is acceptable. However, Bidder has to follow the specifications of LT Switchgear for outdoor Installations and DOP Shall not be less than IP-55.
865	Section-VI, Part-E2: Tender Drawings	Drawing no. 4540-999-POE-J-004: Typical section of Cable tray arrangement in trestle, Rev.0	1 of 1	-		Please refer red highlighted portion in the snapshot adjacent to walkway. Since, cable trays are available on both sides of walkway, bidder understands that toe-guard is only to be considered at the red highlighted portion. Please confirm bidder's understanding. Also, height is not indicated in the typical section, hence kindly provide height to be considered.	For trestle width of 1000/1200 mm toe guards shall be provided. For trestle width more than 1200mm, handrail along with toe guard shall be provided. For toe guard height or handrail refer the respective civil chapters.
866	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION : B-17: SWITCHYARD	43 of 97	9.11.05 (f) (iii)	Earthing conductors embedded in the concrete fibre shall have approximately 50mm concrete cover.	Please note that by considering 72x12mm earthing flat in the FFL, top cover remains shall be 38mm for the finish flooring of 50mm. Hence, Owner to kindly accept minimum floor cover of 38mm in such cases.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
867	Part-E2 Tender drawing		1 of 126		Dwg. No. 9587-999-POE-J-001, Single Line Diagram-Main Plant	(1) Outdoor LT switchgear in Bottom Ash area (owners use) (2) Outdoor LT switchgear in Transformer Area for Oil FIR MCC (owners use)	Bidder requests owner to provide following details for indicated LT switchgears (Owner's use) 1. Incoming feeder rating and type 2. Total quantity and rating of outgoing feeders.
868	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-11B ELECTRICAL SYSTEM EQUIPMENTS	15 of 20	1.19.00	415V switchgear feeders as indicated below (at suitable location to be decided during detailed engineering). (a) 4 Nos. MCCB-125A (b) 4 Nos. MCCB-250A (c) 4 Nos. MCCB-400 A (d) Total 6 Nos. ACB outgoing – 1000 A (in unit emergency switchgear and station service switchgear for feeding owner's loads).	Bidder understands that for Item (a) to (c), only feeders are provided from the switchgears. Further for item (d), bidder requests to provide the owner's load requirement to be considered in the Transformer sizing.	Point (a) to (d) only feeders are to be provided, however they shall not be considered in transformer sizing.
869	TECHNICAL SPECIFICATION SECTION – VI, PART-B	B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	30 of 36	2.00.00 (x)	Additionally Transformer shall be provided with fans/blowers (total fan power min. 1350 W, 415 V) for forced air cooling however all tests and performance guarantee shall correspond to air natural (AN) cooling.	Please confirm the number of fans which are required to be provided. Since the design of the transformer is for AN and fans are not a functional requirement hence cannot be decided by bidder. Owner to provide the number of fans.	Generally 3 no. of fans will be provided as per NTPC past projects Experience. Hence bidder has to provide min 3 no. of fans.
870	TECHNICAL SPECIFICATION SECTION – VI, PART-B	B-04: TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	1 of 36	1.01.00 (ii)	Voltage Ratio (KV), ST: 420/11.5/11.5 KV	It seems to be a typographical error in voltage rating. Bidder is referring voltage ratio of ST in line with "Dwg. No. 9587-999-POE-J-001, Single Line Diagram-Main Plant " i.e. 400/11.5/11.5 KV Owner may please confirm.	Bidder's understanding is correct.

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871	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB SECTION B-05(B) MV & LV SWGR, PROTECTIONS, CONTROL & METERING	4 of 10	3.03.12	All motor feeders shall have 4-20mA analog output (current signal) for use in control logics in DDCMIS or for information in DDCMIS.	This clause is applicable for only breaker controlled MV/LV Motors and only one phase current (Y-Phase) signal to DDCMIS is envisaged. Please confirm.	Bidder to refer amendment No. Elec1-05 in this regard.	
872	Part-E1-Tender drawing			Dwg. No. 9587-999-POC-F-001, General Layout Plan		Bidder request to modify the Transmission line corridor in line with switchyard location. Proposed Transmission line corridor is marked in BLUE. Owner to kindly confirm.	Transmission line corridor marked in blue line is for future lines (i.e Line-3 and 4 as marked in SLD). Bidder has to follow the 50 mtr wide corridor for transmission line marked in pink color for stage-II Evacuation through Raigarh-Kotra line.	
873	Part-E2-Tender drawing			Dwg. No. 9587-999-POE-J-002, 400kV Switchyard SLD		Bidder understands that nomenclature of Generators and transformers shall be as marked to match it with the Dwg. No. 9587-999-POC-F-001 (General Layout Plan). Owner to please confirm.	Bidder's understanding is correct. Bidder to refer amendment No. Elec1-06 - Tender Drawings in this regard.	
874	Part-E2-Tender drawing	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION SECTION – VI, PART-B	5 of 15	Dwg. No. 9587-999-POE-J-002, 400kV Switchyard SLD 3.04.01	ST#2 : 130 MVA Station Transformer Each Station transformer shall be sized to meet the requirements of the worst case of following contingencies: Case I: Outage of One Unit transformer Case II: Outage of any one of the Station Transformer and all the connected loads on the set of Station boards are fed from other available Station transformer.....CHP/AHP shall be considered.	Owner is requested to delete 130 MVA rating of ST#2 mentioned in switchyard SLD. Station transformer shall be sized as per the sizing criteria mentioned in referred clause 3.04.01.	Bidder to refer amendment No. Elec1-06 - Tender Drawings in this regard.	
875	Part-E2-Tender drawing			Dwg. No. 9587-999-POE-J-002, 400kV Switchyard SLD	## BIDDER'S SCOPE OF WORK SHALL INCLUDE INTERCONNECTION OF BUS LINE BAYS IN LARA-1&2 SWITCHYARD WITH THE EXISTING FEEDER OF LARA-1 TO REPAIR (DURING LINE) MODIFICATIONS REQUIRED FOR THE PURPOSE ARE ALSO IN BIDDER'S SCOPE.	Owner to kindly provide drawings for transmission line connection of Champa and Raigarh kotra lines with following details: 1) Coordinates of first Transmission line tower 2) Transmission line tower drawing with conductor elevations. Bidder understands that Transmission tower modification if any is not in bidder scope.	1. Coordinates will be provided during the detailed engineering if required. 2. Transmission line tower drawing with conductor details shall be provided during the detailed engineering if required. 3. Existing Transmission tower modification of Raigarh-Kotra Line is not in the scope of bidder	
876	Part-E2-Tender drawing			Dwg. No. 9587-999-POE-J-002, 400kV Switchyard SLD	## MAIN BUS 1 & 2 OF LARA 1 IS EXTENDED ABOVE THE SPACE INDICATED FOR BUS1 SECTION/ADDITIONAL NECESSARY MODIFICATION FOR INSTALLATION OF BUS SECTION IS IN BIDDER'S SCOPE.	Owner to kindly provide as-built drawings of existing switchyard to access the modification.	This shall be finalised during detailed engineering.	
877	Part-E2-Tender drawing			Dwg. No. 9587-999-POE-J-002, 400kV Switchyard SLD		Fault level of both bus-sections are different for Stage-I bus-extension. Owner to kindly confirm that existing gantries are suitable for short circuit forces relevant to 63KA & no modification in the existing gantries or structures are envisaged by bidder.	Bidders understanding is not correct w.r.t Short circuit forces. Bidder to refer amendment No. Elec1-04 in this regard.	
878	Part-E2-Tender drawing			Dwg. No. 4540-999-POE-J-004, Typical section of cable tray arrangement in trestle		Kindly check overall dimension given as 4000mm which should be 3400mm along with other dimensions as marked. Owner may please review and update.	Bidder to refer amendment No. Elec1-06 - Tender Drawings in this regard.	
879	TECHNICAL SPECIFICATION SECTION-VI, PART B	ANNEXURE-1 TO SUB SECTION A-20 Coal & Biomass, Limestone and Gypsum Plant	7 of 11 4 of 18	3.00.00 SL No 34 3.03.04	100W,220V incandescent (or equivalent LED) DC Emergency lighting shall be provided For CHP/FGD plant area 18W, 220V DC Lighting fixture shall be provided in underground portion of conveyor, each switchgear room, control room, office room, pump house, each drive floor of TPs, staircases of various TPs and buildings and each local control area	Bidder understands Bidder has to follow Clause 3.03.04 for CHP & FGD plant area and consider 18W Lighting fixture. Kindly confirm	Bidder's understanding is correct.	
880	TECHNICAL SPECIFICATION SECTION-VI, PART B	SUB-SECTION-B-08 HT,LT AND CONTROL CABLES	3 of 7	2.010.00	All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated, and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150, 3Cx240 & 3Cx300 sq.mm	As per standard industrial practice, bidder proposes to include 3Cx185sqmm cable also. Owner may please accept.	Bidder's proposal is acceptable. Bidder to refer amendment No. Elec1-07 in this regard.	
881	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION-B-08 HT,LT AND CONTROL CABLES	5 of 7	4.00.05	CABLE DRUMS: Cables shall be supplied in steel drums of heavy construction.	Cable Drums shall be Steel / wooden based on drum length/cable size. Owner may please accept.	Cable drums of wooden type are not acceptable. So, bidder shall comply to technical specifications.	
882	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION B-09 DG SETS	3 of 13	4.10.00	The DG set shall be capable of starting largest size of emergency 415 V drive (motor) having starting KVA/rated KW ratio of 8 (higher if starting current is more than 8) and starting power factor of 0.2	Bidder understands that DG set can be sized with actual starting current of Motor and actual power factor during starting, if vendor is offering improved parameters of starting current and power factor. Owner may please confirm.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.	
883	Typical section of Cable tray arrangement in trestle, Part E2				Typical section of Cable tray arrangement (upto 18 trays)	Dimension of Trestle is indicated as 4000mm and number of trays are indicated as 15Nos.	Bidder understands that trestle width (total) shall be 3000mm and total number of trays will be 16 Nos. Owner may please confirm.	Bidder to refer amendment No. Elec1-06 - Tender Drawings in this regard.
884	SECTION – VI, PART-B	SUB-SECTION B-22 BUSDUCTS	Not mentioned (Just after Page 6 of 6 of referred sub section)		Rating and Technical Parameters of Current Transformer and Voltage Transformer	Since this is EPC project and in line to past/ongoing project(s) practice, ratings & technical parameters of Current Transformer and Voltage Transformer shall be decided by bidder based on system requirement study which shall be approved by Owner during project execution stage. The mentioned parameters in tender are to be considered as tentative. Owner is requested to confirm.	Rating and Technical Parameters of Current Transformer and Voltage Transformer mentioned in Sec-VI, Part-B, Sub section -22 Bus ducts chapter are tentative only. However, bidder has to consider minimum no. of CT/PTs as specified in the technical specifications and Tender Drawings.	
885	SECTION – VI, PART-B	SUB-SECTION-B-01 GENERATOR& AUXILIARIES	PAGE 17 OF 25	11.02.00	11.00.00 FEATURES OF STATIC EXCITATION SYSTEM (If applicable) 11.02.00 Rectifier Transformer	For applicable rating for this project, there are no NTPC approved excitation transformer suppliers in India which complies all technical requirements of specification & "Make in India requirements" as per General Technical Requirements (Part-C, Section VI). Bidder's supplied Excitation Transformer shall conform to IEC-60076-11 and Thermal Class 155 (F) insulation.	Being a critical application of Excitation transformer, bidder may adhere to the technical specifications. However Bidder can supply Excitation transformer conforming to IEC 60076-11 and Thermal Class H Insulation and the Temperature rise shall be as follows: 90 deg C over an ambient temperature of 50 deg C without fan/blower and 85 deg C over an ambient temperature of 50 deg C with fan/blower". Accordingly, bidder proposes change in referred clause as follows: 'a) Temperature rise: 90 deg C over an ambient temperature of 50 deg C without fan/blower and 85 deg C over an ambient temperature of 50 deg C with fan/blower". Owner is requested to confirm acceptance. b) Temperature rise: 70 deg C over an ambient temperature of 50 deg C without fan/blower and 85 deg C over an ambient temperature of 50 deg C with fan/blower	




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SECTION - VI, PART-B	SUB-SECTION-IIC-01	5 of 6	9.01.00	Control and Monitoring from CCR Tower fans, Fire water & Booster system etc. for this project is envisaged to be controlled mainly from the Large Video Screens (LVS) in association with the operator workstation (OWS) mounted on the Unit Control Desk (UCD). Fire system (as a whole including PLC control systems) shall be provided with necessary interface hardware and software for dual fibre optic connectivity & interconnection with station wide LAN for two-way transfer of signals for information sharing. TYPE OF BUILDINGS Fire Water Booster Pump House: PLC control room shall be single storeyed and single bay RCC superstructure. Dual processor PLC based control system with two OWS and one A4 size color Laser printer shall be provided in hydrant & spray booster pump house.	a) As per referred clause of section-VI, part-B, Fire water Booster system shall be controlled from UCD workstation and LVS. [i.e. control from DDCMIS] However, from other clauses it is understood that PLC shall be provided for Fire water Booster pumps located in Booster pump house. Request Customer to clarify the same. b) If PLC based control system to be considered, then Bidder proposes to locate PLC panels and OWS in Control room as alternate option instead of Booster pump house. Please confirm c) Bidder understands that fire water pumps are existing. Bidder request Customer to clarify the interface scope between proposed plant and existing fire water system.	a) Bidder to note that PLC shall be provided for Fire water Booster pumps located in Booster pump house. b) Bidder's proposal is also acceptable. c) Bidder understanding regarding existing fire water pumps is correct. No C&I interface between proposed plant and existing fire water system.
SECTION - VI, PART-A	SUB-SECTION-IIC	6 of 18	2.03.05	The Contractor shall provide integrated HART system for all DDCMIS for centralized configuration, maintenance, diagnosis & recordkeeping for all electronic transmitters, control valves & analyzers with HART protocol. DDCMIS AI(4-20 mA) cards shall be HART enabled. For Unit DDCMIS, the analog 4-20 mA input cards shall have input resistance >= 250 ohm inside the card / FTA. 4-20 mA DC signal will only be used for control purpose and superimposed HART signal will be used for configuration, maintenance, diagnostic and record keeping facility for electronic transmitters and Analyzers etc.	Bidder understands that HART system for all DDCMIS indicated in Part-A referred clause is typo error. The requirement mentioned in Part-B clause shall be followed i.e. HART shall be considered for Unit DDCMIS only. Please confirm.	Bidder's understanding is not correct Bidder to comply with the specification requirements.
SECTION - VI, PART-B	SUB-SECTION-IIC-02 DDCMIS	3 of 17	13.00.00			
TECHNICAL SPECIFICATION S SECTION - VI, PART-A	SUB-SECTION-IIC	11 of 18	3.03.00	Water Balance Dash board Suitable displays/dash boards are to be generated in WS DDCMIS for indicating total water consumption of the plant and for indicating further break down of this total water consumption into consumption of various plant areas. Additional flow measurements (other than those indicated in the tender P&IDs/water balance diagram), if any required, for achieving the above functionality shall also be in the scope of the Contractor	Bidder request Customer to define the extent of breakdown of water consumption at this stage, since it will have impact on the instruments quantities and DDCMIS package.	The same shall be decided during detailed engineering based on water. Further, refer amendment No. C&I-1-04.
TECHNICAL SPECIFICATION S SECTION - VI, PART-A	SUB-SECTION-IIC	11 of 18	4.00.00.c	Contractor to provide triple redundant sensors (Limit switches) for the status of manual Gates/ Valves to be implemented in 2oo3 configuration being used in protection of critical drives (BFP and CEP).	Limit switches are prone to failure and spurious trips. Therefore it is suggested to not consider these switches in protection of critical drives as per OEM practice. Alternate measurements e.g. suction flow low/suction pressure low-low (derived from suction Flow transmitters/ pressure transmitters) is already considered for BFP tripping. Therefore request Customer to confirm acceptance of the same.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
SECTION - VI, PART-A	SUB-SECTION-IIC	13 of 18	4.00.00.h	ANALYSER INSTRUMENTS OF DM / PT, LET, CHLORINATION (ClO2), CWT AND CPU PLANT : All weather Local Panel fitted with integral Air Conditioner shall be provided for housing analyzers etc if the same are not kept in AC rooms.	Bidder request Customer to confirm that the requirement indicated in the referred clause is for wet chemistry analyzers (Silica/ Sodium). All other analyzers (pH, conductivity, Residual chlorine etc.) shall be field mounted and suitable for ambient conditions.	Bidder to comply with the specification requirements.
SECTION - VI, PART-A	SUB-SECTION-IIC	13 of 18	4.00.00 Notes-4	CEMS, and EQMS analyzers/instruments shall be provided with provision for bidirectional connectivity over ModBus/RS-232/RS-485 with Employer's central cloud server for real time data monitoring, remote diagnostics & remote calibration checks, etc., complying with CPCB IT Division document "Protocol for real time (Emission & Effluent) data management from industries version 1.2 (10 & 2015), CPCB Guidelines July-2017 or CEMS or the latest regulatory requirements of CPCB/SPCB/other regulatory/statutory body prevailing at the time of award of the contract.	In Tender, no direct connectivity of CEMS and EQMS systems are indicated with CPCB Server. Please confirm, if, Employer's central cloud server is having connectivity with CPCB server to meet the statutory requirements.	Bidder's understanding is not correct. Bidder to comply with the specification requirements.
SECTION - VI, PART-A	SUB-SECTION-IIC	7 of 18	2.04.04	..... This shall include all cables and accessories required for connecting Contractor's system upto the Employer's systems such as ERP, etc.....	a) Terminal points for interface with Employer's systems (viz. ERP, CLIMS, etc.) are not included in Sub-section-III. Please include all terminal points in CI no. 3.00.00 of Sub-section-III.	
SECTION - VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	2 of 3	3.00.00	Control & Instrumentation	b) Customer has indicated terminal point for only Makeup water system and AWRS. Similarly, interfaces may be required with existing CHP, fuel oil system, existing fire water system, etc. However, terminal points for the same are not indicated in CI no. 3.00.00 of Sub-section-III. Please include terminal points for all interfaces between proposed plant and existing plant.	Specification requirements are clear. Bidder to comply with the specification requirements.
SECTION - VI, PART-A	Annexure C to IIC Contract quantity	14 of 25	2.04.00	Distant plants (Common Plant Areas) Make Up Water Pump House: 02 (see note 3 below)	Bidder wish to clarify that Note-3 is not available in the referred clause. Bidder request Customer to inform specific requirement if any. Alternately delete the reference to Note-3	Bidder to refer amendment No. C&I-1-08.
TECHNICAL SPECIFICATION S SECTION - VI, PART-A	Annexure C to IIC Contract quantity	2 of 24	2.00.00	Guidelines for Functional Grouping of Controllers Electrical system of Unit DDCMIS will be a separate process block. <u>However, electrical breakers of other DDCMIS shall be distributed along with respective process areas.</u>	In referred clause it is mentioned that "Electrical system of areas other than Unit DDCMIS" shall be distributed along with respective process areas. However, in Functional grouping details of Standalone DDCMIS and other BOP DDCMIS, electrical system is not mentioned. Bidder request Customer to indicate Electrical system in FG grouping along with the respective process areas in Tender specification	Referred clause is clear. Bidder to comply with the specification requirements.
SECTION - VI, PART-A	Annexure C to IIC Contract quantity	15 of 24	G	LIST OF ANALYSERS Note: 1. Multistream for Silica and Sodium Analyser shall be acceptable. Multistream analysers shall have at least one stream as spare.	a) Bidder wish to clarify that Chloride analysis is not indicated in the list of analysers mentioned in the referred clause. In case, Chloride analysis is required as per Bidder's design then Multi Channel Chloride analyser shall be considered. Bidder request Customer to indicate Multi channel analyzer for Chloride in Tender specification.	a. Bidder's proposal for multi channel chloride analyser is acceptable.
SECTION - VI, PART-B	SUB-SECTION - IIIC-12 SWAS	4 of 6	3.02.00	Minimum specifications of analysers Hydrazine: No. of Streams- Single	b) Bidder request Customer to accept Multi channel analyzer for Hydrazine. Accordingly please update the tender specification.	b. Bidder's proposal is not accepted Bidder to comply with the specification requirements.
SECTION VI, PART-B	SUB-SECTION - IIIC-12	3 of 6	3.02.00	Chloride: Range*: 0-1000 ppb freely programmable	As per SWAS measurement points indicated in Part-A, Chloride analysis is not required for SWAS. However, in case Chloride analyser is required as per Bidder's design, then Bidder proposes to consider Chloride analyzer range as per process requirement. Please confirm.	Bidder's proposal is acceptable.
SECTION VI, PART-B	SUB-SECTION-IIIC-04 MEASURING INSTRUMENTS (PRIMARY & SECONDARY)	17 of 36	10.00.00 11.00.00	AMBIENT AIR QUALITY MONITORING STATION (AAQMS) DATA LOGGER AT AAQMS & METEOROLOGICAL STATION	Requirement of AAQMS & Meteorological station is not specified in Part-A of tender specifications. Hence, Bidder understands that AAQMS & Meteorological station is not in Bidder's scope. Please confirm.	Bidder's understanding is correct.
SECTION - VI, PART-A	Annexure C to IIC Contract quantity	20 of 24	N	Contractor shall supply and install IP based CCTV system along with IP based announcement system which shall be used for monitoring safety during construction from Safety control room. It shall be possible to make announcements to alert the workers whenever required. These cameras shall be installed at all strategic locations in the plant area. These camera can be wired or wireless as per suitability at site. Initially these installations will be temporary & locations will keep on changing depending upon the work in progress. After COF of last Unit these cameras are to be installed permanently at suitable locations in consultation with NTPC.	Since both CCTV and announcement system are IP based and location of cameras and loudspeakers shall be common, network for CCTV system and Loudspeakers shall be common. Bidder Customer to indicate the same in the tender specification	Bidder to refer amendment No. C&I-1-02.
SECTION - VI, PART-B	SUB-SECTION-IIIC-04	2 of 36	2.01.00	For HART transmitter SIL 2 certification is required.	Bidder understands that intention is to provide quality instruments due to which SIL-2 certified instruments have been asked in Tender. Hence, Bidder request Customer to accept model wise SIL-2 certification instead of individual tag wise certification.	Noted. Bidder to comply with the specification requirements.
SECTION - VI, PART-B	SUB-SECTION-IIIC-20	1 of 3	2.00.00.f	Furniture like Computer tables, Chairs and other furniture related to Central control room, Programmer room, PC room	Bidder understands that the relevant workstations and engineering workstation shall be located in Programmer room. Separate PC room is not required.	
SECTION - VI, PART-B	SUB-SECTION-IIIC-01	6 of 6	9.03.00.2	Programmer Room /Programmer Room is envisaged to be located near the CER. This shall house the servers/ other workstations & Engineer station for DDCMIS (SG, TG and BOP C&I systems), various PCs	Please confirm	Bidder's understanding is correct.

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901	Section-VI, Part-A	Sub-Section-II-C	1 of 18	1.06.00	In this package fieldbus based controls and conventional controls (hardwired 4-20mA/DIDO) are envisaged. The usage of these two types of controls and devices is indicated below. The distribution of equipment devices for both conventional and fieldbus based controls shall be in various FCs of Control System, complying with Functional Grouping guidelines (Annexure to this section).	Fieldbus systems are indicated for DDCMS based control systems only since reference is provided to FGs.	Please refer clause 1.06.00 part-A sub-section II-C. Further, regarding PLC systems bidder's understanding is noted.
	Section-VI, Part-A	Sub-Section-II-C	2 of 18	1.06.02	For open loop control of complete main plant and offsite areas fieldbus based control system, fieldbus based actuators, Profibus DP based IEC LV LV SWGR/MCC and fieldbus based PT/DPT/TT shall be provided excluding applications given in Note-A.	However, there is discrepancy for open loop control, wherein complete main plant and offsite areas (implying inclusion of PLC/microprocessor/proprietary etc., based control systems) are indicated to be fieldbus based excluding applications given in Note-A.	
	Section-VI, Part-B	Sub-Section -II-C-09	3 of 6	14.02.00	Integration with Station LAN: The PLC system shall be OPC compliant and shall be provided with necessary hardware and software for successfully establishing dual redundant fiber optic connectivity with DDCMS Station wide LAN using bidirectional OPC communication through OPC DA / UA protocol.	PT/DPT/TT, actuators and IEC in LV SWGR/MCC shall be conventional and non-Fieldbus based, for controls implemented in PLC/microprocessor/proprietary systems. Further, PLCs shall interface with Station LAN using any of the protocols as per tender, as finalized during detailed engineering. Please confirm	
902	Section-VI, Part-A	Annexure B to IIC	17 of 24	1	Portable Testing and Commissioning tool-Ref Clause no.15.00.00, Sub-section IIIC-02, Part-B, Section VI for technical specification	Bidder wish to highlight discrepancy in the referred clauses.	This is errata, please read as clause 32.00.00 in place of 15.00.00 in clause I(22), Annexure C to IIC Contract quantity.
	Section-VI, Part-B	Sub-Section-IIIC-02	17 of 17	32.00.00	The testing and commissioning tool is intended to be used for test operation of any drive, in absence of DDCMS during initial commissioning (e.g. fan trial run, etc.) While the tool shall be used for all type of drives envisaged in the specification, it is designed to be operated for one drive at a time. Portable trolley mounted system completed with necessary hardware for operating the drives and monitoring its parameter shall be supplied	Clause no.15.00.00, Sub-section IIIC-02, Part-B does not indicate any requirement of Portable testing and commissioning tool. However, requirement of portable trolley mounted system is indicated in Cl. No. 32.00.00. Please confirm if the requirement indicated at Cl. No. 1 (22) is pertaining to portable trolley mounted system indicated at Cl. No. 32.00.00 of Sub-Section-IIIC-02.	
903	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	31 of 31	General Note-7	Control & Instrumentation Mandatory Spares for specific sub-systems such as <u>hydrogen generation plant</u> and Condensate Polishing Unit (if applicable), the spares shall be governed by the spares indicated against the corresponding specific clauses only.	Bidder understands that Hydrogen Generation plant is not applicable for this project. Please delete the requirements mentioned for Hydrogen Generation plant in the referred clauses.	Bidder's understanding is correct. hydrogen generation plant is not applicable for this project.
	SECTION - VI, PART-B	SUB-SECTION-IIIC-09 PROGRAMMABLE LOGIC CONTROLLER SYSTEM	1 of 6	1.00.00	All electrical devices like switches/ transmitters/ controller/ analyzer/ solenoid valves which are located in the <u>hydrogen generation plant</u> shall be made intrinsically safe by providing suitable type of transformer isolated barrier/ Zener barrier of standard make in case it is a standard and proven practice of the bidder.		
904	SECTION VI, PART-C	GENERAL TECHNICAL REQUIREMENTS	20 of 119	8.03.05.03	These packages shall be installed on the Learning Management Server (LMS) of Power Management Institute (PMI), NTPC located at Noida.	a) Bidder understands that e-Learning course shall be contents in SCORM (Sharable Content Object Reference Model) format which shall be integrated in LMS of NTPC PMI. Software applications for viewing the content is part of NTPC PMI server, further no hardware is required for e-learning package. Please confirm.	No specific hardware is envisaged. Content to be developed in latest HTML format. Bidder to comply with the specification requirements.
			21 of 119	8.03.05.03 (4a)	The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.	b) Bidder would like to clarify that certain items like Blackberry, Windows Mobile are outdated and might not be in use. Please delete this requirement.	
			21 of 119	8.03.05.03 (4d)	Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.		
905	SECTION - VI, PART-C	General Technical Requirements	16 of 119	8.03.04 (a-iv)	Further, two Licenses of the used 3D Modelling Software (One for Engineering View and One for Site View) shall be provided along with compatible Hardware for possible review and study of the Model Files being submitted by the Bidder Time to time.	a) Bidder wish to clarify that for 3D model software, most of the Software suppliers (viz Autodesk, Aveva, Bentley, etc.) have moved to subscription model and no longer offering perpetual licenses. Software are provided by suppliers on annual subscription basis. In view of above, Bidder request Owner to delete the requirement of perpetual license.	Bidder to comply with the specification requirements.
					All software provided shall necessarily include cost for perpetual license(s) for use on all the machines and an Annual maintenance contract (AMC) which shall include software upgrades as & when released by the software agency for a period of three years after warranty/guarantee period.	b) Bidder understands that the annual subscription shall be considered for total 106 Months (52 months COF Plus 18 months warranty period plus 36 months AMC). Please confirm.	
906	Section-VI, Part-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	3 of 8	1.14.00	Provision for interconnection (Single stream, capacity 2400 TPH) from Stage-II to Stage-I and Stage-I to Stage II by providing suitable modifications of existing system/ arrangement	a) Please include all terminal points related to interface of Bidder's scope Control and Instrumentation with Employer's systems in Sub-section-II, Terminal Points & Exclusions and Owner's input b) As per tender clause 1.14.00 of sub-section-IIA-15, only provision for inter-connection is to be considered. Hence, Bidder understands that interconnection cable is not in Bidder's scope. Please confirm. c) Bidder request Customer to inform the tentative distance from proposed CHP area to existing CHP DDCMS for considering necessary hardware in proposed CHP DDCMS. d) All necessary hardware/ software modifications/ upgradation, as required at Employer's CHP DCS/ RIO end, to interface with Bidder's system shall be in Employer's scope. Please confirm.	a. Noted b. bidder's understanding is not correct. Bidder to comply with the specification requirements. c. Refer GLP d. Noted.
	Section-VI, Part-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	1 of 3	1.04.00	Coal Handling Plant a) Feed from Employer's TP-4 of Stage-I to Stage-II b) Feed to Employer's Conveyor 13A/B at TP-14 of Stage-I		
	Section-VI, Part-A	SUB-SECTION-II-C	5 of 18	2.02.00	For CHP DDCMS, necessary signal exchange with Employer's existing stage-I CHP DDCMS system shall also be in Contractor's scope. For this signal exchange, the number of I/Os shall be considered as DI: 32 DO: 16 AI:8 AO:8. The exact scheme shall be finalized during detail engineering. Employer's stage-I CHP DCS/RIO panel shall be the terminal point.		
907	Section-VI, Part-A	SUB-SECTION-IIA-15 COAL & BIOMASS HANDLING PLANT	8 of 8	3.14.00	For measurement of tank level in water application ultrasonic type level transmitter and for slurry-based application Radar type level transmitter are to be provided. For the specification of these instruments and all other measuring instruments shall be complying to specification requirements of Part-B of Measuring Instrument (Primary and Secondary).	Bidder proposes to consider DP type LT for water application & Ultrasonic/ Radar Type Level transmitters for Slurry Tanks/ Sumps. Bidder request Customer to accept Bidder's proposal.	Bidder's proposal is not accepted. Bidder to comply with the specification requirements.
908	SECTION - VI, PART-B	C&I ANNEXURE TO SUBSECTION-A-20 COAL, GYPSUM & BIOMASS HANDLING PLANT	3 of 4	8.00.00	CCTV The cameras provided for the system shall be colored, suitable for day and night operation and network compatible & with Full HD resolutions. PTZ cameras shall be high speed integrated dome type. Minimum 4 nos. of cameras per S/R shall be provided covering the complete S/R and stockyard, however the exact location shall be finalized during detailed engineering after checking the coverage.	Bidder understands that CCTV cameras mentioned in referred clauses are same & total no of CCTV for stockyard area shall be as per SECTION - VI, PART-A, Annexure C to IIC Contract quantity, Clause No. 2.03.00. Please confirm.	Bidder's understanding is not correct. Bidder to comply with the specification requirements.
	SECTION - VI, PART-A	Annexure C to IIC Contract quantity	13 of 24	2.03.00	Common Plant Areas - Coal Handling Plant/Lime Stone Handling Plant/Gypsum Handling Plant 10. Stockyard area 10 No. of Cameras		
909	Section-VI, Part-E	Dwg No: 9587-001--POM-A-022	-	-		As per Bidder's design, flow measurement of slurry at outlet header of slurry recirculation pumps is not used for control purpose. Since flow measurement is not required in Bidder's design, flow element and transmitter for the same is not applicable. Please confirm.	Bidder's proposal is acceptable.
910	Section-VI, Part-A	SUB SECTION-6A-14 LIMESTONE AND GYPSUM HANDLING PLANT	2 of 2	3.14.00	For measurement of tank level in water application ultrasonic type level transmitter and for slurry-based application Radar type level transmitter are to be provided. For specification of these instruments and all other measuring instruments shall be complying to specification requirements of Part-B, Section-VI.	Bidder proposes to consider DP type LT for water application & Ultrasonic/ Radar Type Level transmitters for Slurry Tanks/ Sumps. Bidder request Customer to accept Bidder's proposal.	Bidder's proposal is not accepted. Bidder to comply with the specification requirements.
	Section-VI, Part-E	Dwg No: 9587-001--POM-A-022	-	-	Note 8. Only Ultrasonic/ Radar Type Level transmitters shall be provided for Slurry Tanks/ Sumps		
911	SECTION-VI, PART-B	D-1-6	9 OF 25	6.03.08	Minimum thickness for rolled/ built up section shall be 6mm.	Bidder understands that minimum thickness of member means flange thickness irrespective of web thickness for a rolled section. Please confirm.	Bidder to refer Amendment No. D2-07.
912	SECTION-VI, PART-B	D-1-5	78 OF 86	5.23.20.2	The grade slab shall consist of 230 mm thick rubble salsing (63 mm downgraded hard stone..... overlaid by 75 mm thick P. C. C. M. 7.5 and 100 mm thick RCC of grade M-20 with minimum 8 mm dia bars placed at 200 mm C / C in either direction respectively, There will be minimum 50 mm thick metallic hardener finish over the RCC slab.	The said clauses are contradictory. For grade slab of all buildings bidder shall follow clause 5.23.20.2. Kindly confirm the same.	5.23.20.02 clause is for CHP areas. For other areas Clause 5.13.01 is applicable.
			45 OF 86	5.13.01	In all buildings including main plant building, the ground floor slab shall consist of minimum 150mm thick RCC M25 grade base slab over an under bed as specified below.		

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

913	SECTION-VI, PART-B	A-20 Coal & Biomass and Gypsum Plant	5 of 93	4.1.7	Pavement of minimum 6 m width, all along the Ground conveyor shall be provided. For single stream conveyor, width of the pavement may be 4 m minimum.	Bidder understands that - 1. For Double Stream conveyor 4m wide paving shall be provided on each side. 2. For single stream conveyor 2m wide paving shall be provided on each side. Kindly confirm bidder understanding.	Bidder to provide specified pavement with including below conveyor portion.
914	SECTION-VI, PART-B	D-1-9 D-1-5	13 OF 30 69 OF 86 70 OF 86	9.11.01 5.23.02 5.23.04	For Mill Bunker Building, transfer points, crusher house, conveyor gallery, steel louvered windows shall be provided. Overhead / Ground Conveyor Galleries and Trestles - Windows shall be provided with wire mesh as specified elsewhere in this specification. Transfer Houses : Adequate steel doors and windows for proper natural lighting and ventilation shall be provided.	Bidder proposes the following - For mill building, Transfer points and crusher house steel louvered windows shall be provided. For conveyor galleries windows shall be provided with wire mesh. Kindly confirm the same.	Louvered window to be provided with wire mesh on inside. Specification requirement is clear in this regard.
915	SECTION-VI, PART-B	D-1-8 D-1-5	9 OF 19 8 OF 86	8.06.00 5.02.08	All gratings shall be electroformed types. Minimum thickness of the grating shall be 40 mm for indoor installation and 32 mm for outdoor installation. A walkway of minimum width 600mm shall be provided along the Cable Trays supporting floor of the gallery. The walkway shall comprise 40mm thick MS grating	The said clauses are contradictory. Being an outdoor installation of grating in cable gallery walkway, bidder shall provide 32mm thick grating in place of 40mm thick as per clause 8.06.00. Please confirm.	Bidder to refer Amendment No. D2-11.
916	SECTION-VI, PART-B	D-1-5	66 OF 86	5.23.01	The structural arrangement to be adopted for the design and construction of underground portion of track hopper and machinery hatches shall be as shown in tender drawing.	Bidder request to provide mentioned track hopper tender drawing.	Bidder to refer Amendment No. D2-02.
917	SECTION-VI, PART-E				Tender Drawing 9587-999-POC-F-001.	Existing Trunk drain TD-2 is passing through different elevation e.g. BLOCK-2 (RL+208.00), BLOCK-3 (RL+202.00) & BLOCK-4 (RL+210.00) (refer site levelling plan drawing 9587-001-POC-A-003). Bidder understands that trunk drain TD-2 shall be dismantled, re-designed and re-routed in FGD, CHP areas for storm water drainage, if required. Disposal point of aforesaid Stage-II storm water drain shall be connected to the nearest existing trunk drain/diversion drain. Please confirm bidder's understanding.	Trunk Drain TD-2 shall be rerouted. Rerouting & redesign keeping the existing IL level of (+)201.15M of TD-2 at coordinates 416W/2688.35 is in bidder's scope. Disposal point of stage II drain shall be as per design requirement and may be connected to the nearest existing trunk drain/diversion drain.
918	SECTION-VI, PART-E				Tender drawing: 9587-001-POC-A-004 9587-001-POC-A-003	FGL of coal stockyard shown in RL+209.00 in Tender drawing "LAYOUT OF DRAINS" 9587-001-POC-A-004 is not matching with "SITE LEVELLING PLAN" 9587-001-POC-A-003 RL+208.00. Kindly confirm	FGL of coal stockyard shown in RL+208.00 in Tender drawing "SITE LEVELLING PLAN" 9587-001-POC-A-003 shall prevail.
919	SECTION-VI, PART-E				Tender Drawing: 9587-001-POC-A-005.	Please clarify whether access road has to be provided in between the stockpiles . In case it is required, please specify the width of the road.	Double lane access road shall be provided in between the stockpiles.
920	SECTION-VI, PART-E				Tender Drawing 9587-001-POC-A-005. 	Double lane road (cyan color) connecting mixing tank/utility area (RL +210.00) to stockpile area road (RL +208.00) crosses railway track at RL +202.00. Road slope 1 (vertical):8(horizontal) is difficult to achieve within given available space and railway siding level. Bidder request to omit this road and provide alternate path from existing plant road to access mixing tank/utility area.	Double lane road (cyan color) connecting mixing tank/utility area shall be at RL (+) 202.00M. Bidder to refer Tender drawing in amendment No. D2-16.
921	SECTION-VI, PART-E				Tender Drawing: 9587-001-POC-A-004, Layout of Drains 	Bidder understands that storm water drain shall be connected to nearby existing trunk drain. Bidder requests owner to provide complete detail drawing of trunk drain TD-2 & TD-3 showing invert level and sizes.	Disposal point of stage II drain shall be as per design requirement and may be connected to the nearest existing trunk drain/diversion drain. TD-2 IL (+) 203.00M to (+) 201.15M width 2 m TD-3 IL (+) 201.15M to (+) 200.5M width 2 m
922	SECTION-VI, PART-E				Tender Drawings 9587-999-POC-F-001 9587-999-POC-F-002	Grid line 1000W is not correctly shown in tender drawings.	Bidder to refer amendment No. D2-16 in this regard.
923	SECTION-VI, PART-A	IIA-15	3 OF 8	1.14.00	Provision for interconnection (Single stream, capacity 2400 TPH) from Stage-I to Stage-I and Stage-I to Stage II by providing suitable modifications of existing system/arrangement	Bidder understands that additional load & supporting arrangement of new conveyor on existing TP-14 and conveyor 26A on existing TP-4 has been considered in GLP. Bidder request owner to provide structural arrangement drawings along with relevant STAAD files of existing TP-14, TP-4 along with associated conveyors for planning and estimating the structural strengthening works involved.	Necessary details shall be provided to the successful bidder.
924	SECTION VI, PART-E				Tender Drawing: 9587-999-POC-F-001 NOTES: ELEVATION (+)0.00 CORRESPONDS TO RL(+)+209.5 9587-999-POC-F-002 NOTES: ELEVATION (+)0.00 CORRESPONDS TO RL(+)+208.5	There is contradiction of reduced levels of (+)0.00 in tender drawings. Bidder requests Owner to confirm which is correct.	Tender Drawing: 9587-999-POC-F-001 NOTES: ELEVATION (+)0.00 CORRESPONDS TO RL(+)+209.5 shall prevail.
925	SECTION-VI, PART-B				ANNEXURE H INDICATIVE ARRANGEMENT OF COAL STOCK PILE 	Owner is requested to clarify below mentioned points within indicative arrangement of Coal Stockpile as provided in "ANNEXURE H": a.Width of RCC Paving between RCC Retaining wall and Coal Stockpile drain. b.The text of "1500" near "PRECAST RCC COVER (TYP)" is not applicable.	Bidder to refer Amendment No. D2-15.
926	SECTION-VI, PART-B	A-20	41 OF 93	2.10.1	Spacing of monkey ladders on trestles (a)Where height of conveyor gallery (walkway level) is 10 m or more: On every trestle (b)Where height of conveyor gallery (Walkway level) is less than 10m.: On alternate trestle	Bidder shall provide monkey ladders on four-legged trestles at cross over locations. Similar practice followed in previous NTPC projects.	Bidder's understanding is not correct. Monkey ladders on trestles shall be provided as specified.
927	SECTION-VI, PART-B	D-1-5 IID	60 OF 81 2 OF 8	5.23.11 1.00.00	Toilets Toilets with potable water line facilities shall be provided in each of the following locations: (A) Crusher House (Ground Floor) – (Gents Toilet - 1 No for each.) (B) In CHP Control Room building – (Gents and Ladies Toilets - 1 No. each) (C) Wagon Tippler control room building. (Gents Toilet-1 No for each.) Each Gents toilet shall have lock enclosure, and the following fittings: Ladies toilet shall be similar to gents' toilet as detailed above, except item at s.no. ii and iii and provision for drinking water cooler. Package type STP shall be to be provided. Bio-Toilet shall be provided near all the modular worker's sheds/accommodation, CHP building outside the plant boundary. Besides these areas, any toilet block provided in area for plant boundary shall be a Bio-toilet. Bio-toilets shall be made for anaerobic bacterial decomposition of human waste. After decomposition and treatment of the human waste, the residual water from Bio-Toilet shall be colorless, odorless, devoid of any solid particles and shall have pathogen inactivation by 99%. The water thus obtained shall require no further treatment / waste management and shall be used for irrigation purposes. c. Packaged type Sewerage treatment plant (3 nos. as indicated in tender drawing General Layout Plan) and sewage pumping station including sewage pump, sump & house and connection up to sewage treatment plants (either of owner or bidder); connection of sewage lines of all buildings under Bidder's scope to the nearest sewerage system.	The said clauses are contradictory. Bidder shall consider separate package type STP for CHP buildings each i.e., Crusher house, CHP control room, wagon tippler control room. Kindly confirm.	Bidder's understanding is correct. Consider separate package type STP for CHP buildings each i.e., Crusher house, CHP control room, wagon tippler control room(as inside plant boundary).

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 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

928	SECTION VI PART-A	IID	5 OF 8	1.00.00	30. Civil, structural, architectural works for SOLAR PV plant on roof top of building/facilities in the bidder's scope.	Bidder understand that future provision of installing SOLAR photovoltaic panel shall be kept over roof top of only RCC buildings of CHP facilities. Bidder do not envisage to provide such provisions for all CHP area steel structures e.g. Conveyor galleries, TP's etc. Kindly confirm bidder's understanding.	Bidder's understanding is correct.
	SECTION VI PART-B	D-1-5	1 OF 86	5.01.00	f) Architectural design of all Power Plant Building shall be suitable for installation of solar photovoltaic panels on roof tops for renewable energy purpose.		
929	SECTION VI PART-A	IIA-15	3 OF 8	1.14.00	Provision for interconnection (Single stream, capacity 2400 TPH) from Stage-II to Stage-I and Stage-I to Stage II by providing suitable modifications of existing system/arrangement CHP Stage-I to CHP Stage-II interconnection shall be done at TP-4. The cable trundle on the RHS will foul with the opening envisaged for connection of conveyor gallery. This relocation of cable trundle to be carried out in EPC work.	Bidder requests owner to provide complete superstructure and foundation drawing of stage-I cable gallery and TP-4.	Details shall be provided during detailed engineering.
930	SECTION-VI, PART-E	9587-001-POC-A-007			RL 71.00 m FGL mentioned in "typical cross section of reservoir embankment at inlet pipe location"	FGL mentioned in the reservoir drawing is contradicting with FGL furnished in area grading drawing. Owner to please confirm the FGL.	Bidder to refer Amendment No. D2-16.
931	SECTION-VI, PART-E	9587-001-POC-A-007			300 mm Th sand layer below HDPE liner.	Bidder shall consider equivalent thickness of soil or fly ash as an alternative to sand layer below the HDPE liner. Please confirm.	Bidder's proposal is not accepted. Bidder to comply with the specification requirements.
932	SECTION-VI, PART-B	SUB-SECTION-D-1-5	39 OF 86	5.08.00	Plant Storm Water Drainage System All RCC drains shall be either RCC Cast-in-Situ or RCC Pre-cast drains. The minimum grade of concrete shall be M25 for RCC Cast-in-Situ drains and M30 for RCC Pre-cast drains. Toe drain shall be of adequate capacity to be constructed in RCC grade M30.	Bidder understands that Grade of concrete for RCC drain shall be M25. Please confirm.	Bidder's understanding is not correct. Bidder to comply with the specification requirement
			22 OF 86	5.04.03			
933	SECTION-VI, PART-B	SUB-SECTION-D-1-5	22 OF 86	5.04.03	Minimum top width On downstream slope of the embankment, rip-rap shall be provided from toe up to or higher level than the HFL.	Owner to please provide HFL level.	HFL is 206.71.
934	SECTION-VI, PART-B	D-1-4	2 of 4	4.03.1	The specified formation level(s) shall be achieved by raising by controlled filling with borrowed earth where the existing ground levels are lower than the specified level.	Subject to suitability of earth, Bidder can consider surplus available excavated earth from within the plant boundary for filling purpose.	Bidder's understanding is correct.
935	SECTION-VI, PART-B	D-1-5	02 of 30	9.03.01 and 5.05.15	9.03.01 - All Buildings shall be designed with Toilets as per NBC norms. 5.05.15(f) - All buildings shall have minimum one toilet block each.	Bidder understands that Toilet block shall be provided in buildings with permanent occupancy. Buildings like pump houses, electrical buildings, etc with no permanent occupancy shall not be requiring Toilet blocks. Please confirm.	Bidder's understanding is correct.
936	SECTION-VI, PART-B	D-1-5	13 of 86	5.02.09 (ii)	Air Conditioned Office for 25 persons (Including 5 cabins for Senior persons) with Pantry, Toilet block(Ladies and gents toilet separately), conference room for 25 persons, shall be provided in MPH building in addition to other facilities specified. This area shall have access to natural light on three sides minimum. It shall have air lock lobby at entrance with auto sliding doors.	Three side natural light access shall not be possible, however bidder suggest that maximum amount of natural light access shall be provided considering the mass of the floor plate.	Natural to comply with the specification requirements.
937	SECTION-VI, PART-B	D-1-9	17 of 30	9.15.00	The above design philosophy put into practice shall be detailed out through presentation drawings, perspective views, scale models, detail drawings, etc	Bidder understands this specified clause pertains to the main power house control room only. Please confirm.	Bidder's understanding is correct.
938	SECTION-VI, PART-B	D-1-9	21 of 30	Finishing Schedule	Main power house : (n) Conference room, senior executive room, Computer Room : Ceiling finish - Designer metal false ceiling.	Bidder understands that metal false ceiling is aluminum panel ceiling as described in the specification clause : 9.13.00 False Ceilings.	Bidder's understanding is not correct. Bidder to comply with the specification requirement
939	SECTION-VI, PART-B	D-1-5	85 of 86	5.31.00 & 5.33.00	FOA Building Safety Control Room	Owner to furnish finish schedule for the FOA Building and Safety Control room.	Bidder to refer Amendment No. D2-14.
940	SECTION-VI, PART-B	D-1-5	39 of 86	5.08.00	The inside drain dimension at any point should not be less than 0.45m (height) x 0.75m (breadth).	Bidder understands that minimum size mentioned in clause is for main drains only. For others, Bidder proposes : a. Secondary drain shall be minimum 0.3m (height) x 0.3m (breadth) or as per design requirement which ever is higher b. Garland drain shall be based on design size requirement Please confirm	This clause is for storm water catch drain.
941	SECTION-VI, PART-B	D-1-5	39 of 86	5.08.00	Plant Storm Water Drainage System	Bidder requests Owner to provide the size and invert level of inlet/outfall drains shown.	Bidder is requested to visit the site during tender stage. Details of existing drain will be shared to successful bidder.
942	SECTION-VI, PART-B	D-1-12 (C)		D-1-12 (C)	Annexure - C Geotechnical report	Geotechnical report in tender documents are not applicable for proposed plant locations. Bidder requests owner to provide Geotechnical report of proposed plant area.	Bidder to refer Amendment No. D-1-01,D-1-02.
943	SECTION-VI, PART-B	D-1-7	131 of 668	7.02.02	During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-1.	Bidder understands that the approved geotechnical investigation report during detail engineering stage shall be the basis of allowable bearing pressure.	Bidder to refer Amendment No. D-1-01,D-1-02.
944	SECTION-VI, PART-B	D-1-4	02 of 04	4.03.00	Bidder shall ensure that road access and drainage facilities for each block is available when site leveling in that block is completed. Unless otherwise mentioned, all roads and drains within a block shall be constructed by the bidder within a month from the date of completion of site leveling of that block.	Bidder understands that mentioned schedule is not feasible. Bidder proposes to construct road and drain as per requirement and progress at site.	Bidder's understanding is not correct. Bidder to comply with the specification requirements.
945	SECTION-VI, PART-B	D-1-5	39 of 86	5.07.00	SEWERAGE SYSTEM	Bidder request to furnish information regarding number of users for the design of sewage treatment plant.	Decentralized Sewage Treatment units should be as per the design requirements, subject to minimum combined capacity of 75 Cum/dav.
946	SECTION-VI, PART-B	D-1-5	40 of 86	5.10.00	A 40mm bitumen mastic wearing course over concrete ----- Please confirm.	There is no information of bitumen wearing course in drawing of "Details of Roads" (9587-001-POC-A-06). Bidder understands that drawing 9587-001-POC-A-06 shall be followed.	A 40mm bitumen mastic wearing course over concrete shall be provided by bidder as per Specification requirement. Revision in drawing of "Details of Roads" (9587-001-POC-A-06) is done in this regard in Amendment No. D2-16.
947	SECTION-VI, PART-B	D-1-6	6 of 25	6.02.04	Crane load	Bidder understands that, impact factors provided are for gantry girder design. Bidder proposes to use crane load impact factor as specified in IS:875 (Part-2) for main frame and foundation design. Please confirm	Specification is clear in this regard.
948	SECTION - VI, PART-A	SUB-SECTION-IID CIVIL WORKS	8 of 8	2.03.00	Sizing of the reservoir shall be such so as to utilize the maximum allocated area for the reservoir as per the layout drawing of the plant and as directed by the Owner. Bottom 500 mm (minimum) depth of water shall be treated as dead storage for settlement of any silt etc	Bidder understands that identified laydown/preassembly area of 75 acres (approx.) shall be converted to raw water reservoir by Owner after the completion of the project. Please confirm Bidder's understanding.	Bidder's understanding is not correct. 75 acres of laydown/preassembly area identified is to be converted into reservoir by bidder.
949	SECTION - VI, PART-A	SUB-SECTION-IID CIVIL WORKS	8 of 8	2.03.00	DEVELOPMENT OF LAYDOWN AREA Bidder shall use a Lay down area as shown in GLP. One area marked in GLP totalling 75 acres (approx.) are identified as laydown /preassembly area. Further, bidder to note that this 75 acres of land shall be converted into reservoir.	In case future reservoir is included in Bidder's scope of work and needs to be completed within the 48 month schedule then the same cannot be utilized for laydown purpose. In that case Owner is requested to provide alternate laydown area within the vicinity of plant premises.	Additional area of approximately 25 acres shall be allocated within plant premises during construction stage. Bidder to manage the allocated laydown area in reservoir area such that it can be vacated in phased manner for construction of reservoir as per project schedule.
950	SECTION - VI, PART-A	SUB-SECTION-IID CIVIL WORKS	8 of 8	2.03.01	d. RCC drains in the entire laydown area and along roads shall be planned so as to ensure proper disposal of rainwater.	Bidder understands that suitable RCC/Earthen drains must be provided in laydown area to ensure proper disposal of rainwater and avoid waterlogging. Please confirm	Bidder to comply with the specification requirements.
951	SECTION - VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS	40 of 86		All roads shall be of rigid pavements unless otherwise specified. Rigid pavements shall be constructed with Geopolymer concrete.	Bidder's request Owner to allow Cement Concrete roads as an alternative to Geopolymer concrete road.	Bidder to comply with the specification requirements.
952	SECTION - VI, PART-A	SUB-SECTION-IID CIVIL WORKS	8 of 8	2.03.00	Disposal of surplus excavated material in NTPC Land outside plant boundary(including dressing the top surface) and compacting the same by mechanical means in layers(not exceeding 300mm thickness.	a) Bidder request Owner to furnish the location coordinates of the land and associated approach road identified for disposal of surplus excavated earth. b) As substantial earthwork is involved, Bidder understands that dedicated approach road is available for to and fro movement of dumpers. Please confirm.	Bidder to refer Annexure D2-A and D2-B as attached in Amendment No. D2-17.
953	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	6 of 101	1.05.02 (d)	The working fluid temperature to be considered for design of pressure part tubes starting from water wall bottom ring header upto and including the water wall outlet headers shall be arrived by adding an additional margin of minimum 40°C to the maximum predicted/expected fluid temperature in these pressure parts.	Customer is requested to note that pressure parts design temperature will be based on worst case of all operating conditions and over and above adding additional margin will increase the thickness of the pressure part components. For cyclic loading design thickness of components is important and should be as minimum as possible and hence margins will be as specified in the IPR. We request Customer to kindly remove the requirement of additional margins specified in the specification.	Bidder to comply with the specification requirements.
954	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	7 of 101	1.05.02 (e) (v)	Austenitic stainless steel, SA- 213 UNS S30432 Shot Peened, TP347H FG or approved equivalent.	Customer is requested to note that the SA-213 UNS S30432 shot peened material will be used at SH and final RH outlet where the high steam temperature is experienced. The length (straight tube) of the shot peened SA-213 UNS S30432 will be decided by bidder during detail engineering stage based on bidder experience. NTPC may note that the shot peened tube loses its properties once it is undergone with the manufacturing process (Bending). We request Customer to kindly accept the bidder's clarification.	Bidder to comply with the specification requirements.
955	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	5 of 101	1.05.01 Note	Minimum number of coal pulverisers to be provided for each steam generator shall not be less than Eight (8)	We request Customer to allow minimum no of coal pulverisers shall be as per OEM standard proven design. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
956	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	13 of 66	7.01.01 (3)	2 Meters or maximum soot blowing radius, whichever is lower. Bidder can also provide the higher depth limited to 2.5 m also, only if it is a bidder's proven practice. References shall be provided in support of the same. However it will be limited to maximum soot blower radius.	We understand that the technical requirement mentioned in this clause is applicable to Economiser also, i.e. 2.5 depth as per bidder's proven practice is applicable for Economiser also. Kindly confirm acceptance.	The specified requirements are applicable to the heat transfer surfaces against the given clause. For economiser, bidder to comply with the specification requirements.

**EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2**

957	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	13 of 66	7.01.01 (8)	b) Contractor to minimize/limit use of different grades of tube materials in one SH/RH bank to three. One SH/RH bank is defined as tubes/elements connected between two headers.	Bidder would optimise / minimise the use of different grades of tube materials in one SH/RH bank considering the Ultrasupercritical parameters of 600 deg C rating. Customer is requested to accept our proposal .	Bidder to comply with the specification requirements.
958	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	14 of 66	7.01.01 (10)	Space Provision Keep provision of space for atleast 20% addition of additional economizer and 10% for the reheater surfaces in future. The surface provisioning shall be flare gas upstream section of the economizer. Structure/hanger design shall be suitable for loads due to these additional surfaces (filled with water) also.	Customer is requested to note that Bidder has achieved the rated RH outlet temperature in all previous installation. Moreover as per bidder design RH temperature is control / achieved by gas biasing damper. Hence, there will not be any issue to achieve the rated RH temperature. The requirement of RH additional surface is not applicable for bidder's design. Customer is requested to confirm acceptance.	Bidder to comply with the specification requirements.
959	SECTION-VI, PART-B	SUB SECTION-G-06 PRE-COMMISSIONING & COMMISSIONING ACTIVITIES	5 of 14	3.02.05	SCR SYSTEM Complete pre-commissioning work including tests of facilities such as pressure drop test of SCR system and all other tests as mutually agreed in the Contractor's quality assurance program as well as those identified in the specification.	We understand that this requirement is not applicable for SCR system as Bidder's scope for this project is limited to SRDS system only. Kindly confirm acceptance.	Commissioning shall be limited by the scope of SCR/Hybrid ready system.
960	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	49 of 66	16.01.01	Further, the Bidder shall provide an interconnection arrangement at station header with High Temperature Aux. Steam station header of existing stage-I (2x800 MW) units (Approx. length of interconnecting line is about 2250 meters).Auxiliary steam when sourced through this interconnection shall be available at a maximum rate of 60 T/hr with parameters 16 ata / 310°C at Stage-I TP.	Customer is requested to remove the approx length clause as it shall be as per actual distance from TP from Stage-I and location of PRDS as per layout. Steam parameters of 16 ata / 310 Deg C, pressure seems to be on lower side. Bidder requests Customer to provide steam at 19 ata / 310 Deg C and 90TPH rate.	This length mentioned here is approximate length. However, bidder to note that, interconnection arrangement based on actual length shall be provided by Bidder. Specification requirement is clear. Bidder to comply with the specification requirements.
961	SECTION-VI, PART-E	9587-001-POM-A-019	-	C4-C5	Motor operated valve upstream of control valve at flash tank inlet	Customer is requested to note that the water separator drain control valve is critical for boiler start up system. Warm up connection is required for instant operation of valve during plant operation. Since the control valve is shown at down stream of the motor operated isolation valve, proper warm up can not be provided to the control valve. Bidder proposes the motor operated valve will be provided at down stream of the control valve instead of upstream as per tender P&ID.	Detailed aspects w.r.t. the valve location shall be reviewed during detail engineering based on the selected specific equipment/sub-system.
962	SECTION-VI, PART-E	9587-001-POM-A-020 9587-001-POM-A-018	-	-	Scheme for Pulvisier (Vertical Mill) Scheme of Air & Flue Gas Path with Instruments (With Trisector APH)	 Bidder have considered the flow measurement as per bidder standard practice as follows: 1. Mill inlet air flow is as per bidder proven practice based on slant orifice flow measurement. This proven OEM design has been successfully executed in Power projects in India. 2. FID/DPA fans inlet flow based on Pressure measuring Annular pipes at inlet box opening and inlet cone. Kindly confirm acceptance.	Bidder's proposal is acceptable.
963	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	15 of 22	9.05.01	Vaporizer shall be designed to supply ammonia vapour to SCR reactor under all operating conditions. The vaporizer shall be shell and tube type heat exchangers. Auxiliary steam shall be used as heating source which will transfer heat to secondary Glycol/Water/Glycol/Water which in turn would supply heat to ammonia. Glycol/Water/Glycol-Water mixture as intermediate heat transfer medium shall be circulated in closed cycle. Either of options shall be used as a working fluid in heating system of Ammonia vaporizer as per bidder's proven practice.	Bidder proposes water bath type natural circulation system instead of forced circulation system for heating of ammonia based on proven practice. The water will be directly heated through auxiliary steam and heat in water will be transferred to ammonia. Customer is requested to kindly confirm acceptance.	Bidder to comply with the specification requirements.
964	SECTION-VI, PART-B	SUB-SECTION G-07 MDL	-	-	MDL List	We have found that MDL list is required to be updated inline with Bidder's scope for Lara project. E.g. Auxiliary boiler related requirements are also covered in the MDL List. Hence, we request customer to update the MDL list including all packages applicable for Lara project and kindly remove the items which are not applicable for Bidder's scope as per Lara Tender Specification.	Bidder to refer amendment No. SG1 in this regard.
965	SECTION-VI, PART-A	SUB SECTION IB PROJECT INFORMATION Annexure-IV(7A)	15 of 22	-	HGI of Biomass	Customer is requested to provide HGI of Biomass which is currently not available in the biomass analysis.	Bidder to note that the characteristics of torrefied biomass are already given. The same along with sample testing may be utilized towards HGI.
966	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	11 of 76	1.01.03.02 (b)	55% TMCR - 115 degree C or as predicted by the bidder whichever is higher	Bidder understands that the flue gas temperature at 55% TMCR is 115 degree C or as predicted by the Bidder whichever is higher as per SCR ready design system and hence without SCR operation. Customer is requested to confirm the same.	Confirmed.
967	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	5 of 76	1.01.01 (xii)	LD for 0.1% increase in APH Leakage against the shortfall (as per part-B guarantee condition description).	Customer is requested to note that as per contract, the boiler efficiency will be calculated as per EN_12952-15-Acceptance tests which include the air heater leakage. It means that LD will be applicable twice for boiler efficiency (plant heat rate) as well as separately for APH leakage. Hence, we request Customer to remove the APH leakage from Category-I guarantee and remove the LD. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
968	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	8 of 76	1.01.02 (xiii)	LD for 0.1% increase in APH Leakage (as per part-B guarantee condition description)	Customer is requested to note that as per contract, the boiler efficiency will be calculated as per EN_12952-15-Acceptance tests which include the air heater leakage. It means that LD will be applicable twice for boiler efficiency (plant heat rate) as well as separately for APH leakage. Hence, we request Customer to remove the APH leakage from Category-I guarantee and remove the LD. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
969	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	7 of 76	1.01.02 (vi)	Coal Pulvisier Wear Parts Warranty Life of Coal Pulvisier wear parts in hours of operation	In case of Mills wear measurement test: Since 6 mills are mostly running, top & bottom mills running hours criteria is not met even after 3 years of Plant operation. Hence for this case, suitable sunset clause to be included such as- a) If out of 8 Mills- 4 Mills wear measurement test criteria achieved, then other 4 mills wear test to be deemed completed. OR b) Mill wear measurement test also to be inline with Mill Capacity test i.e., only 4 mills out of 8 mills after completion of required operating hours.	Number of mills are dependent on coal quality and unit load. Specification requirement are clear and bidder to comply the same.
970	SECTION-VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	2 of 76	1.00.01 (i) 2	For Performance / Acceptance tests other than those identified at 1 above: After the conductance of Performance test, the contractor shall submit the test evaluation report of Performance test results to Employer promptly but not later than 7 (seven) days from the date of conductance of Performance test. However, preliminary test reports shall be submitted to the Employer after completing each test run.	Coal and Ash analysis report from NABL accredited lab is required for Boiler Efficiency report preparation, which cannot be obtained within 7 days. We request Customer allow bidder to submit coal and ash report after 7 days.	Bidder to expedite the process. Specification requirement are clear and bidder to comply the same.
971	SECTION-VI, PART-B	SUB SECTION- G-04 STANDARD TEST PROCEDURE	5 of 227 (i) and (ii)	-	Note - Boiler efficiency & Turbine cycle heat rate will be determined during SG PG Test and TG PG Test respectively	Boiler efficiency test method is not furnished here. Customer is requested to furnish the Boiler efficiency test procedure.	Bidder to refer Functional Guarantee Chapter of sub-section-IV, Section-VI-Part-A of technical specifications.
972	SECTION-VI, PART-B	SUB SECTION- G-04 STANDARD TEST PROCEDURE	227 of 227	-	Penthouse maximum & minimum MTM temperature difference should be within 40 deg.C. Necessary combustion tuning shall be done to ensure the same.	Customer is requested to clarify the requirement of this clause and the purpose of same in PG Test Procedure.	This is to optimize the performance and contain the temperature variations.
973	SECTION-VI, PART-B	SUB-SECTION-G-04 STANDARD TEST PROCEDURE	227 of 227	-	1) PG test should be done at design coal GCV, however for conductance of PG test coal GCV variance can be allowed from -10% to +5% of design coal. Formula for applying correction shall be as per BSEN 12952-15 (2003).	As per bidder understanding, the GCV variation given here are for conductance of PG test. However, any correction due to coal analysis shall be as per formula as indicated in the BSEN 12952-15 (2003) as specified in the tender specification. Also, the design coal variation in GCV is on a higher side as the corrected GCV is going beyond the range of coal GCV specified in the tender specifications. Customer is requested to correct the same.	Bidder to comply specification requirement. Also bidder to refer the revise coal data and revised range in this regard.
974	SECTION-VI, PART-B	SUB-SECTION-G-04 STANDARD TEST PROCEDURE	227 of 227	-	2) PG test to be done irrespective of any shortfall from rated parameters if it is attributed to design issues.	Bidder would like to know the requirement of this condition for conductance of PG Test. As per bidder's understanding, the shortfall from rated parameters will have negative impact on the plant heat rate and hence, PG test conductance will not be suitable in such conditions. Customer is requested to provide clarification in this regard.	This has been conceived to take care of the practical difficulties faced during the PG test conductance on account of test coal quality deviation from design specified values.
975	SECTION-VI, PART-A	SUB SECTION -IB PROJECT INFORMATION	12 of 22	Annexure-IV-2	Coal Analysis Range of 5% coal supplies - Later	The coal analysis provided in the tender specification does not include values of 5% range of coal. Customer is requested to note that these values are essential for boiler design. Hence, we request Customer to kindly provide 'Later' values of 5% range of coal. Kindly provide the requirement input.	Bidder to refer amendment No. SG1 in this regard.
976	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	12 of 66	7.01.01 (c)	Ensure even temperature distribution at gas and steam side by criss-crossing the steam paths between LHS and RHS.	As per Bidder's standard boiler design, twin fire vortex is provided for uniform heat absorption across the furnace. In this furnace, steam temperature control can be achieved by individual right/left spray control system for the superheater and with the help of gas biasing damper control for Reheater temperature balancing. Hence, criss-cross arrangement in SH and RH line are not necessary for twin fire vortex furnace design and not envisaged. Customer is requested to confirm acceptance.	Bidder to refer amendment No. SG1 in this regard.
977	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	16 of 66	8.02.00 (d)	Supported by steam or water cooled hanger tubes forming part of Steam circuit with hanger tubes designed for a minimum of 2 times the calculated load so as not to cause any dislocation/damage to the tube banks/setting. Necessary calculations in support of this shall be furnished by the bidder. Structural type hanger support will not be acceptable.	Customer is requested to note that the economiser support by steam or water cooled hanger tubes will be new supporting arrangement for bidder as compare to the previous installation. Bidder would like to clarify once again that Economiser coils are supported by structural arrangement as per proprietary and proven standard design, which will not interfere the normal operation and maintenance of the boiler. Further bidder confirms that the structural support arrangement shall be designed taking care of erosion problems for fly ash. Further the supporting arrangement shall be designed for a minimum of two times the calculated load so as not to cause any dislocation/ damage to tube bank / sections. Hence, we request Customer to accept structural type hange support also.	Bidder to comply with the specification requirements.
978	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	10 of 66	5.01.00 (b)	Steam Separator construction shall have: (b) Fusion welded construction with welded hemispherical dished ends.	Bidder understands that steam Separator and Drain collection vessel with forged construction is also acceptable to Customer inline with Bidder's earlier experience in Customer projects and supplies made by bidder for Customer projects. Customer is requested to confirm acceptance.	Bidder to refer amendment No. SG1 in this regard.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

979	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	12 of 66	6.04.00	A CFD and FEM analysis to conform to specified cyclic requirements shall be carried out and furnished by the contractor alongwith the pump data sheet.	CFD / FEM analysis will be conducted to conform to specified cyclic requirements as applicable to BCP. Customer is requested to confirm acceptance.	Bidder to comply with the specification requirements.
980	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	49 of 66	15.21.00	While deciding coverage of LRSBs the maximum coverage of LRSB shall not be considered more than 2m.	Requested to update this clause as per following While deciding coverage of LRSBs the maximum coverage of LRSB shall not be considered more than 2m in blowing radius .	Bidder to refer amendment No. SG1 in this regard.
981	SECTION-VI, PART-B	SUB-SECTION-A-22 MILL REJECT HANDLING SYSTEM	2 of 3	2.03.00 (7)	Tensioning arrangement. Hydraulic/pneumatic	We request Customer that minimum no of coal pulverisers shall be as per OEM standard proven design. Customer is requested to confirm acceptance.	Bidders query is not clear. Bidder to comply with the specification requirements.
982	SECTION-VI, PART-B	SUB-SECTION-A-22 MILL REJECT HANDLING SYSTEM	2 of 3	2.03.00 (12)	Reliable and proven hydraulic/pneumatic auto take up arrangements, with facility of adjustment of tension. The tension assembly shall be designed to absorb any momentary shock loading.	Requested to update this clause as per following: Reliable and proven hydraulic/pneumatic auto take up arrangements with facility of adjustment of tension or as per OEM standard and proven Tensioning Arrangement.	Bidder to comply with the specification requirements.
983	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	10 of 101	1.05.06.01	6) Rotational speed for drive selection 1 r.p.m. or actual offered whichever is higher	Customer is requested to note that RAPH speed will be decided by OEM as per standard design. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
984	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	28 of 66	10.07.13	2 x 100% Scanner Air Fans for all the scanners of one Steam generator unit shall be provided preferably at firing floor and away from Economiser Hopper ash evacuation system to avoid any ash ingress in scanner air fan system.	The scanner air fans shall be located at coal feeder floor as per previous projects with Customer. Kindly confirm acceptance.	Specification is clear in this regard and Bidder to comply with the specification requirements. Further details shall be discussed during detail engineering in line with the specifications requirements.
985	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	56 of 66	22.01.01	Full range and full scale performance testing shall be conducted at shop on one number each of the following Fans as per BS 848-1:2007 / BS EN ISO 5801:2008.	Bidder would request that Full range and full-scale performance testing shall be conducted at shop on one number each of the following Fans as per BS 848-1:2007 or as per latest revision / BS EN ISO 5801:2008 or as per latest revision. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
986	SECTION-VI, PART-E	9587-001-POM-A018	H-9, H-8	-	Suction for emergency air from atmosphere of Scanner Cooling Fan shown after Duplex Air Filter	Bidder requests that suction for emergency air from atmosphere shall be before Duplex Air Filter as provided for previous projects executed for Customer. Kindly confirm acceptance.	Specification is clear in this regard and Bidder to comply with the specification requirements. Further specific details shall be discussed during detail engineering in line with the specifications requirements.
987	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	23 OF 101	1.05.19.01	2. Each Reactor shall be sized to Pressure withstand capability: ± 660 mmvc (Minimum) or Maximum conceivable head of fans, whichever is higher at 67% yield strength	The SCR reactor and its supporting system shall be designed as per bidder's standard and proven practice. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
988	SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	24 OF 101	1.05.19.01	11. SCR Supporting Structure Considering additional load of following: i) Ash accumulation of 150mm height above each catalyst layer including future layer ii) Each layer plugged with 50% ash including future layer iii) Ash hopper completely filled with Ash	The SCR reactor and its supporting system shall be designed as per bidder's standard and proven practice. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
989	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	5 OF 66	3.01.04	Furnace Bottom hopper - Design of Boiler and its supporting structure shall be considering 50% ash/clinker loading in furnace bottom hopper and corresponding to ash density of 1600Kg/m ³ .	Furnace bottom hopper Boiler and its supporting structure shall be designed as per bidder's standard and proven practice and corresponding to ash density of 1600Kg/m ³ . Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
990	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	9 OF 66	4.01.00	(b) The casing/pert house and its supporting system shall be capable of taking additional loads due to accumulations of ash upto 300 mm height or actual expected (in between two overhauls of the units), whichever is higher. This additional load is over and above other loads considered for casing design. The ash density for the purpose of ash loading shall be at least 1300 kg/m ³ .	The casing/pert house and its supporting system shall be designed as per bidder's standard and proven practice. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
991	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	5 OF 22	4.02.03	Design Pressure: The reactor shall be designed for a 660 mm w.c. or maximum conceivable pressure of the relevant fans, whichever is higher, at 67% of yield strength of material used for reactor frame/stiffeners/plates.	The reactor shall be designed for ± 660 mm w.c. at 67% of yield strength of material used for reactor frame/stiffeners/plates or maximum conceivable pressure of the relevant fans, whichever is higher. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
992	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	5 OF 22	4.02.03	The SCR reactor and its supporting system shall be designed for the following: (a) Capable of taking additional loads due to accumulations of ash upto 150mm height above catalysts for each layer including future layer. (b) Catalyst modules including the future layer 50% filled with ash and ash hopper (if applicable) filled up to the top of the hopper partition plane. This additional load shall be considered over and above other loads considered for reactor casing and frame design. The ash density for the purpose of ash loading shall be at least 1350 kg/m ³ . (c) Reactor support frame for catalyst module shall be suitable for holding/supporting modules with height higher than originally envisaged by the contractor. Additional height of the module shall be suitable to accommodate 10% higher catalyst volume. Accordingly, the reactor structure shall have 10% margin in the total weight of the modules.	The SCR reactor and its supporting system shall be designed as per bidder's standard and proven practice. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
993	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	5 OF 22	4.02.04	Flow straightener/ flow rectifier of suitable erosion resistant material shall be installed between the inlet hood of the reactor and the reactor housing for directing the flue gas perpendicular to the plane of the catalyst.	Based on bidder experience and proven practice the requirement of suitable erosion resistant material for flow straightener/ flow rectifier installed between the inlet hood of the reactor and the reactor housing for directing the flue gas perpendicular to the plane of the catalyst is not envisaged. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
994	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	5 OF 22	4.02.06	Each catalyst elevation shall be provided with grating platform inside the reactor housing to support and place the catalyst modules. The opening of the grating shall be sufficiently large to prevent ash plugging/ accumulation. The elevation of platform outside the reactor shall match the elevation of inside the reactor platform to facilitate the easy removal/placement of catalyst modules.	Based on bidder experience and proven practice the requirement of grating platform inside the reactor housing to support and place the catalyst modules for each catalyst elevation is not envisaged. Customer is requested to confirm the same.	The requirement is critical w.r.t. smooth O&M. Bidder to comply with the specification requirements.
995	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	11 OF 22	7.08.00	Components of ammonia injection system exposed to flue gas stream shall be constructed from suitable grade of stainless steel.	Based on bidder experience and proven practice the requirement of stainless steel material for components of ammonia injection grid exposed to flue gas stream is not envisaged. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
996	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	39 OF 66	13.01.03	All flue gas duct, air ducts and the wind boxes shall also be designed for +/- 660mmWC or maximum conceivable pressure of the relevant fans, whichever is higher, at 67% of yield strength of material.	Based on bidder experience, all flue gas duct, air ducts and the wind boxes shall also be designed for +/- 660mmWC at 67% of yield strength of material or maximum conceivable pressure of the relevant fans, whichever is higher. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
997	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	40 OF 66	13.01.05	The ducts shall be of rectangular cross-section and shall be of all welded construction. Circular ducts are not acceptable. Following requirements shall be complied with: (a) Min. 5 mm thick steel plates for gas ducts upto ESP and min 6mm thick steel plates for gas duct after ESP. (b) Min. 5 mm thick steel plates for air ducts.	Bidder proposes to use 6 mm thick for Gas Duct inline with executed reference with customer for their projects. Customer is requested to confirm the same.	Bidder to comply with the specification requirements.
998	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	41 OF 67	13.01.11	v) The expansion joints shall be tested as per requirements specified elsewhere in the Technical Specification. Each identical type (corresponding to various size, operating/design parameters, material, design etc.) from the given populace shall be selected for representing the identical sets. The number of EJ's to be selected for performing tests shall be discussed and finalized. A minimum of 5 expansion joints, however, shall undergo performance testing. The type test of expansion joints shall also be governed by EJMA requirements.	The expansion joints shall be tested as per OEM's recommendation. A minimum of 3 expansion joints, however, shall undergo performance testing inline with executed reference with Customer. Customer is requested to confirm the same.	The numbers shall be as per the specified criteria. Bidder to comply with the specification requirements.
999	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	44 OF 66	13.02.08	Components of regulating dampers coming in the flue gas path, including gas biasing dampers (if applicable), shall be made of erosion resistant material, having minimum life of 16,000 hrs. Material of the shaft for all types of dampers shall be stainless steel. Dampers associated with FGD and its bypass system shall be as per material specified elsewhere in the specification.	Material of the shaft for all types of dampers shall be as per OEM standard inline with executed reference. The material of shaft for gas biasing damper shall be ASTM A576 G1025/1026. Customer is requested to confirm the same.	Specifications requirements are clear and bidder to comply the same. Further, specific details shall be discussed during detail engineering in line with the specifications requirements.
1000	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	41 OF 66	13.01.11	i) Metallic type expansion joints suitable for the service conditions shall be provided. The expansion joint design shall conform to the requirements of the EJMA Standards.	Based on bidder experience and proven practice, Bidder proposes to use Non-metallic Expansion joint at the following locations due to layout constraint: i) RAPH inlet and outlet Terminal point -Air and Gas side ii) Mill inlet Hot PA duct Terminal point iii) ESP inlet and ESP outlet However rest of the locations shall be followed inline with specifications. Customer is requested to confirm the same.	Specifications requirements are clear and bidder to comply the same.
1001	SECTION-VI, PART-B	SUB SECTION- G-05 STANDARD TYPE TEST PROCEDURE	34 OF 38	3.1	3. General 3.1 The Gate & Flap damper shall be tested in vertical position and the damper shall be tested in horizontal position Approved Quality Plan.	3.1 The Gate & Flap damper shall be tested in Horizontal position and the damper shall also be tested in horizontal position Approved Quality Plan inline with Customer for their executed reference project, due to safety aspects. Customer is requested to confirm the same.	Specifications requirements are clear and bidder to comply the same.

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1002	SECTION-VI, PART-B	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	10 OF 22	5.11.00	These gates and dampers shall be made up of erosion resistant material.	These gates and dampers shall be made up of as per OEM's recommendations/ based on bidder experience and proven practice the requirement of erosion resistant material is not envisaged. Customer is requested to confirm the same.	Specifications requirements are clear and bidder to comply the same. Further, specific details shall be discussed during detail engineering in line with the specifications requirements.
1003	SECTION VI, PART-B	SUB SECTION-A-08 Power Cycle Piping	11 of 19	1.10.00	DRAINS & VENTS (a) All high points in piping system shall be provided with vents. All low points shall be provided with drains. Provisions of drains on steam piping shall be as per ASME code TDP-1. Drain lines shall be adequately sized so as to clear condensate in the line and prevent water hammer and damage to turbine due to water induction. All piping shall be sloped towards the system low point such that slope is maintained in both hot and cold condition. (b) For All Power cycle piping systems, minimum inside diameter of drain/pipe selected shall not be less than 19mm. Minimum drain size for Feed Water line shall be 50 Nb.	Customer is requested to note that the drain pipe size for boiler and critical piping will be decided by the bidder as per proven design and best engineering practice. Customer is requested to kindly confirm acceptance.	Bidder's Proposal is not acceptable. Bidder to comply with the specification requirements.
1004	SECTION VI, PART-B	SUB SECTION-A-08 Power Cycle Piping	10 of 19	1.08.00	18. Unless otherwise agreed, all valves shall be fitted with the spindle in upright position	Customer is requested to note that valve will be installed in horizontal pipeline with stem upright and in vertical pipeline will have horizontal stem. Customer is requested to kindly confirm acceptance	Bidder's suggestions in vertical lines may be considered during detailed engineering.
1005	SECTION VI, PART-B	SUB SECTION-A-08 Power Cycle Piping	10 of 19	1.08.00	19. The minimum inside diameter for valves shall be as per requirements of ASME B16.34. For valves beyond the listed sizes & rating in Table-A of non-mandatory Appendix-A of ASME B16.34, the minimum diameter of valve flow passage shall not be less than 90% of pipe inside diameter. However, reduced port valves are also acceptable for sizes 65NB and below.	Customer is requested to note that ID of the valves shall be in line to ASME B16.34 requirements i.e. Table-A of non-mandatory Appendix-A of ASME B16.34. Customer is requested to confirm the same.	Provisions of Technical specification are clear and self-explanatory. Bidder to comply the same.
1006	SECTION VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	6 of 86	5.02.04 (f)	Waterless Bio Urinals with enclosure are to be provided by the contractor on each floor elevation of each boiler. Maintenance of toilet in hygienic condition till COD of the unit shall be the responsibility of the bidder.	Specification is not clear. Bidder understands that urinals to be provided at main floor elevations during construction of the Boiler . Customer is requested to provide clarification in this regard.	Urinals to be provided at each floor.
1007	SECTION VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	6 of 86	5.02.04 (f)	Floor of Machine Room shall be provided with profiled metal decking sheet. Trough shall be filled with Insulating Material (glass wool or rock wool) and thereafter finished with Minimum 60 mm thick wooden flooring , consisting of 37 mm thick hardwood planks, finished with 11 mm thick laminated wooden flooring (of 'pergo' or equivalent) with plank size 193x1195mm (material class shall be 34 as per EN13329), over 2 mm expanded polystyrene foam and polythene sheet under laying.	bidder has found mismatch of this clause with clause no. 1.02.05, Sub-section-A-24, Part-B, Section-VI. Bidder propose to consider RCC slab for Machine room flooring. Kindly confirm acceptance.	Bidder to adhere to the Clause no 5.02.04(f) in this regard Bidder to comply with the specification requirement.
1008	SECTION VI, PART-B	SUB-SECTION-A-24 SERVICE ELEVATORS CRANE, HOIST & MONORAIL	2 of 6	1.02.05	The machine room will be provided with R.C.C. floor slab with necessary pockets for anchor bolts and slots.	Bidder has found mismatch of this clause with clause no. 5.02.04(f), Sub-section-D-1-5, Part-B, Section-VI. Bidder propose to consider RCC slab for Machine room flooring. Kindly confirm acceptance.	Bidder to refer amendment No. TG1-08 in this regard.
1009	SECTION VI, PART-B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	6 of 14	1.03.00	14. Clear head room for material movement at ground level in Boiler Envelop: 5.0m (Minimum) (Unless specified Otherwise)	Bidder has considered first elevator landing level of Boiler at EL +4.00 mtr where Mill maintenance platform has been considered. Hence, Bidder propose to maintain min. 3.5 mtr headroom at Ground floor considering various sizes of equipment located at Ground floor inside the Boiler envelope wherever required. Remaining areas will be considered with piping, ducting and other boiler facilities at Boiler ground level based on system requirement. However, for maintenance of Major equipment like Fans, Mill etc., min. 5 mtr headroom has been considered inline with executed projects of Bidder. Customer is requested to accept bidder's request.	Bidder to comply with the specification requirements.
1010	SECTION VI, PART-B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	7 of 14	1.03.00	20. No. of Fire Escape staircases in the main plant with fire doors at each landing: Min-4 Nos. per unit-However the number shall meet the requirement of insurance companies.	Bidder understands that this requirement is for Main plant building only . Kindly clarify.	Bidder's understanding is correct.
1011	SECTION VI, PART-B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	13 of 14	1.03.00	58. All facilities of mill reject handling system specified elsewhere in the specification such as pump, tank, conveyor, piping etc shall be above ground level in boiler area.	Bidder understands that facilities of Mill reject system other than Bucket elevator is required to place above ground level of Boiler. However, non-drive end of Bucket elevator shall be placed inside pit arrangement with adequate maintenance space. Kindly confirm acceptance.	Bidder's understanding is correct.
1012	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	13 of 28	2.15.03 (d)	The coal mill shall be suitable for installation on RCC block type foundations and also at a suitable height in order that complete mill reject system as (described at sub section II A -17 of Part A) should be above the finished floor level of mill area or zero meter whichever is higher. Adequate maintenance space all around the mill zero meter have to be provided. However, the non drive end part of bucket elevator may be allowed to placed at minus meter with adequate maintenance space.	Bidder understands that facilities of Mill reject system other than Bucket elevator is required to place above ground level of Boiler. However, non-drive end of Bucket elevator shall be placed inside pit arrangement with adequate maintenance space. Kindly confirm acceptance.	Bidder's understanding is correct.
1013	SECTION VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	98 of 101	4.03.03	In case of mechanical conveying system, a vibrating feeder and metallic belt/chain flight conveyor carry mill reject from hopper to subsequent metallic /chain flight conveyor for further conveying to Bucket elevator for final storage at Silo.	Bidder understand that vibrating feeder shall be considered if required for the system. However, as per OEM recommendation of Bidder, vibrating feeder is not required. Hence, Bidder proposes to proceed without Vibrating feeder. Kindly confirm acceptance.	Refer Amendment No. MH-25
1014	SECTION VI, PART-A	SUB-SECTION-IA-17 MILL REJECT HANDLING SYSTEM	1 of 1	1.01.01	(c) Mechanical feeder including Vibrating Feeder (if applicable) for mill rejects below each pyrite hopper for feeding at consistent rate to the mill reject conveyor.	Bidder understand that vibrating feeder shall be considered if required for the system. However, as per OEM recommendation of Bidder, vibrating feeder is not required. Hence, Bidder proposes to proceed without Vibrating feeder. Kindly confirm acceptance.	Bidder to provide Vibrating feeder for controlled feeding if required.
1015	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	26 of 66	10.05.29	While platform shall suit the specific offered design of mill, it should facilitate the O&M requirements of other parts/components of the milling system. This continuous platform (at each side) shall be approachable from ground floor at both sides through suitable stairs .	As the Boiler and Bunker buildings are integrated and necessary stair approach has been considered from Boiler itself with inter connection platform to Bunker building . Also, provision of stair at bunker building will affect the approach of mill arrangement at ground level . Hence, Bidder propose not to provide separate stair case for Mill maintenance floor . Kindly confirm acceptance.	Mill being the critical equipment for the plant sustained operation, the easy access from ground floor is important. Bidder to comply with the specification requirements.
1016	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	26 of 66	10.05.30	The mill and its motor, gear box foundation bolts shall have adequate maintenance space and accessibility for tightening both from top and bottom side of foundation bolts. Alternatively, additional minimum four (04) numbers of extra foundation bolt shall be provided at extreme corners of base plate which can be used in case of failure of existing foundation bolts.	As per Bidder design, entire foundation bolts will be embedded inside the RCC with anchor frame arrangement. Further, foundation bolt sleeves will be filled with grouting and nuts at bottom side of the bolts will be tack welded. Hence, tightening of bolts from bottom side is not required. Same design has been followed in all the projects executed by Bidder. Further additional bolts are also not required considering the above. Customer is requested to kindly confirm acceptance.	Specifications requirements are clear and bidder to comply the same. Further, the details shall be decided during detail engineering based on the system offered, in line with the specifications requirements.
1017	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	39 of 66	13.01.04	All interconnecting gas ducts between the boiler and the ESP shall have a minimum slope of 45 degree with respect to horizontal so that any chance of accumulation of ash particles in the duct can be avoided under all normal/abnormal operating conditions.	No significant ash accumulation in interconnecting gas ducting of the Non NTPC projects supplied by bidder without 45 deg slope . Hence, Bidder propose to consider the inter connecting duct without slope for simplification of the arrangement. Kindly confirm acceptance.	Specifications requirements are clear and bidder to comply the same.
1018	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	54 of 66	17.01.18	For meeting the above requirement in respect of platforms the Bidder shall include in his proposal platform area of 19,000 m2 (clear all intervening pipes, columns, actuators, instrument enclosures, racks etc. and excluding area covered by stairways)	We have found mismatch of the requirement mentioned in this clause with other clause no. 2.20.04, Sub-section-IA-01, Part-A, Section-VI. Bidder proposes to proceed with 20,000 m2 gallery area considering 800MW unit. Also, Bidder would like to clarify that platform below the pipes, actuators and instrument enclosures shall be considered as a part of gallery area provided in the contract as the same is required for safety of the operating personnel. Removal of platform below such facilities will lead to difficulty during maintenance. We also understand that platforms covered by stairways, landings and ESP platforms are excluded from the above gallery area . Kindly provide the required clarification and confirm that our understanding is correct.	Bidder to refer amendment No. SG1 in this regard. Further, the specifications requirements are clear and bidder to comply the same.
1019	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	19 of 28	2.20.04	For meeting the above requirement in respect of platforms the Bidder shall include in his proposal platform area of 20,000 m2 (clear all intervening pipes, columns, actuators, instrument enclosures, racks, gates, valves etc. and excluding area covered by stairways & landings and excluding platforms required for ESP)	We have found mismatch of the requirement mentioned in this clause with other clause no. 17.01.18, Sub-section-A-02, Part-B, Section-VI. Bidder proposes to proceed with 20,000 m2 gallery area considering 800MW unit. Also, Bidder would like to clarify that platform below the pipes, actuators and instrument enclosures shall be considered as a part of gallery area provided in the contract as the same is required for safety of the operating personnel. Removal of platform below such facilities will lead to difficulty during maintenance. We also understand that platforms covered by stairways, landings and ESP platforms are excluded from the above gallery area . Kindly provide the required clarification and confirm that our understanding is correct.	Bidder to refer amendment No. SG1 in this regard. Further, the specifications requirements are clear and bidder to comply the same.

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1020	SECTION VI, PART-B	SUB-SECTION-A-21 ASH HANDLING PLANT	17 of 44	1.15.00	CHUTES AND HOPPERS - Minimum Valley Angle 70 degrees	As per earlier executed projects for customer, min slope of 60 deg is sufficient for coarse ash hoppers. Hence, Bidder proposes Customer to consider this requirement accordingly. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1021	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	20 of 66	9.02.02	Condensate from SCAPH shall lead to atmospheric flash tank in the boiler area.	Bidder has found mismatch of this clause with clause no. 2.11.01, Sub-section-II A-01, Part-A, Section-VI. Bidder propose to proceed the condensate from SCAPH directly to atmospheric flash tank itself. Kindly confirm acceptance.	
1022	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR AUXILIARIES INCLUDING ESP	8 of 28	2.11.01	all piping associated with start up recirculation drain system, all auxiliary steam piping to SCAPH, mill fire fighting etc. and drain piping from SCAPH tank(s) to atmospheric flash tank	Bidder has found mismatch of this clause with clause no. 9.02.02, Sub-section-A-02, Part-A, Section-VI. Bidder propose to proceed the condensate from SCAPH directly to atmospheric flash tank itself. Kindly confirm acceptance.	Bidder to refer the amendment in this regard.
1023	SECTION VI, PART-B	SUB-SECTION-A-24 SERVICE ELEVATORS CRANE, HOIST & MONORAIL	6 of 6	2.05.00	For the hoists with more than 2.0 ton lifting capacity or more than 10.0 M lift, motor operated hoist block for both long travel and lift shall be provided. Other hoist blocks shall be of hand operated type for both travel and lift. However, all monorails coming out of the building shall be provided with electric hoist block, irrespective of load and lift.	Bidder has found mismatch of this clause with clause no. 2.24.03, Sub-section-II-A-01, Part-A, Section-VI. Bidder propose to proceed motorized electric hoists for capacity more than 2.0 ton or lift more than 10.0 m. Kindly confirm acceptance.	Bidder to refer the corresponding clauses of specification for the corresponding items/equipments. Bidder to comply with the specification requirements.
1024	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR AUXILIARIES INCLUDING ESP	21 of 28	2.24.03	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. All auxiliary structures, monorails, runway beams for all lifting tackles, hoists etc., are included in Contractor's scope of supply. Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Bidder has found mismatch of this clause with clause no. 2.05.00, Sub-section-A-24, Part-B, Section-VI. Bidder propose to proceed motorized electric hoists for capacity more than 2.0 ton or lift more than 10.0 m. Kindly confirm acceptance.	Bidder to comply the specifications requirements as specified in various chapters/clauses for the equipments in corresponding areas.
1025	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR AUXILIARIES INCLUDING ESP	24 of 28	2.30.00	1. Each area maintenance feasibility to be ensured in Steam Generator design including coil tube replacement and APH basket removal.	Customer is requested to note that the requirement for coil tube is not clear. We request Customer to clarify.	The same may be referred towards system like SCAPH etc.
1026	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR AUXILIARIES INCLUDING ESP	24 of 28	2.30.00	7. Boiler to be provided with vacuum cleaning system network to ensure proper hygiene. In this context portable system to capture the ash around the boiler peripheral surface shall be provided along with network transmission of captured ash to a common location.	Boiler is provided with open grating only, and the possibility of dust accumulation is minimum. Bidder does not envisaged this requirement and proposes to proceed without vacuum cleaning system. Kindly confirm acceptance.	Bidder to comply with the installation of vacuum cleaning arrangements as per the specifications requirement.
1027	SECTION VI, PART-A	SUB SECTION-II A-02A SELECTIVE CATALYTIC REDUCTION SYSTEM Annexure-SG-04	3 of 4	2	a) Duct up to Economiser Bypass Gate including blanking Plate. SCR Ready Sketch	Bidder propose to provide blanking plate without gate arrangements at SRDS terminal points inline with recent executed NTPC projects with SRDS arrangement and as per SCR Ready Sketch in Tender specification.	Specifications requirements are clear and bidder to comply the same.
1028	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR AUXILIARIES INCLUDING ESP	28 of 28	7.00.00 (1)	Boiler enclosure shall be covered with colour coated metal sheeting. The metal sheet shall display a visually appealing painting (which will be informed later) on outside. The height covered for sheeting will be from boiler roof to Penthouse and 15 m below from penthouse bottom. During Overhauling or repair, the covering should not restrict material movement from Top and Sides of the boiler. Accordingly, removable type sheet shall be provided for such location. Necessary approach and lugs shall be provided for this purpose.	Bidder has found mismatch of this clause with clause no. 4.02.01, Sub-section-A-02, Part-B, Section-VI. Bidder proposes to proceed with the Boiler roof extended at least 2 meters below from the top of Pent house.	
1029	SECTION VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	9 of 66	4.02.01	e) Be provided with boiler roof arrangement of proven design & architecture. The boiler main roof arrangement shall be provided with monitor for ventilation and light. The overlap between the monitor and the main roof should be such that it prevents ingress of rain to the steam generator casing/penthouse. The boiler roof shall be extended downwards all around the boiler to a level of at least 2 meters below the penthouse casing roof. Suitable ventilation provision shall be provided in these side walls. All necessary sealing collars/wall boxes shall be provided where the pipes pass through the boiler roof or its extended side walls.	Bidder has found mismatch of this clause with clause no. 7.00.00 (1), Sub-section-A-02, Part-A, Section-VI. Bidder proposes to proceed with the Boiler roof extended at least 2 meters below from the top of Pent house.	Bidder to note that the cl. 4.02.01, SS-A-02, part-B refers the minimum requirement. Hence, the clause 7.00.00 (1), SS-II-A-01, part-A (Architectural Features for Steam Generator Enclosure) is the governing clause referring the higher height / extension.
1030	SECTION - VI, PART-A	SUB-SECTION-VI CHAPTER -01 SG & AUXILIARIES	9 OF 38	1.08.00 (A)	Coal Burners/ Coal Pipe Bends (for tangential firing) 1. Coal compartment assembly - 2 sets** 5. Coal nozzle castings - 1 set** 6. Adjustable coal nozzle tips - 1 set**	Bidder clarifies that requirement for replacing whole Coal compartment assembly may not arise as operational life of Coal nozzle and adjustable Coal nozzle tips differ. Replacing whole compartment may not be the best practice in terms of effective utilization of spares. Bidder request customer may check the actual spare utilization practice across the industry and to delete the item from the spare list. Bidder proposes to remove S.no. 1 (Coal compartment assembly) from the list of mandatory spares. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1031	SECTION VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	14 OF 28	2.15.10	Rota probe type coal sampling system for obtaining samples from PF outlets of all the mills using the methods specified in ISO 9931 "Coal sampling of pulverized coal conveyed by gases in direct fired coal system". The minimum number of coal sampling systems to be provided for two steam generator shall be equal to at least the number of PF pipe outlets	Bidder proposes to use proven ASME PTC 4.2 Coal sampling system in place of system as per ISO 9931/ IS 16617 as ISO / IS systems were not functioning satisfactorily in all of bidder's previous projects in which ISO/IS sampling were supplied. Customer is requested to confirm acceptance.	Specific constraints as experienced by the bidder are not clear. The specified system is being used at projects/stations. Further, bidder to utilize improved version of associated equipments/items (like probes, nozzles etc.) & process for the specified sampling in line with the specified code/standard.
1032	SECTION - VI, PART-B	SUB SECTION-A-02	25 OF 66	10.05.18	For pulverized coal sampling for fineness and distribution: (a) Provide tapping points on each PF pipe at pulverizer outlet suitable for coal sampling as per IS 16617: 2018. (b) Ensure that the coal sampling provisions are complete with screwed plugs, compressed air purging connections at tapping points, heating arrangement and other requirements as required for IS 16617: 2018 sampling. (c) Provide (1) Rota Probe for coal sampling as per IS 16617: 2018 and ASME respectively. (2) Dirty Pitot tubes per Steam Generator, suitable for measurement of coal velocity in coal pipes. (d) Provide convenient approach/access for above coal sampling/measurement points, from nearest platform floor.	Bidder proposes to use proven ASME PTC 4.2 Coal sampling system in place of system as per ISO 9931/ IS 16617 as ISO / IS systems were not functioning satisfactorily in all of bidder's previous projects in which ISO/IS sampling were supplied. Customer is requested to confirm acceptance.	Bidder's reference to the code/standard (ISO 9931) in the query as against the code/standard in the specified clause is not clear.
1033	SECTION - VI, PART-B	SUB SECTION-A-02	35 OF 66	11.05.03(f)	Type of valves (for oil services) - Plug type (metallic seated), leak proof, fire safe as per the requirement of API 6FA	Bidder proposes to provide fire safe soft seated ball valves for the fuel oil application as per bidders proven practice. Kindly confirm acceptance.	Fire safe valves are already specified. Further, specific details shall be discussed during detail engineering in line with the specifications requirements.
1034	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	13 of 28	2.15.03 (b)	Oil supply line for input shaft bearing should be taken from side/top of the common line, having a collection chamber at the bottom side to trap debris if any.	Bidder proposes that the design of Gear box supplier shall be as per their standard practice and will be followed for collection chamber. Kindly confirm acceptance.	The detailed aspects shall be reviewed based on the selected mill specific design/scheme. Bidder to comply the specifications requirements.
1035	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	14 of 101	1.05.08.03 (a)	The YGP index for the specified coal is indicated in Project Information, Subsection-I-B, Part-A, Section-VI of Technical specification when measured as per BS Standard BS-1016 Part:111. The Bidder shall furnish a curve alongwith his offer indicating the variation in guaranteed wear life with variation in YGP index of coal fired. Separate curves for different wear elements of mill shall be furnished e.g. for grinding rolls, grinding rings, clearly indicating its relationship with YGP index of coal. The curve shall be subject to Employer's approval.	Bidder would like to clarify that separate curves for Roller liners & Table liners indicating its relationship with YGP index of coal will be furnished. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1036	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	23 of 66	10.05.01 (A) (a)	Further the classifier vanes (if applicable) shall be lined with approved wear resistant material to ensure the guaranteed wear life.	Bidder requests customer to accept that wear resistant material for Classifier Vanes shall be as per Bidder's Design to satisfy guaranteed wear life. Kindly confirm acceptance.	The detailed design aspects shall be reviewed based on the selected mill specific design in line with specifications. Bidder to comply with the specification requirements.

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1037	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	26 of 66	10.05.28	Adequate numbers of hinged access doors/windows with access ladders shall be provided to facilitate access to various parts of pulverizer. The access doors shall be suitable for on load inspection and maintenance of pulverizer.	Bidder understands "On load" means "Mill under running condition". In this condition inspection & maintenance of Pulveriser is not feasible because mill is working under pressure. Customer is requested to modify the requirement accordingly.	The requirement is functional towards inspection & maintenance. Specific construction/access details shall be provided by the bidder during detail engineering based on the offered mill type.
1038	SECTION – VI, PART-A	SUB-SECTION-VI CHAPTER -01 SG & AUXILIARIES	19 of 38	1.22.02	Mandatory Spare FGD - Gates in Flue Gas System of Air Flue gas path of Boiler including FGD: 1. Seals ----- 2. Actuator-----	Bidder understands this clause is applicable for FGD gates only and not applicable for Boiler Gates. Kindly confirm that our understanding is correct.	Specification requirement is clear & bidder to comply the same.
1039	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	2 OF 15	1.08.00	The designed fault level for various voltage levels shall have the following minimum values: 11 KV systems - 50 KA rms for 1 second 3.3 KV systems - 40 KA rms for 1 second 415 V systems - 50 KA rms for 1 second	Customer is requested to note that the fault level of following voltage level is not defined. Hence same shall be: - 11240V AC - 9KA (RMS) for 1 Sec. 2120V AC UPS: - As per OEM & Customer approval 3324V DC - As per OEM & Customer approval Kindly confirm acceptance.	Bidder's proposal is acceptable.
1040	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	8 OF 15	3.06.00	Power factor of 415 V bidirectional drive loads is taken as 0.65 and efficiency as 0.8 for motor rating less than 15 kW.	Bidder would like to clarify that S1 duty motor efficiency shall be considered as per IS:12615 Premium Efficiency class-IE3 for sizing of LT Boards. Kindly confirm acceptance.	Efficiency shall be considered as follows: upto 50KW = IE4 50KW - 200 KW = IE3. Power factor shall be considered as per technical specifications.
1041	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	8 OF 15	3.06.00	For motor ratings of 15 kW and above the corresponding values are 0.75 and 0.8	Bidder would like to clarify that S1 duty motor efficiency shall be considered as per IS:12615 Premium Efficiency class-IE3 for sizing of LT Boards. Kindly confirm acceptance.	Efficiency shall be considered as follows: upto 50KW = IE4 50KW - 200 KW = IE3. Power factor shall be considered as per technical specifications.
1042	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	9 OF 15	3.06.00	Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5mm2, 14CX1.5 mm2	Bidder would like to clarify that Standard Control Cables of 19CX1.5Sgmm also may please be accepted on case to case requirement. Kindly confirm acceptance.	Bidder's proposal may be considered on case to case basis only as per the requirement during the detailed engineering.
1043	SECTION – VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	9 OF 15	3.06.00	At least one spare core shall be made available in each of the control cable	No. of spare cores in control cable shall be provided as per SECTION-VI, PART-B, SUB-SECTION-B-10 CABLING, EARTHING & LIGHTNING PROTECTION, Page No. - 10 of 22, Clause No.- 4.04.15 of project specification. Kindly confirm acceptance. 	Bidder shall follow Clause no. 4.04.15 of Subsection B-10 Cabling, Earthing and Lightning Protection.
1044	SECTION – VI, PART-B	SUB-SECTION II-B-03 VFD	5 OF 11	11.03.00	Air cooled VFDs shall be provided with cooling fans mounted integral to the VFD/ enclosure. The VFD shall include air-flow pressure switches and temperature detectors to monitor proper operation of the air cooling system. If the fan fails, the system must generate the alarm/trip for the fan failure.	1.We understand that there is no requirements of redundant fan (2x100%) for panel enclosure. 2.No. of fan, Air Flow Pressure Switches and other accessories shall be provided as per OEM design and system requirement. Kindly confirm.	Bidder's proposal may be considered on case to case basis only as per the requirement during the detailed engineering.
1045	SECTION – VI, PART-B	SUB SECTION B-05(B) MV & LV SWGR- PROTECTIONS, CONTROL & METERING	4 of 10	3.03.12	All motor feeders shall have 4-20mA analog output (current signal) for use in control logics in DDCMS or for information in DDCMS	Bidder would like to mention that 4-20mA analog output (current signal) shall be wired to DDCMS only for the Critical drives. Kindly confirm acceptance.	Bidder to refer amendment No. Elec1-05 in this regard.
1046	SECTION – VI, PART-B	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCTS	13 OF 19	7.00.00	The motor feeders shall be provided with Intelligent Motor Controller (IMC) in place of overload relay, in the power circuit. Intelligent Motor Controller (IMC) shall provide protection, metering, control, monitoring and historical logging for 1φ and 3φ AC induction motor using integral current transformers (CTs) or external CTs and line-line voltages (415V).	Bidder would like to clarify that for Electric Crane/Hoist, without VFD operation motors, the motor feeder inside hoist/crane control panel shall be without Intelligent Motor Controller (IMC). Kindly confirm acceptance.	Bidder's understanding is correct.
1047	SECTION – VI, PART-B	SUB-SECTION-B-15 ELECTRICAL HOIST, CRANE AND ELEVATOR	3 of 5	8.00.00	Motors shall conform to latest revision of IS 325, IS 3177 and motor subsection of this specification.	Please note IS.325 has been withdrawn & replaced by IS12615:2018. Hence motor shall be as per latest engineering standard/Codes IS 12615/IEC:60034. Kindly confirm.	Bidder's understanding is correct.
1048	SECTION – VI, PART-B	SUB-SECTION-B-15 ELECTRICAL HOIST, CRANE AND ELEVATOR	4 of 5	7.06.0 (b)	Limit voltage drop at motor terminals within 2% at extreme positions.	The voltage drop at motor terminal during motor starting condition, shall be limited to 10% and during full load running condition, shall be limited to 3% of the rated voltage as per SUB-SECTION-B-08 HT LT AND CONTROL CABLES, Clause No. - 3.00.01 (b) for Steam Generator (Boiler) area applications (Mill bay crane, SG Elevator, etc.). Kindly confirm acceptance.	Maximum 2% Voltage drop in DSL and overall drop of maximum 3% from switchgear for Hoists, Electric cranes and Elevators only.
1049	SECTION – VI, PART-B	SUB-SECTION-B-15 ELECTRICAL HOIST, CRANE AND ELEVATOR	5 of 5	7.06.0 (C)	Power Supply 	Bidder would like to clarify that control transformers (Rating & Qty.) in Elevator EOT/Hoist system shall be as per OEM proven design (Customer's approved vendor). Kindly confirm acceptance.	Bidder's proposal may be considered on case to case basis only as per the requirement during the detailed engineering.
1050	SECTION – VI, PART-A	II-B ELECTRICAL SYSTEM EQUIPMENT	20 OF 20	1.24.00	415 V/690 V LV VFD: The Variable frequency drive (VFD) system shall be of a modern proven design for similar applications in power plants/industry. The system shall be either Current Source Inverter (CSI) or Voltage Source Inverter (VSI) type with minimum Twelve (12) pulse design.	From SECTION – VI, PART-B, SUB-SECTION II-B-03 VFD, point number 5.02.00, we understand that VFD with Six (6) pulse design is acceptable. Hence The Mill Rotary Separator (MRS) VFD may be a 132kW drive with Six (6) pulse design. Kindly confirm acceptance.	Bidder's Proposal is not acceptable. Bidder must adhere to the technical specifications only.
1051	SECTION – VI, PART-B	II-B-02 MOTORS	1 of 4	3.01.00	b) Continuous duty LT motors upto 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC-60034-30.	Mill Rotary Separator (MRS) motor of Pulveriser is a 10Pole motor and standard defines efficiency class for motors upto 8pole. Therefore Efficiency class of MRS motor of Pulveriser will be as per manufacturers standard. Kindly confirm acceptance.	Bidder's proposal may be considered on case to case basis only as per the requirement during the detailed engineering.
1052	SECTION-VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	3 of 28	2.06.00	Start-up Recirculation & Drain system Double isolation (one motorised and one manual) valve at the suction and Motorised isolation. Electrohydraulic operated control valve and a non return valve on the discharge of the pump. Alternatively, Electrohydraulic operated control valve and a motor operated stop cum check valve is also acceptable	Bidder clarifies that type of actuator for control valve will be based on actuator thrust requirement as per process conditions. Customer is requested to confirm acceptance.	Specification requirement is clear & bidder to comply the same. Further, details shall be discussed with the bidder during detail engineering inline with specification requirements.
1053	SECTION-VI, PART-B	SUB-SECTION-IIIC-08	3 of 5	5.00.00	All control valves shall be furnished with pneumatic actuators except for pressure and temperature control valve for auxiliary PRDS application (electro-hydraulic / pneumatically operated) and separator drain control valve (electro-hydraulic type).The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements.	Bidder clarifies that type of actuator for control valve will be based on actuator thrust requirement as per process conditions. Customer is requested to confirm acceptance.	Bidder's proposal not acceptable. Bidder to comply with the specification requirements.
1054	SECTION-VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	9 of 28	2.13.01	ID fan At least two(2) nos. of duplex thermocouples or duplex platinum RTDs (100 ohm at 0oC)and one no. of temperature indicators shall be provided for bearing metal temperature measurement, control and monitoring.	Bidder will provide three RTD as per space availability and protection interlock requirement. Customer is requested to confirm acceptance.	Specification requirement mentioned in referred clause is clear. However, three (03) nos. of duplex thermocouples or duplex platinum RTDs (100 ohm at 0oC) for bearing metal temperature measurement, control and monitoring are also acceptable.
1055	SECTION-VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	13 of 28	2.15.04	PA Fan At least two(2) nos. of duplex thermocouples or duplex platinum RTDs (100 Ohm at 0 Deg. C) and one no. of temperature indicators shall be provided for bearing metal temperature measurement, control and monitoring.	Bidder will provide three RTD as per space availability and protection interlock requirement. Customer is requested to confirm acceptance.	Specification requirement mentioned in referred clause is clear. However, three (03) nos. of duplex thermocouples or duplex platinum RTDs (100 ohm at 0oC) for bearing metal temperature measurement, control and monitoring are also acceptable.
1056	SECTION-VI, PART-A	Annexure C to IIC Contract quantity	3 of 24	2.01.01	NOx system block: This block will consist of control of NH3 unloading, storage and Dosing system, Control and Monitoring of Selective Catalytic Converter (SCR) and associated soot blowing system, etc	Bidder would like to clarify that SCR unit control will be part of unit DDCMS and Ammonia storage handling system will be part of common DDCMS. Kindly confirm acceptance.	Bidder's proposal noted.
1057	SECTION – VI, PART-B	SUB-SECTION-IIIC-01 BASIC DESIGN CRITERIA	1 of 6	4.00.00	Bidder shall ensure that various C&I instruments /equipment like vibration monitoring system,4-20mA electronic transmitters/transducers, Temperature elements and other instruments/local devices etc. that are being furnished by the Bidder, are of the same make, series and family of hardware to the extent possible so as to ensure smooth and optimal maintenance, easy interchangeability and efficient spare parts management	Bidder would like to clarify that Model, series, make of various C&I instruments /equipment like vibration monitoring system, 4-20mA electronic transmitters / transducers, Temperature elements and other instruments/ local devices etc will not be same as manufacturers are totally different. Kindly confirm acceptance.	In the referred clause specification requirement is clear. Bidder to comply with the technical specification requirements.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1058	SECTION – VI, PART-B	SUB-SECTION-III-C-02 DDCMIS	3 of 17	13.00.00	Analog Signal Conditioning & Processing	Bidder would like to clarify that IO modules supplied will be as per OEM proven design of DDCMIS vendors approved by Customer. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1059	SECTION – VI, PART-B	SUB-SECTION-III-C-02 DDCMIS	3 of 17	14.00.00	Binary Signal Conditioning & Processing	Bidder would like to clarify that IO modules supplied will be as per OEM proven design of DDCMIS vendors approved by Customer. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1060	SECTION – VI, PART-B	SUB-SECTION - IIIC-02 DDCMIS ANNEUXURE IIIC-02C	1 of 6	1.01.01	The Servers/Workstations/PC Stations/Laptop to be provided by the Contractor should be latest available in the market, with maximum possible configuration of memory & storage and 4K resolution graphics capability for the offered make and model at the time of supply to prevent early obsolescence and shall be subject to Employer's approval. The software packages including OS, Application software as per functional requirement and Anti-Virus Software with IPS# to be included with the Servers/Workstations/PC Stations/Laptops shall also be the latest version available at the time of supply. Additional softwares viz. Latest MS OFFICE professional (for PC stations), Microsoft Visual Studio (only for Programmer PC), Adobe Acrobat professional (for PC stations) shall also be the latest version available at the time of supply.	Customer is requested to note that hardware specification of workstation will be selected by DCS OEM as per HMI software requirement. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1061	SECTION – VI, PART-B	SUB-SECTION-III-C-05	2 of 6	9.00.00	Diagnostics & Indication Channel Level Diagnostics (with reverse polarity, wire break, short circuit & optical / galvanic isolation) for DI / DO, AI & AO shall be provided. Each Individual Channel healthiness shall be monitored at workstation / OUI level. 2. Individual signal status of each Input / Output, power supply status shall be indicated on the module faceplates.	Bidder would like to clarify that IO modules supplied will be as per OEM proven design of DDCMIS vendors approved by Customer. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1062	SECTION – VI, PART-B	SUB-SECTION - IIIC-02 DDCMIS ANNEUXURE IIIC-02D	4 of 4	9.03.00	The measurement system of control system should be capable of acquiring data from various equipment & system in digital form through serial port, field bus / profibus, Ethernet connection using industry standard protocols. The control system shall include requisite modules for accepting such signals. Examples of such signals will be from remote I/O signals (through extended I/O bus, field bus/profibus type temperature transmitters, fault/diagnostic signals from vibration monitoring system, UPS/DC system etc. Requirement of such ports is indicated at Part-A	Bidder proposes Field bus/profibus for field instruments in DDCMIS /BMS except for Boiler protection system where protection signals shall be hardwired. Kindly confirm acceptance.	Bidder understanding is not correct. Refer clause no 1.06.00 Part -A/IIIC scope & supply.
1063	SECTION – VI, PART-B	SUB SECTION-A-02	29 OF 66	10.08.03	PA flow measuring devices shall be provided at air inlet to each pulveriser as well as at the suction of each fan. PA Fan inlet flow measurement shall be provided using fan inlet elbow. However, if such an arrangement is not possible, flow element (venture/areofol) shall be provided with three pair of tapping points at suction of each PA Fan.	Bidder would like to clarify that PA Fan inlet flow measurement shall be provided using fan inlet elbow. Since the measurement is only for monitoring and not used for any Control, single instrument scheme is considered. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1064	SECTION – VI, PART-B	SUB SECTION-A-02	37 OF 66	12.09.00	Fan inlet flow measurement shall be provided using fan inlet elbow. However, if such an arrangement is not possible, flow element (venture/areofol) shall be provided with three pairs of tapping points at suction of each FD fan.	Bidder would like to clarify that FD Fan inlet flow measurement shall be provided using fan inlet elbow. Since the measurement is only for monitoring and not used for any Control, single instrument scheme is considered. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1065	SECTION – VI, PART-E	Drwg No 9587-001-POM-A-018a & 9587-001-POM-A-018b			Scheme for air and flue gas path. Aerofoll is indicated at combustion air flow	Bidder have considered the flow measurement as per bidder standard practice as follows: 1. Mill inlet air flow is as per bidder proven practice based on slant orifice flow measurement. This proven OEM design has been successfully executed in Power projects in India and accepted by various customers. 2. FD/ID/PA fans inlet flow based on Pressure measuring Annular pipes at inlet box opening and inlet cone. Kindly confirm acceptance.	Bidder's proposal is acceptable.
1066	SECTION – VI, PART-E	Drwg No 9587-001-POM-A-020			Scheme for pulveriser - Venturi is indicated at Pulveriser inlet air flow	Bidder have considered the flow measurement as per bidder standard practice as follows: 1. Mill inlet air flow is as per bidder proven practice based on slant orifice flow measurement. This proven OEM design has been successfully executed in Power projects in India and accepted by various customers. 2. FD/ID/PA fans inlet flow based on Pressure measuring Annular pipes at inlet box opening and inlet cone. Kindly confirm acceptance.	Bidder's proposal is acceptable.
1067	SECTION – VI, PART-B	SUB SECTION-A-02	9 OF 66	3.09.00	Suitable temperature monitoring system consisting of 80 nos. of thermocouples should be provided for Bottom hopper, Pent House, Economizer, SCR hoppers, APH hopper etc. The exact location and number of thermocouples shall be finalized during contract stage. However, Bidder shall furnish unit rates for addition/deletion of the thermocouples with respect to the numbers mentioned above	Bidder has no experience for this system and find no utility in providing temperature measurements at Bottom hopper, Penthouse, Economizer, SCR hoppers, APH hopper etc., hence bidder does not envisaged the same in scope. Kindly confirm acceptance.	Specification requirement is clear & bidder to comply the same.
1068	SECTION – VI, PART-B	ANNEUXURE-SS1 SELECTIVE CATALYTIC REDUCTION	22 OF 22	18.00.00	For measurement of ammonia concentration in the flue gas at the outlet of the SCR reactor, In-situ type laser based or extraction type ammonia gas analyser shall be provided. Analyser type shall be proven for the required conditions such as duct size and ash concentration for this project.	Bidder would like to clarify that extractive type shall also be considered for ammonia gas analyser as per OEM proven system which is available in the market. Customer is requested to accept our request.	Specification requirement is clear. & bidder to comply the same. Further, details shall be discussed with the bidder during detail engineering inline with specification requirements based on the system offered.
1069	SECTION – VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	6 OF 66	3.02.01	As a part of the static stability, interalia, the outlet temperature profile for each tube at the intermediate header inlet (if applicable) and vertical wall outlet header be calculated. The variance of tube outlet temperature shall be validated by carrying out site demonstration for the first boiler during commissioning by affixing metal temperature thermocouples at each evaporator outlet tube (at intermediate header inlet, if applicable, and vertical wall outlet). These thermocouples shall be over and above the requirements for meta temperature thermocouples specified elsewhere. In case the temperature variance in the evaporator tubing temperature during such demonstration is found to exceed the design considerations necessary modifications to the evaporator flow circuits shall be done by the contractor to control the tube temperatures.	Metal Temperature Thermocouples on each tube of Water Wall at top & bottom of Intermediate Header, on 1ry, 2ry, 3ry SH Headers, 1ry/2ry RH Headers etc form a huge number of Thermocouples, difficult to route/ manage at site and are not required for any monitoring, control or protection purposes, hence Bidder requests Customer to exclude these MTTC from the scope of supply. Bidder will consider metal thermocouples similar previous projects done for Customer.	Specification requirement is clear & bidder to comply the same.
1070	SECTION – VI, PART-B	SUB-SECTION-III-C-04	8 OF 36	3.06.00	Composite Accuracy shall be as follows : RTD =>±0.25% of 0-250 deg C span, TIC /K-type =>±0.2 % of 0-600 deg C span, CJA accuracy (for TIC) shall be ± 1 deg C.	Bidder would like to clarify that the accuracy is subject to market availability. Hence the same will be provided as per OEM practice. Customer is requested to confirm.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1071	SECTION – VI, PART-B	SUB-SECTION-III-C-04	15 OF 36	7.00.00	Microprocessor based vibration monitoring system shall be provided for fan/pumps/motors etc. qty. of which shall be as indicated Part-A.	Bidder would like to clarify that vibration monitoring is not applicable for Boiler circulation pump due to following reason Bidder would like to clarify that BCP and motor is an integrated unit installed in hanged pipe support. The vibration of pump motor unit will be absorbed by the connecting pipe unit as it is suspended from the boiler recirculation pipe work. Hence vibration measurement for BCP is not considered. Kindly confirm acceptance.	Refer clause k, Annexure C to IIC Contract quantity part-A.
1072	SECTION – VI, PART-B	SUB-SECTION-III-C-06	1 OF 2	1.01.00	All electric actuators, pneumatic control valves, Junction Boxes, Solenoid boxes and Local control panels which are not installed inside building, suitable canopy shall be provided and design of canopy shall be approved by Employer during detailed engineering	All electric actuators, pneumatic control valves, Junction Boxes, Solenoid boxes and Local control panels are selected suitable for outdoor application. Further canopy for such frequently accessed devices will consume free maintenance space, hinder access & inhibit proper maintenance. Hence no canopy is envisaged. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1073	SECTION – VI, PART-B	SUB SECTION-A-02	8 OF 66	3.07.00	Provide stainless steel expansion markers/indicator on all the four furnace walls to monitor thermal expansion. Predicted thermal expansion at different levels to be indicated. In addition to local indicators, measurement system (4-20mA Output) for remote indication shall also be provided on all the four furnace walls.	Bidder has no experience of providing thermal expansion measurement system with 4 - 20mA. Hence not considered in the scope of Bidder. If still required, employer is requested to furnish detail specification of the Instrument required for the application. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1074	SECTION – VI, PART-B	SUB SECTION-A-02	48 OF 66	15.14.00	All soot blowers shall be suitable for local and remote automatic sequential operation	Local Operation of Soot Blower shall be manually through inbuilt LP6S provided with each Soot Blower. Automatic sequential operation is not envisaged locally. Please confirm bidder understanding is correct.	Bidder's understanding is correct.
1075	SECTION – VI, PART-B	SUB-SECTION-III-C-04	5 OF 36	3.01.00	MEASURING INSTRUMENTS(PRIMARY & SECONDARY) Thermocouple- No. of element- Duplex	We would like to provide 2 nos Simplex type temperature elements for application where duplex Temperature Element cannot be provided. Customer is requested to confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1076	SECTION – VI, PART-B	SUB-SECTION-III-C-04	5 OF 36	3.02.00	Resistance Temperature Detector (RTD)- No. of element- Duplex	We would like to provide 2 nos Simplex type temperature elements for application where duplex Temperature Element cannot be provided. Customer is requested to confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1077	SECTION – VI, PART-B	SUB-SECTION-III-C-04	5 OF 36	3.01.00	MEASURING INSTRUMENTS(PRIMARY & SECONDARY) Thermocouple-	Thermocouple of FEGT is integral to the equipment and is selected as per OEM requirement complying ANSI MC 96.1 standard. It cannot be supplied complying conventional Thermocouple specification. Customer is requested to confirm acceptance.	Bidder's proposal is acceptable.
1078	SECTION – VI, PART-B	SUB-SECTION-III-C-04	6 OF 36	3.03.00	Metal Temperature Thermocouples Thermocouple wire gauge: 18 AWG Protective sheath: SS 321 Protective sheath dia: 8 mm OD Mounting accessories: 1/2" BSP SS sliding end connector, weld pad, clamps of heat resistant steel SS310.	Metal Temperature Thermocouples wire gauge, protective sheath material, sheath dia, mounting accessories / material etc. shall be suitably selected by Bidder as per process conditions and to suit easy installation and maintenance. Customer is requested to confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1079	SECTION – VI, PART-B	SUB-SECTION-III-C-04	7 OF 36	3.03.00	For furnace zone, impervious ceramic protecting tube of suitable material along with Incoloy supporting tubes and adjustable flanges.	Since protecting tube with impervious ceramic material is prone to damage therefore, bidder proposes to consider fully protecting tube with fully inconel material. Customer is requested to confirm acceptance.	Bidder's proposal is noted. However, Bidder to provide detail document during detail engineering for Employer's approval.
1080	SECTION – VI, PART-B	SUB-SECTION-III-C-04	24 OF 36	13.02.00	Flow Nozzle Beta Ratio: Around 0.7	Flow Nozzle Beta Ratio will be considered between 0.4 - 0.7, meeting the process limitations. Customer is requested to confirm acceptance.	Bidder's proposal is noted. Same shall be discussed and finalised during detail engineering.
1081	SECTION – VI, PART-B	SUB-SECTION - IIIC-02	4 OF 5	1.11.01	All IMC modules in LV SWGR/ MCC are to be interfaced with DDCMIS through Profibus DP protocol.	This clause conflicts with clause no. 3.03.12 of SECTION-VI, PART-B SUB SECTION B-05(B) Pg 4 of 10 stating "All motor feeders shall have 4-20mA analog output (current signal) for use in control logics in DDCMIS or for information in DDCMIS". Bidder will follow IMCC connectivity with DDCMIS as per SECTION – VI, PART-B, SUB-SECTION - IIIC-02, clause 1.11.01. Please confirm.	Bidder to refer amendment No. Elec1-05 regarding current signal. Regarding IMCC connectivity with DDCMIS, bidder to follow technical specifications.


EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1082	SECTION – VI, PART-B	SUB-SECTION-III-C-04	7 OF 36	3.06.00	Transmitter shall be HART/Fieldbus (Profibus PA/Foundation Fieldbus complying to IEC 61158) compatible, have EMC compatibility as per EN 61326.	Bidder will consider Profibus / Foundation Field Bus Compatible temperature transmitters for metal thermocouple except for temp transmitter used for MFT. Customer is requested to confirm acceptance.	Bidder's understanding is correct.
1083	SECTION – VI, PART-B	SUB SECTION- G-03 LAYOUT PHYSIOLOGY	2 of 14	1.01.03	Control Rooms / Control Equipment Rooms/ RIO rooms shall be air-conditioned. Batteries for power supply systems as required shall be placed in separate ventilated Battery rooms	Bidder would like to clarify that air conditioned rooms will be provided subject to feasibility. As an alternate, Bidder will consider air conditioned panels for the same. Customer is requested to confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1084	SECTION – VI, PART-E	Drawing No XXXX-999-POM-AA-004			Scheme for main steam, Hot reheat & Cold reheat steam	The conductivity type level switch is shown for drip leg in main steam. No specification requirements mentioned for conductivity type level switch in tender. Customer is requested to clarify the same.	Bidder to provide as per their standard proven practice .
1085	SECTION – VI, PART-B	SUB-SECTION-III-C-02 DDCMIS	17 of 17	31.00.00	Remote service centre- Method of connection is as below The method of connection shall be as per Bidder's standard practice with Two-Factor Authentication (2FA). Virtual Private Networks (VPN) technology shall be used for data integrity and confidentiality. The type of VPN (SSL, IP Sec, SSL), no. of bits for encryption etc, shall be decided during detailed engineering. Further, this access shall be strictly under request control & record of such access shall be made available to the Employer's designated personnel. Also, it should be ensured that the hardware at the other end of the Remote access connection (i.e. at the contractor's works) shall be standalone/isolated (i.e. not connected to any network). However, it is preferred to have the connection through a single point in the plant's DDCMIS system. The fixed charges & running cost till warranty period shall be included in the Quoted Price. The running cost thereafter shall be included in the AMS price	Bidder would like to clarify that the method of connection will be as per OEM proven practice. Customer is requested to confirm acceptance.	Bidder's proposal is noted. However, details shall be reviewed during detail engineering.
1086	SECTION – VI, PART-A	IIC CONTROL & INSTRUMENTATION SYSTEM	667/1012	1.06.02	For open loop control of complete main plant and offsite areas fieldbus-based control system, fieldbus based actuators, Profibus DP based IMC LV SWGRMCC and fieldbus based PT/DPT/TT shall be provided excluding applications given in Note-A.	It is understood that the PT/DPT/TT shall be of Fieldbus type. If the level transmitter used is Ultrasonic type or Radar type, it will be with HART protocol (4-20mA). Customer is requested to clarify.	Bidder's understanding is correct.
1087	SECTION- VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	36 of 91	1.05.21.01	4. Gas flow (M3/sec) at Design point - To be worked out by Bidder when firing the specified worst coal at VWO load, considering 20% excess air at economizer outlet.	Bidder understand that Flue Gas flow at design point condition to be worked out considering the firing of coal as per Sr. no. 2 of above at VWO Load. Please confirm.	Bidder's understanding is correct.
1088	SECTION – VI, PART-A SECTION-VI, PART-B	SUB-SECTION-III-A-04 SUB-SECTION-A-05	520 of 1012 563 of 1046	4.01.04 3.03.04	Motorized isolation gates at Absorber gas inlet, Absorber gas outlet and FGD bypass in the main duct to Chimney along with 2x100 seal air fans for each gate and 2x100 heaters for absorber outlet gate & bypass gate. A bi-plane bypass damper along with 2x100 seal air & 2x100 heaters shall also be provided in the bypass duct. The blade and other components in the gas path, of the bypass damper and gate at Absorber outlet shall be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm or better material. The seals shall be made of Alloy C-276 or better material.	Since the MOC of the dampers (Indicated in CL.No:3.03.04 / Section-VI / Part-B / Sub-Section-A05 / Pg 563 of 1046) at the Absorber outlet and By-pass duct are suitable for corrosion resistant, bidder is not envisaging any heaters in seal air for the same. Kindly confirm.	Bidder to comply with the specification requirements.
1089	SECTION – VI, PART-A SECTION-VI, PART-B SECTION-VI, PART-B	SUB-SECTION-III-A-04 SUB-SECTION-A-05 SUB-SECTION-A-05	520 of 1012 562 of 1046 562 of 1046	4.01.04 3.03.01 3.03.02	Motorized isolation gates at Absorber gas inlet, Absorber gas outlet and FGD bypass in the main duct to Chimney along with 2x100 seal air fans for each gate and 2x100 heaters for absorber outlet gate & bypass gate. A bi-plane bypass damper along with 2x100 seal air & 2x100 heaters shall also be provided in the bypass duct. For this purpose, Motorized Guillotine type gates shall be provided at (i) hot gas inlet to Absorber (in case booster fan is not provided by the bidder)and (ii) cold gas outlet from Absorber. Quick opening Bi-plane motorized/pneumatic damper along with 2x100% seal air fans & 2x100 electrical heaters shall also be provided in the by-pass duct.	Kindly note, there is a discrepancy in the clauses regarding the dampers to be provided in the bypass duct. Bidder shall provide only quick opening Bi-plane pneumatic damper as per clause no. 3.03.02 / SECTION-VI, PART-B / SUB-SECTION-A-05 / PAGE 5 OF 26 and motorized isolation gates at bypass is not considered. Please confirm.	Bidder to refer amendment No. SG1 in this regard.
1090	SECTION – VI, PART-A SECTION-VI, PART-B SECTION-VI, PART-B SECTION-VI, PART-B	SUB-SECTION-III-A-04	522 of 1012 573 of 1046 576 of 1046 579 of 1046	7.05.00 7.07.06 10.01.00 13.05.00	All the storage tanks shall be lined with vinyl ester based flake glass lining from inside. The Waste water collection tank shall be of Steel construction with rubber lining Wastewater tank, Filtrate tank, Secondary hydro cyclone feed tank: Vinyl Ester based flakeglass lining/ Polymeric Epoxy of minimum 3 mm thickness Slurry tanks: Replaceable Chlorobutyl/Bromobutyl rubber lining of minimum 5 mm thickness The outside surface of the tanks shall be coated with paint as approved by the Employer. Interior surface of the tanks shall lined with replaceable chlorobutyl/bromobutyl rubber lining of minimum 4 mm thickness or with vinyl ester based flake glass lining of minimum 3 mm thickness or Epoxy lining minimum three coats of 150 micron thickness and the outside surface shall be coated with paint as approved by the Employer.	Kindly note there is discrepancy regarding the lining on internal surface of the tanks. Bidder understands that slurry storage tanks shall be lined internally as per the clause no. 10.01.00/SECTION-VI, PART-B(pgs. 576 of 1046 and Water storage tanks shall be as per the clause no. 13.05.00 / SECTION-VI, PART-B / Pg. 579 of 1046. Please confirm.	Bidder to refer the respective clauses for the corresponding type of tank for the lining. Specifications are clear and bidder to comply with the specification requirements.
1091	SECTION-VI, PART-B	SUB-SECTION-A-05	558 of 1046	1.01.00	The flue gas temperature may approach the economiser outlet temperature of about 300°C in case the regenerative air preheaters fails to operate. The Contractor shall take this aspect into account while designing the Flue Gas Desulphurisation (FGD) System.	Since the absorber is preceded by emergency cooling system, we don't envisage mentioned excursion temperature at absorber, downstream part and outlet duct. Hence, excursion temperature is applicable only for duct before absorber. Further, the excursion temperature at inlet duct of absorber (i.e from tapping point to absorber inlet) of 300°C is considered for 15 mins. only. Please confirm.	Bidder to comply with the specification requirements.
1092	SECTION-VI, PART-B	SUB-SECTION-A-05	558 of 1046	1.02.00	The Steam Generators which are designed to burn pulverised coal will use LDO during startup and at low loads for warm up and flame stabilization. Further, the frequency and duration for startup and low loads operation may be quite high during the first year of unit commissioning and operation. The Steam Generator has been designed for cyclochw shift operation. The Contractor, shall take into account the entire characteristics of expected combination of fuels to be fired and the expected numbers of Steam Generator start-ups while designing the FGD system.	Bidder understands that the FGD system shall be designed for various types and combination of coal as mentioned in tender.	Specifications requirements are clear. Bidder to comply with the specifications requirements.
1093	SECTION-VI, PART-B	SUB-SECTION-A-05	562 of 1046	3.02.04	The duct from Absorber outlet to bypass duct & duct after by pass damper/gate to chimney inlet shall be made of clad sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over 7 mm thick (minimum) mild steel base metal.	As per bidder's Collaborator's proven practise, the duct from Absorber outlet to wet stack shall be made of Carbon steel of minimum 6 mm thickness with flake glass lining of minimum 2 mm thickness. Please confirm.	Bidder to comply with the specification requirements.
1094	SECTION-VI, PART-B	SUB-SECTION-A-05	559 of 1046	1.03.09	Draining and flushing for the items in contact with limestone/gypsum slurry (pipes, tanks, pumps etc.) which are required even during short time outages or an emergency shutdown shall be started automatically and by remote control from the Control Room.	As per bidder's standard practice, only critical items in contact with limestone/gypsum slurry shall be provided automatic draining and flushing arrangement.	Avoiding deposition of slurry & its flushing is an important aspect for the FGD system smooth O&M. Specifications requirements are clear and bidder to comply with the specification requirements
1095	SECTION – VI, PART-B	SUB SECTION-A-02	564 of 1046	5.01.00	The slurry recirculation pumps shall have a minimum margin of 10% of flow and head, over the actual requirement for meeting the guarantee and design point conditions. All slurry recirculation pumps including motors shall be of the same size and type.	To avoid unnecessary over design and inefficiency of recirculation pump, bidder shall consider 10% margin on frictional head instead of total head. Bidder request owner to please accept and confirm.	Specifications requirements are clear and bidder to comply with the specification requirements.
1096	SECTION-VI, PART-B	SUB-SECTION-A-05	565 of 1046	5.03.02	Head For spray tower process actual requirement considering choking/ blockage of minimum 10% of the oxidation nozzles / sprayers or minimum 8500 mmwc whichever is higher. Margin on Head: 10% margin on the higher value of above conditions.	In case of Spray tower, head shall be selected considering 10% on actual head or min. 8500mmwc whichever is higher. Please accept and confirm the same.	Specifications requirements are clear and bidder to comply the specifications requirements. Further, Bidder to refer amendment No. SG1 regarding the margin description.
1097	SECTION-VI, PART-B	SUB-SECTION-A-05	566 of 1046	5.04.00	Gypsum Bleed Pump: i) Flow : 100% of gypsum produced at Design point condition ii) Head : As per system requirement iii) Margins : a) Flow 15% b) Head 20%	The margin on Flow shall be 10% and on frictional head shall be 15% as per standard design practice. Bidder request owner to accept.	Bidder to comply with the specification requirements.
1098	SECTION-VI, PART-B	SUB-SECTION-A-05	566 of 1046	5.06.02	Homogeneity shall be ensured, if the deviation from average is less than +10%	This requirement is too strict and cannot be met. Homogeneity shall be less than ±30%.	Bidder to comply with the specification requirements.
1099	SECTION-VI, PART-B	SUB-SECTION-A-05	567 of 1046	5.06.06	Three stage chevron type Mist Eliminators (ME) made of polysulfone or stainless steel shall be provided at the exit of the absorber.	In addition to the Material mentioned for ME MOC, bidder request owner to include Polypropylene and FRP as per Bidder's proven practice.	Bidder to comply with the specification requirements.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1100	SECTION-VI, PART-B	SUB-SECTION-A-05	567 of 1046	5.06.06	The headroom shall have a height of more than 2200 mm. The mist eliminator support beams shall be designed to act as maintenance walkways approximately 300 mm wide and shall allow for a minimum 500 Kg/m ² load.	The headroom of 2200 mm mentioned for Mist eliminator is based on Roof type arrangement; However, bidder clarifies that minimum headroom of 1500 mm will be provided (Similar to Spray bank header distance) for flat type Mist eliminator design. The walkway of 300 mm wide mentioned for Mist eliminator is based on Roof type arrangement; However bidder clarifies that there will not be any specific walkway & the complete mist eliminator modules shall be used for handling / walking for flat type Mist eliminator design.	Bidder to note that the access and walkways requirements are critical for smooth O&M purpose. Specifications requirements are clear and bidder to comply the specification requirements.
1101	SECTION-VI, PART-B	SUB-SECTION-A-05	568 of 1046	5.06.11 5.06.13 5.06.15	The complete absorber vessel (absorber oxidation tank, absorber tower & absorber outlet duct upto absorber outlet flange) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thickness) by explosion bonding or hot rolling, having minimum 7 mm thick carbon steel as base material. All internal members shall be lined with minimum 2 mm Alloy 59/ C276. All metallic fasteners which are provided inside the absorber/absorber wet-dry interface ducting shall be of Alloy 59/ C276. The other bridges (supports) shall be lined with minimum 2 mm Alloy 59/ C276.	As per the bidders' collaborator experience and proven practice, the complete absorber vessel shall be made of minimum 7 mm thick carbon steel with 2 mm thick flake glass lining. And also all internal members and other bridges shall be lined with 2mm thick flake glass lining. Please confirm.	Specifications requirements are clear and bidder to comply with the specification requirements.
1102	SECTION-VI, PART-B	SUB-SECTION-A-05	569 of 1046	5.06.23	It should be possible to discharge the absorber sump into the auxiliary absorbent tank within 2 hours.	Please note that time required to empty absorber using gypsum bleed pump and by gravity shall be around 8 to 15 hours. Draining of absorber using a dedicated pumping system is possible between normal slurry level and minimum slurry level within 2 hrs. The balance slurry will be drained to the drain sump by gravity.	Bidder to also refer the cl. 7.08.01, Sub-Section-A-05, part-B for complete clarity on the emptying requirements. Specifications requirements are clear and bidder to comply the specifications requirements.
1103	SECTION-VI, PART-B	SUB-SECTION-A-05	570 of 1046	6.07.01	Limestone Slurry Supply Pumps& Piping w/ Margins Heads: 15% (minimum)	Bidder understands that the 15% margin on head indicated is on friction head only. Please confirm.	Bidder's understanding is not correct.
1104	SECTION-VI, PART-B	SUB-SECTION-A-05	571 of 1046	7.03.01	... The outlet water content in the gypsum shall be as per the requirement of the vacuum belt filters.	Bidder understands that the vacuum belt filter shall be designed as per primary hydro cyclone underflow inlet to VBF maintaining gypsum production and moisture content as per the tender condition. Please confirm bidder's understanding.	Specifications requirements are clear and bidder to comply with the specification requirements.
1105	SECTION-VI, PART-B	SUB-SECTION-A-05	571 of 1046	7.03.03	The complete frame of the filter and all parts in contact with gypsum shall be made of corrosion resistant material or shall be provided with corrosion resistant liners of proven design.	As the frame for vacuum belt filter shall never come in contact with gypsum slurry, hence shall be made of carbon steel painted with corrosion resistant paint. Bidder request owner to please agree and confirm the same.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1106	SECTION-VI, PART-B	SUB-SECTION-A-05	572 of 1046	7.04.10	A 2 m (min.) wide platform shall be provided around each belt filter.	Platform requirement and width of the platform shall be decided during detail engineering based on the OEM's recommendation and Layout arrangement and the same will be subject to customer's approval.	Specifications requirements are clear and bidder to comply with the specification requirements.
1107	SECTION-VI, PART-B	SUB-SECTION-A-05	572 of 1046	7.05.05	The vacuum receiver and pump internals shall be suitably lined to protect against the corrosive environment. The material selected for vacuum pumps & vacuum receivers shall be proven for similar application.	It is not suggested to do the rubber lining on the vacuum receiver/ water separator and pump internals as the liner may fall off after operating for a certain period, which will impact the performance of the pump. The material for casing without liner is acceptable as per our experience and proven practice. Addition to this, we would like to justify that there will be no corrosion since the sealing water is clarified water. Liners were not provided for all our earlier projects of NTPC (Kharagone, Lara, Darlipali and Vinhyachai) and all other state utilities.	Specifications requirements are clear and bidder to comply with the specification requirements.
1108	SECTION-VI, PART-B	SUB-SECTION-A-05	573 of 1046	7.06.03	The pump shall be capable of pumping of filtrate water with solid concentration of not less than 10% & particle lumps of 6-7mm. A 10% margin shall be provided in each of the pump.	Filtrate pumps handling slurry will have a slurry concentration much less than 10%. Also the filtrate pumps handling slurry will never have a particle size of 6-7 mm. Hence this clause is not applicable. Please clarify the requirement.	Specifications requirements are clear and bidder to comply with the specification requirements.
1109	SECTION-VI, PART-B	SUB-SECTION-A-05	573 of 1046	7.07.06	2x100% horizontal centrifugal pumps shall be provided for pumping the waste water from waste water. The material of Casing shall be rubber lined or Hi-chrome steel. The impeller shall be made of Hi-chrome steel. Shaft shall be of stainless steel 410 and shaft sleeve shall be stainless steel.	As shaft shall never come in contact with the medium of flow, hence, the shaft shall be of EN8 instead of stainless steel 410. Please confirm.	Specifications requirements are clear and bidder to comply with the specification requirements.
1110	SECTION-VI, PART-B	SUB-SECTION-A-05	574 of 1046	7.07.10	Bucket conveyors shall be provided by the contractor to feed lime to each of the lime storage silos from ground level. The Bucket conveyors shall be sized to completely feed each lime silo within 2hrs. Adequate storage and feeding system required for feeding the lime to the Bucket conveyors is also in the Contractor's scope	As the stacked lime quantity required for lime dosing is very less, hence bucket elevators are not required. For handling of lime a chain pulley arrangement shall be provided. Please confirm.	Specifications requirements are clear and bidder to comply with the specification requirements.
1111	SECTION-VI, PART-B	SUB-SECTION-A-05	574 of 1046	7.08.03	Agitation shall be provided to prevent settlement of slurry by sufficient no. of Top entry agitators with emergency flush start system.	Kindly note, in case of top mounted agitator, emergency flushing system is not required as the agitator is mounted above the slurry settlement zone. This clause shall be applicable for side entry agitators. Further, for Huge volume of slurry in case of spray type absorber we recommend to go with side entry agitators, request to accept the same.	Bidder to refer amendment No. SG1 in this regard.
1112	SECTION-VI, PART-B	SUB-SECTION-A-05	575 of 1046	8.4.00	All the slurry pumps shall be provided with motorized suction and discharge valves.	Bidder request owner to include the option of pneumatic operated valves for all motor operated valves at suction and discharge of the pumps.	Specifications requirements are clear and bidder to comply with the specification requirements.
1113	SECTION-VI, PART-B	SUB-SECTION-A-05	575 of 1046	8.5.00	In case of pump with rubber lined casing, the casing should be radially split to allow easy removal of impeller.	Bidder understands that even in case of pump with hi chrome casing, the casing shall be radially split. Please confirm.	Kindly refer the complete clause along with experience requirements as specified. Bidder to comply with the specification requirements.
1114	SECTION-VI, PART-B	SUB-SECTION-A-05	578 of 1046	12.01.00	The contractor may provide a recirculation line with motorized isolation valve / restriction orifice made of erosion resistant material for the above purpose.	Bidder request owner to include the option of pneumatic operated valves.	Bidder to comply with the specification requirements.
1115	SECTION - VI, PART-E		46 OF 85	9587-001-POM-A-022	SCHEMD OF FGD - ABSORBER SYSTEM 	As per bidder's collaborator's standard practice, control valve for gypsum bleed pump shall be placed only in the discharge line and not in recirculation line. Please accept and confirm.	Bidder to comply with the specification requirements.
1116	SECTION- VI, PART-B	SUB-SECTION-A-05 (FGD)	21 OF 26	12.02.00	All the pipes handling slurry shall be provided with replaceable rubber lining of proven quality. The Contractor can provide slurry pipes size up to 400 NB made up of FRP material as per ASTM 2310 and testing as per ASTM 82265 (silicon carbide coating on slurry exposed surface) if it has previous experience of providing the same. Outer surface of the pipes should be fire retardant. If it has previous experience of providing the same.	Bidder proposes FRP (with SIC coating inside pipe) as alternative material for all sizes of all slurry service piping, please confirm.	Bidder to comply with the specification requirements.
1117	SECTION- VI, PART-B	SUB-SECTION-A-05 (FGD)	13 OF 26	6.07.03	The limestone slurry pipes shall be sized to minimize erosion and avoid settling of the limestone at part load operation. The slurry pipes shall be lined with replaceable wear resistant natural rubber lining of minimum 6mm thickness. Additional thickness of 2 mm in rubber lining shall be provided at bends.	Bidder proposes FRP (with SIC coating inside pipe) as alternative material for all sizes of all slurry (including limestone slurry) service piping, please confirm.	Specifications requirements are clear. Bidder to comply with the specification requirements.
1118	General Query				Owner to furnish Repose angle to be considered for Gypsum	Bidder to consider 35 degree angle of repose.	
1119	General Query				Please clarify whether storage of gypsum shall be considered as Dry Gypsum or Wet Gypsum.	Dry Gypsum shall be considered for storage volume calculation.	
1120	General Query				As NIT is silent about requirement of Dozer / Pavloaders for Gossum handline. Hence we have not considered the same.	Dozer / Pavloader for Gossum handline is not in the scope of subject package.	
1121	General Query				As NIT is silent about requirement of weigh bridge for gypsum area. Hence we have not considered the same.	Bidder to refer Drawing No 9587-001 (R)-POM-A-031. Accordingly Bidder to consider 100T weigh bridge in Gypsum area.	
1122	General Query				Owner to furnish model no. & maximum number of wheels of truck to be used for gypsum handling system.	Maximum number of wheels of truck to be used for gypsum handling system shall be 16.	
1123	General Query				Bidder has considered upto 10 meter gypsum stockpile height with three side retaining wall & one side kept open for truck bay for truck loading. Bidder request Owner to confirm.	Bidder to design gypsum handling system including system layout considering 16 wheel trucks. Bidder to design the system considering upto 8 meters gypsum stockpile height. Further retaining walls, opening for truck bay, peripheral road for truck movement inside gypsum storage shed etc shall further be finalised during detail engineering.	
1124	Section VI / Part B	D-1-1	1 of 2	1.01.00	Preliminary geotechnical investigation in the proposed area has been carried out by the Owner and the bore-log data is furnished in Annexure 'C'.	Kindly provide the recommendation table from the geotechnical investigation report.	Bidder to refer Amendment No. D-1-01,D-1-02.

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1125	Section VI / Part B	D-1-12 (C)	3	7.02.02 g)		For heavily load structures like chimney, the NABC provided for foundation resting on soil in table 1 will not be sufficient. The nearby borelog indicates the presence of hard clay below 4.0 m depth with SPT more than 40. Hence, giving due consideration to above bidder requests that the NABC calculated during detailed engineering shall be allowed after approval of geotechnical investigation report.	The table has been superseded. Bidder to refer Amendment No. D-1-01.D-1-02 for updated NABC.
1126	SECTION – VI / PART-A	SUB-SECTION-ID	1 of 8	1.00.00	d. Complete site levelling of entire plant area as shown in drawing no. 8013-001-POCA-003 Titled 'Site Levelling Plan'.	In order to propose an optimize layout, bidder would like to change the extent of grading variation as against shown in the area grading drawing 8013-001-POCA-003 Site Levelling Plan' to suit the various facilities. Kindly confirm.	Bidder to follow site levelling plan. Bidder to refer Amendment No. D2-16.
1127	SECTION – VI / PART-A	SUB-SECTION-IA-04	2 of 6	2.04.01	Further, Quick opening Biplane motorized/pneumatic damper along with 2x100% seal air fans & 2x100 electrical heaters shall also be provided by the Contractor in the by-pass duct.	In view of the recent NTPC's observation of condensation occurring in the duct from 10 fan discharge Flue gas tap off to Booster Fan suction/inlet duct when the unit is running in FGD bypass mode, bidder request NTPC to review the number of locations of dampers or any other suitable measure. Kindly confirm.	Bidder to suitably take care of the such condensation problem occurring in the ducts by adequate interventions.
1128	Section VI / Part B	A-01	40 OF 101	1.05.22.01	minimum inside diameter of flue liner shall not be less than 800mm.	Bidder request owner allow to consider minimum inside diameter as per process requirement.	This shall be discuss during detail engineering based on the provided chimney/chimney liner.
1129	Section VI / Part B	D-1-5	19 OF 86	5.03.03	The wind shield shall be designed for vertical loading, cross wind loading, seismic loading, circumferential wind loading, thermal gradients etc. The load calculation and load combinations shall be as detailed in IS 4998.	The bidder understands that wind shield shall be analyzed and designed for cases with and without flue liner loads as per IS 4998: 2015 using limit state method. Please confirm.	Bidder's understanding is correct. The load calculation and load combinations shall be as per latest edition of IS 4998.
1130	Section VI / Part B	E-4	5 OF 5	1.17.00	Borosilicate block shall conforms to NTPC data sheet and to be tested as per Relevant applicable standard.	Bidder requests owner to provide detailed technical specifications/NTPC data sheet for borosilicate lining over the steel flue.	Minimum requirements are given. Further, Bidder to submit details inline with the applicable code and specification requirements.
1131	Section VI / Part B	D-1-5	37 of 86	5.06.02.03	Gypsum dewatering building This shall be steel framed building with R. C. C. roof and floor. For steel building roof/ floors shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only over structural beams).	Considering the overall project times, Bidder request NTPC to allow RCC framed structure with brickwork/concrete block work with plastering on both sides as additional configuration for Gypsum dewatering building. Kindly confirm.	Bidder's request is not acceptable. Bidder to comply with the specification requirements.
1132	Section VI / Part B	D-1-6	1 of 25	6.01.03	ii) The Bunker building, transfer towers, conveyor galleries and trestles, crusher house, boiler, ESP Control Building, ESP supporting structures, including inlet and exhaust duct support structures, Compressor House, Pipe cable Gallery shall have structural steel framed super structure.	For ESP control room building, Bidder request NTPC to allow the option of RCC / Steel framed building in line with building description for FGD MCC control room building described in Clause 5.06.02; Section VI/Part B; Sub-section D-1-5; page 37 of 86. Kindly confirm.	Bidder's request is not acceptable. Bidder to comply with the specification requirements.
1133	TECHNICAL SPECIFICATION SECTION-VI, PART B BD DOC NO.-CW-CM-1159-C-03M-001		PAGE 4 OF 10	SUB SECTION-E-13 RAW WATER SYSTEM (MECHANICAL)	Hydraulic Test: 100%, 1.5 times the design pressure or 2 times the working pressure whichever is higher	Bidder request to perform RT/UT/ PAUT/TOFD in lieu of Hydraulic Test	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1134	SUB-SECTION-E-10 CONDENSATE EXTRACTION PUMP SUB-SECTION-E-12 BOILER FEED PUMP		PAGE 2 OF 2 PAGE 3 OF 4	Note	Note: 1) Shop tests shall be conducted with soften Quality Water.	Water quality used for shop tests shall be as per approved manufacturer standard practice	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1135	SUB-SECTION E-59 CIVIL WORKS		PAGE 4 OF 6	(ii) CW Liner/ Pipes Fabricated using H.R. coils with spiral weld joints at 1) Factory	Option-1 & 2: UT : Not Recommended	Bidder request for approval of UT/ PAUT/TOFD in lieu of RT	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1136	SUB-SECTION E-59 CIVIL WORKS		PAGE 4 OF 6	5. RT : - 100 % RT on circumferential joints liner for weld length as per Fig 1 -5% RT on top 2/3 portion of circumferential joints and -5% RT on longitudinal joints		Bidder request for approval of UT/ PAUT/TOFD in lieu of RT	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1137	SUB-SECTION E-59 CIVIL WORKS		PAGE 4 OF 6	(ii) CW Liner/ Pipes Fabricated using H.R. coils with spiral weld joints at DPT on root run: 100% DPT for pipes up to 1200mm diameter		Pipes fabricated using HR Coils with Spiral Weld Joints at factory is an automated process of welding and it is not possible to carryout DPT on root run.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1138	SUB-SECTION E-59 CIVIL WORKS		PAGE 5 OF 6	7. Hydro test 1.5 times the design pressure or 2 times the working pressure whichever is higher. In exceptional cases where hydraulic test is not possible the same may be substituted with 100% RT as per the instruction/discretion of EIC.		Bidder proposes to carryout 100% RT/UT/ PAUT / TOFD in lieu of Hydrotest	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1139	EPC PACKAGE SECTION-IV (GCC)		PAGE 28 OF 73	19.4	The Contractor shall not be allowed to sub-contract works to any subcontractor/ sub-vendor from a country which shares a land border with India unless such contractor is registered with the competent Authority. The Competent Authority for the purpose of registration shall be as mentioned in Annexure-IV to SCC. However, the said requirement of registration will not apply to subcontractors from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects. The Contractor may apprise itself of the updated lists of such countries available in the website of the Ministry of External Affairs.	Bidder understand that In case vendors who are already approved/have executed various items in NTPC/equivalent project/s are not in the indicative vendor list, bidder may consider same subject to meeting government regulation at the time of ordering	Bidder understanding is not correct. Please refer 40.00.00 of General Technical Requirements for detailed specification on Make In India guidelines.
1140	SUB-SECTION- E-00 INTRODUCTION TO QUALITY ASSURANCE SPECIFICATION		PAGE 1 OF 1	-	Various standards referred in this document shall be the latest revisions.	Bidder request to follow clause "PART-C 5.00.00 CODES & STANDARDS OF GENERAL TECHNICAL REQUIREMENTS 5.02.00 (unless covered otherwise in the specifications, the latest editions (as applicable as on the date of bid opening), of the codes and standards given below shall also apply, as there is different requirement in different sections of specification"	Part-C 5.00.00 Codes & standards of GTR clause no 5.02.00 shall be read in conjunction with the specification requirement in E-00.
1141	SUB-SECTION-E-06 POWER CYCLE PIPING		Page 1 of 5	1.01.00	(f) All butt welds in alloy steel piping of P-91, X-20, X-22 & material P15E group & above shall be checked for RT/ UT/PAUT/TOFD & MPI after SR.	(f) All butt welds in alloy steel piping of P-91, X-20, X-22 & material P15E group & above shall be checked for RT/ UT/PAUT/TOFD & MPI after SR. Bidder has worked with similar NDT process and has successfully completed activity in past projects. Bidder request to kindly confirm	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1142	SUB-SECTION-E-06 POWER CYCLE PIPING		Page 2 of 5	3	(4) ... Further, 10% of butt welds of underground piping shall be subjected to RT.	Bidder request for alternative Volumetric NDT Examination including UT/Advanced NDT	Bidder to meet/ follow the technical specification requirement.
1143	SUB SECTION-E-13 RAW WATER SYSTEM (MECHANICAL)		Page 2 of 4 Page 4 of 4	B.	x. 5% RT/ 5% UT by TOFD/PAUT techniques on those butt weld joints which can be 100% hydro tested xo. 100% RT / 100% UT by TOFD/PAUT technique of the butt weld joints of pipeline shall be carried out which cannot be Hydro tested. viii. 5% RT/ 5% UT by TOFD/PAUT techniques on those butt weld joints which can be 100% hydro tested. ix. 100% RT / 100% UT by TOFD/PAUT technique of the butt weld joints of pipeline shall be carried out which cannot be Hydro tested.	Bidder request to perform RT/UT/ PAUT/TOFD in lieu of Hydrotest	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1144	SUB-SECTION-E-08 STEAM TURBINE & INTEGRAL AUXILIARIES		Page 24 of 26	1.10.02	(c) All welds between condenser neck and LP turbine shall be subjected to 100% radiographic and magnetic particle examination.	Bidder request to perform PT in lieu of Magnetic Particle Testing as there is very limited access available for performing NDT	Bidder is not acceptable. Bidder to meet the technical specification requirements.
1145	SUB-SECTION-E-06 POWER CYCLE PIPING		Page 2 of 5	2	(2) Temperature > 175 Deg. C upto 400 Deg. C or pressure exceeding 17 bar and upto 71 bar. (iii) 100% MPE.	Bidder request to provide option for performing Penetrant testing in lieu of MPE	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1146	SUB-SECTION-E-06 POWER CYCLE PIPING		3 of 5	1.05.00	(b) Hardened/stellited valve disc and seat are to be subjected to LPI and hardness check.	Hardness testing on seat/disc may be performed on a sample test coupon (PTC) instead of actual seat. The Sample test coupon will undergo same process as that of actual seat material and the hardness of this test coupon will be measured. As the hardness test on actual seat creates indentation on seat, which may become a leak path in the future during the valve operation. (inline with Sub section E-08 1.07.01).	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.

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1147	SUB-SECTION -E-05 LP PIPING PACKAGE (MECHANICAL)	2 of 3	Note 1	100% Hydraulic test shall be carried out. Weld joints not subjected to hydraulic test due to some unavoidable reasons, shall be subjected to 100% RT/PAUT.	Bidder request to provide option for performing RT/PAUT in lieu of Hydraulic Test	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1148	SUB-SECTION-E-12 BOILER FEED PUMP	2 of 4	1	(a) Performance Tests on each Boiler Feed Pump to determine the characteristic curve (Head, Capacity, Efficiency & Power) at Design Speed and to ensure compliance with design requirements specified in the specification. Measurement shall be carried out at 10%, 25%, 50%, 65%, 80%, 100% & 125% of Design Flow with loop water at design temperature. Performance Test at other specified Conditions shall be carried out on all Boiler Feed Pumps at their respective Speeds at design temperature.	Many manufacturers does not offers / recommend to conduct performance test below recommended flow, therefore performance tests at 10 % , 25 % flow will not be done. It's more like pump running in dry conditions which may damage the pump internals Performance test is performed at reduced speed and temperature meeting HIS guidelines and Note 5 of Sub Section E-12	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1149	Sub-Section E-60 QA-Disclaimer of Indicative Vendor list	Page 1 of 2 Page 2 of 2	1.1 1.7	However, in case of error/omission, if any, and represented by the successful bidder this will be addressed during the execution of the contract based on the material evidence available with NTPC / Main Contractor. 1.7 The list of sub-vendors is periodically revised to include new sub-vendors. Such a revision may also see a deletion of certain sub-vendors who may have been disqualified on grounds of inadequate performance or banned in line with NTPC's banning policy. The then current list will be shared with the successful bidder immediately on award.	Bidder understand that a) In case vendors who are already approved/have executed various items in NTPC project are not in the indicative vendor list, bidder may consider same b) Bidder request to share the banned vendors as on date, which will help bidder for taking in to consideration. This list shall be part of contract at the time of award or order.	a) Please refer Disclaimer on Indicative Vendor List (Part-B, Chapter-60) for additional sub-vendors, subject to meeting specification requirements. b) The Indicative Sub-Vendor list shared is updated one & the same shall be referred. List of banned sub-vendors is already available on NTPC tender website.
1150	SUB-SECTION E-59 CIVIL WORKS	1 of 6	1	1.0 SAMPLING AND TESTING OF CONSTRUCTION MATERIALS Before execution of any civil work the contractor shall conduct full-scale suitability tests on various construction and building material such as soil, fine and coarse aggregates, cement, construction chemicals, supplementary cementitious materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from reputed institutes such as NCCBM-Ballabgarh, CSMRS-Delhi, selected IT's as agreed by the Employer. The test samples for such full-scale testing shall be jointly sampled and sealed by the Employer and contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance department (FOA) representative of the Employer. Format for sampling and testing of cement, coarse aggregate, fine aggregate, chemical admixture, fly ash, water, concrete mix design is enclosed at Annexure-I.	1.0 SAMPLING AND TESTING OF CONSTRUCTION MATERIALS Before execution of any civil work the contractor shall conduct full-scale suitability tests on various construction and building material such as soil, fine and coarse aggregates, cement, construction chemicals, supplementary cementitious materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from reputed institutes such as NCCBM-Ballabgarh, CSMRS-Delhi, selected IT's, NABL accredited Laboratories as agreed by the Employer. The test samples for such full-scale testing shall be jointly sampled and sealed by the Employer and contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance department (FOA) representative of the Employer. Format for sampling and testing of cement, coarse aggregate, fine aggregate, chemical admixture, fly ash, water, concrete mix design is enclosed at Annexure-I.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1151	SUB-SECTION-D-17 CIVIL WORKS FOUNDATION SYSTEM	1 of 8	7.01.02	Tank Foundations a) The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any. b) Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to II. c) Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%.	Bidder understanding is that, wherever Sand is mention, bidder may use either River sand or crushed sand for filling purpose.	Bidder's understanding is partially correct. Bidder can use either natural sand or manufactured sand conforming to IS-383.
1152	SUB-SECTION-D-18 CIVIL WORKS GENERAL SPECIFICATION	5 of 19	8.02.00 CONCRETE 8.02.01 GENERAL	v) PCE type superplasticizers shall be used as high range water reducing admixtures (Type F as per ASTM C494 or equivalent) in the concrete mix. Dosage & mixing methodology of this chemical admixture shall be as per manufacturer's recommendation.	v) Naphthalene or PCE type superplasticizers shall be used as high range water reducing admixtures (Type F as per ASTM C494 or equivalent) in the concrete mix and conform to the requirement as per IS-9103. Dosage & mixing methodology of this chemical admixture shall be as per manufacturer's recommendation.	Bidder's proposal is not accepted. Further, Bidder to refer Amendment No. D2-10.
1153	SUB-SECTION-D-18 CIVIL WORKS GENERAL SPECIFICATION	3 of 19	8.01.02.29	Interlocking concrete block, kerb blocks or concrete block specified for various uses shall be precast blocks made of alkali-activated concrete / Geopolymer concrete as per IS:17452- 2020.	Interlocking concrete block conforms to IS:15658, kerb blocks or concrete block specified for various uses shall be precast blocks made of alkali-activated concrete / Geopolymer concrete as per IS:17452- 2020.	Bidder to refer Amendment No. D2-08.
1154	SUB-SECTION-D-18 CIVIL WORKS GENERAL SPECIFICATION	PAGE 3 OF 19	8.01.03	Acid/ Alkali Resistant Lining All structures receiving acid / alkali resistant lining shall be tested for water tightness and made leak proof before lining work. The acid / alkali resistant lining shall be provided broadly in the areas identified. The Bidder shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later. The Bidder shall replace / rectify defects if any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.	Acid/ Alkali Resistant Lining All Liquid retaining concrete structures receiving acid / alkali resistant lining shall be tested for water tightness and made leak proof before lining work. The acid / alkali resistant lining shall be provided broadly in the areas identified. The Bidder shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later. The Bidder shall replace / rectify defects if any (free of visible physical damages), observed in the lining to the satisfaction of the Engineer without any extra cost during this period.	Bidder to comply with the specification requirements.
1155	SUB-SECTION-D-110 CIVIL WORKS MATERIAL SPECIFICATION	1 of 4	10.02.00 C	c) Petrographic examination of aggregate shall be carried out by the contractor at National Council for Cement and Building Materials (NCS), Ballabgarh, or any other approved laboratory to ascertain the structure and rock type including presence of strained quartz and other reactive minerals for machine foundations, etc.	c) Petrographic examination of aggregate shall be carried out by the contractor at National Council for Cement and Building Materials (NCS), Ballabgarh, selected IT's, NABL accredited Laboratories, or any other approved laboratory to ascertain the structure and rock type including presence of strained quartz and other reactive minerals for machine foundations, etc.	Bidder to comply with the specification requirements.
1156	SUB-SECTION-D-110 CIVIL WORKS MATERIAL SPECIFICATION	3 of 4	10.05.00	Bricks Only fly ash bricks shall be used in all construction, except for elevator shafts, which can be either of burnt clay bricks or RCC construction as per functional / codal provisions. Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75kg/cm2. Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS: 13757 and IS: 12894 respectively. Minimum fly ash content in fly ash based bricks shall be 25%.	Bricks Only fly ash bricks shall be used in all construction, except for elevator shafts, which can be either of burnt clay bricks or RCC construction as per functional / codal provisions. Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75kg/cm2. Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS: 13757 and IS: 12894 respectively. Minimum fly ash content in fly ash based bricks shall be 25%. However, in case of fly ash bricks not available burnt clay bricks of compressive strength 75kg/cm2 and meeting requirement as per IS: 1077 shall be used. Owner is requested to confirm acceptance.	Use of Burnt clay bricks in not acceptable. Bidder to comply with the specification requirements.
1157	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 2 OF 70	4.01.00	Complete recording of the temperatures through out the stress relieving cycle of the material and the weld subjected to heat treatment shall be made by means of chartless recorder / IOT sensors duly password protected with a connectivity to remote server / Cloud .	Presently IBR inspectors accept only physical/hardcopy chart Digital Recorders with chartless recorder / IOT sensors may be used, however Director Boiler need to accept the digital form of recording and issue a directive to all IBR Inspectors to accept the same Hence bidder request to use digital PWHT - Pre-heating, post-heating and post-weld stress relief heat treatment for only P91/P91 materials, as with induction M/c digital data will be available However, if as pilot NTPC would like to take up as digital initiative, 10% of FWS may be explored for POC with such system	Bidder to meet/ follow the technical specification requirement. Further, for any other requirements shall be discussed during detailed Engineering & finalization of QP.
1158	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 41 OF 70	55.00.00	Computed RT shall be used as an advanced Engineering Practice. Main contractor to ensure minimum 10% computed radiography of weld joint to be performed in construction phase for scope agreed in FWS for boiler pressure parts. Main contractor to ensure the transfer & storage of these records in Server	Bidder would like to have exemption for the clause owing to following a) The acceptance from IBR at site for Computed RT shall be taken in to consideration from the boiler board b) In case of other alternative NDT method (such as UT/PAUT) adopted in past project same may also be permitted subject to statutory compliance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1159	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 2 OF 70	3.05.00	Welding Equipment for high pressure (Boiler , PCP) - For GTAW process: HF Welding machines to be used. For SMAW process: Inverter based welding machine are to be used.	Welding equipment shall be used as per earlier practice of bidder as there were no impact of use of existing method welding while operation of plant.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1160	SUB-SECTION-III-C-01 BASIC DESIGN CRITERIA	2.01.00		PROVENNESS CRITERIA 2.01.00 All equipment, systems and accessories furnished under this specification shall be from the latest proven product range of a reputed experienced manufacturer whose successful performance has been established by a considerable record of satisfactory operation in coal fired utility power stations.	Bidder would like to clarify that satisfactory operation of Process plants such as Oil & Gas, Fertilizer etc. may also be considered	Bidder's proposal not acceptable. Bidder to comply with the specification requirements.

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1161	SUB-SECTION-IIC-04 MEASURING INSTRUMENTS (PRIMARY & SECONDARY)		/ Page 10 of 31	Sr. No. 9	CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)- 6.00.00 : Common Requirements for all Analysers - USEPA, TUV, MCERTS or equivalent standards - Compliance to standards	Bidder would like to clarify undertaking for compliance to the standard will be submitted Also latest regulatory requirements of CPCB/SPCB/other regulatory/statutory body prevailing at the time of award of the contract	Specification requirements are clear .Bidder to comply specification & statutory/regulatory requirements as outlined in referred clause.
1162	SUB SECTION-B-02 MOTORS		3 of 5	10.01.00	LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED The following type test reports shall be submitted for each type and rating of HT motor (b) Terminal box-fault level withstand test for each type of terminal box of HT motors only.	Not Applicable for elastomold type terminations	Bidders understanding is not correct. Bidder to comply with the specification requirements.
1163	SUB-SECTION-B-03 VFD		10 of 11	28.02.00	Type test LIST OF TYPE TESTS TO BE CONDUCTED The following type tests shall be conducted under this contract for MV E8) Overall efficiency determination of VFD system including transformer/ Harmonic filters etc at motor full load	Bidder would like to clarify that test may be conducted with regenerative load	Bidders Proposal is not acceptable. Bidder to comply with the specification requirements.
1164	SUB-SECTION-B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS		17 of 38	1.11.02	Type tests criteria for Auxiliary oil filled transformers rated upto 16MVA, 11kV (only type test report has to be submitted) A) The Type Test reports should be of a transformer which is generally similar to the transformer being offered as per IEC 60076-5, Annexure-B and also identical to the offered transformer in the following aspects:....	Bidder would like to clarify that for similarity conditions IEC 60076-5, annexure B will be considered	Bidders Proposal is not acceptable. Bidder to comply with the specification requirements.
1165	SUB-SECTION-B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS		24 of 38	1.11.04	ROUTINE / TYPE TESTS ON TRANSFORMERS: vi)"During Infra red thermography test of GT, the temperature of any part of tank shall be limited to 110 deg C.	We would like to clarify that Infra red thermography tests will be conducted for records only	Bidders understanding is not correct. Bidder shall comply to technical specifications.
1166	SUB-SECTION-B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS		Sr. No. 31/ Page 21 of 38	1.11.04	ROUTINE / TYPE TESTS ON TRANSFORMERS: Short duration heat run test (Not applicable for unit on which temperature rise test is performed)	Bidder would like to understand the procedure & acceptance criteria of this test. As this tests is not covered in generally used standards	Procedure for short term heat run test has been given in CEA Standard specifications and technical parameters for transformers and recators (66KV and above voltage class shall be followed).
1167	SUB SECTION-A-08 Power Cycle Piping		PAGE 5 OF 19	(c)	2. Supplementary requirement SS: Certificate of conformity "COC" from pipe supplier for microstructure and delta ferrite (to be maintained within 3%max. when measured as per VD TUV 1272). Certificate of conformity "COC" from pipe supplier for microstructure and delta ferrite (to be maintained within 3%max. when measured as per VD TUV 1272).	Bidder would like to use VD TUV 1272/equivalent ASTM standard	Bidder to note that, this shall be discussed and finalized during Detail Engineering.
1168	SECTION-VI, PART-B	E-1	1 of 13	1.01.01 (a)	Each plate shall be subjected to a 100% normal ultrasonic at the mill to meet the minimum requirements of EN 10160:1999 / equivalent ASTM standards. Elevated temperature tensile tests shall also be carried out on plate material for each heat.	Bidder would like to clarify that as per standard practice, we generally use forged material as per pressure part schedule and design instead of plate material for water separator. Hence, these tests are not applicable for bidder's design. Tests as per applicable forging code and IBR shall be carried out. Customer is requested to confirm acceptance.	Bidder to meet/ follow the technical specification requirement.
1169	SECTION-VI, PART-B	E-1	1 of 13	1.01.01 (j)	After stress relieving (SR) all welds, internal and external shall be examined by MPI methods depending on size and accessibility and all butt welds shall be subjected to 100% radiography.	After stress relieving (SR) all welds, internal and external shall be examined by MPI methods depending on size and accessibility and all butt welds shall be subjected to 100% ultrasonic testing/radiography/PAUT+TOFD. Customer is requested to confirm acceptance.	Bidder to meet the technical specification requirements.Bidder shall read1.01.01(h) along with 1.01.01(i).
1170	SECTION-VI, PART-B	E-1	2 of 13	1.01.02 (c)	All full penetration nozzle and attachment welds shall be subjected to UT prior to stress relieving	We would like to clarify that maximum area shall be covered. Some location full coverage not possible due to nearby Stubs, Hole, opening or nozzle. Bidder clarifies that UT for full penetration nozzle ID greater than 250 mm shall be performed. Customer is requested to confirm acceptance.	Bidder to meet/ follow the technical specification requirement.This shall be tied up during detailed engineering & finalization of MQPs.
1171	SECTION-VI, PART-B	E-1	2 of 13	1.01.03 (c)	All tubes/panels/coils shall be checked for clearance by steel ball test and for cleanliness by sponge passage	We would like to clarify that Sponge & ball pass will only be carried out for flat Panel & coils as per bidder's standard practice. For steel Ball & Sponge test of Panels, there are constraint due to Y-pieces, Rifle tubes, 3-Dimensional Opening (3D) etc in WW panels. Bidder proposes to carry out Sponge & ball pass only for flat Panel & coils as per standard practice. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1172	SECTION-VI, PART-B	E-1	3 of 13	1.01.03 (f)	Tubes and fabricated panels/coils shall be subjected to hydraulic pressure test including water wall panels, burner panels, preheaters, super heaters & economizers	Bidder understands that the hydrotest is not applicable for loose tubes. Kindly confirm.	Bidder understanding is not correct.Bidder to meet the technical specification requirements.
1173	SECTION-VI, PART-B	E-1	3 of 13	1.01.04 (c)	All bent pipes shall be checked for ovality and thinning by UT on first off lot & on random samples for subsequent pieces. Outer surface of bends shall be subjected to MPI/LPI	Bidder proposes PT/MT on bend area for Hot Bends only as standard practice. Bidder does not envisage PT/MT for Cold bends of pipes. Kindly confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1174	SECTION-VI, PART-B	E-1	3 of 13	1.01.04 (d)	The edge preparation for shop and site welds in stainless steel /alloy steel shall be subjected to dye penetrant check. Non-destructive examination of welds shall be carried out after post weld heat treatment, if any.	Bidder has not envisaged PT for the edge preparation for shop and site weld in SS and alloy steel. 100% MT/PT for all WEP of SS & AS Pipes. Bidder uses 100% UT tested pipes and at shop WEP is carried out at sophisticated CNC machines & followed by visual inspection. WEP of pipes are done through Machining only. Gas cutting and grinding process is not used. Customer is requested to consider our request and confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1175	SECTION-VI, PART-B	E-1	8 of 13	1.02.03 (d)	Full range performance test shall be carried out on one fan of each type and size as per BS 848, Part-1.	Please note that BS 848, Part 1 is now withdrawn and replaced by BSEN ISO 5801. Bidder proposes to perform testing as per BSEN ISO 5801 or equivalent. Customer is requested to confirm acceptance.	Please refer E-00 (page 01 of 01) of Part-B regarding applicability of latest revision of Codes & Standards.Bidder to follow the technical specification requirement.
1176	SECTION-VI, PART-B	E-1	8 of 13	1.02.04 (a)	Raw material for shaft, coupling, gears and pinions, top and bottom races and other rotating components shall be subjected to UT. MPI/LPI shall be carried out to check surface soundness.	Customer is requested to note that forged shafts used in Roller Journal Assembly / Tensioning Parts Assembly shall be subjected to UT & MPI, as applicable, during stages of production. However, Shaft, Coupling, Gears & Pinions, Top & Bottom races and other rotating components are the part of bought-outs viz., Gear Box with Lubrication units, Hydraulic Tilting Device, Roller Loading Device etc. These are compliant to supplier internal quality norms & no reports for UT/MPI/LPI will be produced.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1177	SECTION-VI, PART-B	E-1	8 of 13	1.02.04 (b)	Wear-resistant parts shall be UT/ RT tested to check soundness after suitable heat treatment. Check for chemical composition, hardness and microstructure shall be carried out. For ceramic materials check for various properties including hardness, density, wear rate and composition shall be carried out.	As per Bidder's standard practice, wear resistant parts viz. Roller Liners (Roller Journal Assembly) & Table Liners are composites consisting of SG Iron & Hl chrome material. For such composite material, UT/RT/MPI is technically not feasible. However, LPI shall be conducted to ensure surface integrity. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1178	SECTION-VI, PART-B	E-1	9 of 13	1.02.04 (c)	Butt welds in the tube/ separator /body casing of the mill shall be tested by UT / RT and MPI. All other welds in main tube/separator shall be tested by MPI/LPI for acceptance. The tube shall be statically balanced.	Customer is requested to note that Butt weld shall be subjected to UT and LPI after PWHT, as applicable. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1179	SECTION-VI, PART-B	E-1	9 of 13	1.02.04 (d)	All gearboxes shall be run tested for adequate duration to check rise in oil temperature, noise level and vibration. Check for leak tightness of gear case also shall be performed.	Customer is requested to note that trial run duration shall be as per manufacturer specification (approved by Bidder). Oil leakage shall be checked during no load trial run test at bidder's works/shop. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.
1180	SECTION-VI, PART-B	E-1	9 of 13	1.02.04 (e)	Trail assembly (stacking) of at least one Mill complete with all major components needs to be carried out at shop.	Customer is requested to note that at shop, only one mill will be trial assembled with 01 no. Grinding Table, 01 no. Roller Journal Assembly, 01 no. Lower Housing Assembly and 01 no. Middle Housing Assembly. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable.Bidder to meet the technical specification requirements.

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1181	SECTION-VI, PART-B	E-1	9 of 13	1.02.04 (f)	Fabricated pipe welds should be examined by MPI.	Customer is requested to note that in case of Pulveriser mill, pipe welds are applicable only for Lower housing (seal air arrangement). This is a low pressure piping. Hence, bidder will perform LPI in place of MPI for these pipings. Customer is requested to confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1182	SECTION-VI, PART-B	E-1	11 of 13	1.02.11, c (i)	For plates of 25mm < thickness < 32mm - 10% RT/UT and 100% MPI	Customer is requested to note that Bidder proposes to perform either MPI or PT in lieu of MPI. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1183	SECTION-VI, PART-B	E-1	11 of 13	1.02.11, c (iv)	All fillet welds of built up plate girders shall be inspected 100% by MPI	Customer is requested to note that Bidder proposes to perform either MPI or PT in lieu of MPI. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1184	SECTION-VI, PART-B	E-1	12 of 13	1.02.15, (a)	Hydraulic pressure test shall be carried out on each pipe and expansion below.	Customer is requested to note that bidder will perform air leak test in place of hydrotest for metallic expansion joint/below for piping. It is not possible to perform hydraulic pressure test for metallic expansion joint. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1185	SECTION-VI, PART-B	E-6	01 of 05	1.01.00, (c)	The edge preparation for shop and site welds in stainless steel /alloy steel shall be subjected to a dye penetrate check	Bidder does not envisage PT for the edge preparation for shop and site weld in SS and alloy steel, 100% MT/PT for all WEP of SS & AS Pipes. Bidder uses 100% UT tested pipes and at shop WEP is carried out at sophisticated CNC machines & followed by visual inspection. WEP of pipes are done through Machining only and Gas cutting and grinding process is not used. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1186	SECTION-VI, PART-B	E-6	01 of 05	1.01.00, (d)	Pipe bend shall be checked for ovality and thinning by ultrasonic or other acceptable methods on first off lot & on random samples for subsequent pieces for high pressure applications. Outer surface of bends shall be subjected to magnetic particle examination/LPI.	Bidder proposes PT/MT on bend area for Hot Bends only as Per standard practice and procedure. Bidder does not envisage PT/MT for Cold bends of pipes. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1187	SECTION-VI, PART-B	E-6	04 of 05	1.07.00, (a)	Hydraulic pressure test shall be carried out on each pipe and expansion below	Customer is requested to note that bidder will perform air leak test in place of hydrotest for metallic expansion joint/below. Kindly confirm acceptance.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1188	SECTION-VI, PART-D	ERECTION CONDITIONS OF CONTRACT	02 of 70	3.04.00	On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.	On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be marked by usage of permanent paint. Customer is requested to note this clarification.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1189	SECTION-VI, PART-D	ERECTION CONDITIONS OF CONTRACT	03 of 70	6.01.00	Each steam and water tubes shall be blown with compressed air and shall be subjected to 'ball test' before erection to ensure that no obstructions exist	Each steam and water tubes shall be blown with compressed air and shall be subjected to 'sponge test' before erection to ensure that no obstructions exist as per feasibility.	Bidder proposal is not acceptable. Bidder to meet the technical specification requirements.
1190	SECTION-VI, PART-B	SUB-SECTION-E-1	-	-	Note: PT can be carried out in inaccessible areas where MPI cannot be done.	We understand that PT can be carried out in all inaccessible areas where MPI cannot be done. Kindly confirm acceptance.	Bidder to meet/ follow the technical specification requirement.
1191	Technical Specification, Section-VI, Part-A.	SUB-Section-1	5 of 9	4.02.00	<u>Pre-commissioning and commissioning activities:</u> The contractor's scope shall include all pre-commissioning and commissioning activities, materials and services as detailed in other portion of technical specifications including supply of all consumables (except coal, oil and limestone for which subsequent para may be referred), temporary equipment and pipings, instruments, labour / skilled manpower's etc. The scope includes complete requirement of flushing oils including fresh oil refilling during the pre-commissioning and commissioning activities and subsequent initial operation.	We understand that Bidder pre-commissioning and commissioning activities scope will be limited to the scope of supply included in bidder's scope. Regarding SCR Ready Design system, the pre-commissioning and commissioning activities for SCR reactor, catalyst, Ammonia handling system, etc. are not included in bidder's scope. Kindly confirm. We understand that ammonia required for SCR Ready system related pre-commissioning and commissioning activities will be supplied by Customer. Kindly confirm.	Commissioning shall be limited by the scope of SCR Ready/hybrid ready system.
1192	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION- G-06 PRE-COMMISSIONING & COMMISSIONING ACTIVITIES	9 OF 14	3.03.11	<u>Margin on Fans:</u> After completion of installation of fan drives, Fans, inlet and outlet ducting, measuring equipments etc. contractor shall demonstrate the margin on speed of fans, primary fans, Forced draft fans and induced draft fans as specified elsewhere in Section VI Part B of Technical Specifications.	We understand that shop test reports are acceptable by Customer to demonstrate the margins on Fans and other drives. It is not possible to demonstrate the margin on fans and other drives at project site. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1193	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION- G-06 PRE-COMMISSIONING & COMMISSIONING ACTIVITIES	10 OF 14	3.03.13 a)	Performance characteristic of fans (PA/FD/ID fan capacity, head developed, etc.)	We understand that shop test reports are acceptable by Customer to demonstrate these tests. It is not possible to demonstrate the margin on fans and other drives at project site. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1194	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 2 OF 31	A.4	LP turbine rotor last two stage moving blades along with fastening material (Clamping pieces, Rivets, snubbers, sleeves, springs, locking strips, locking pins etc. whichever are applicable) Note: a) If configuration has one LP Rotor, two sets for each stage of last two stage moving blades of both side flow is required (Total=8 sets) b) If configuration has two LP Rotors (Identical or non-identical) then one set for each stage of last two stage moving blades of both side flows is required (Total=8 sets)	LP1 & LP2 Turbine are identical. Hence, only one set for each stage of last two stage moving blades of both side flow of one LP rotor is considered against this clause. Please confirm acceptance.	It is clearly indicated in item description that if configuration has two LP Rotors (Identical or non-identical) then one set for each stage of last two stage moving blades of both side flow is required (Total=8 sets). Bidder to comply specification requirement.
1195	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 2 OF 31	A.6	Aux oil pump/startup oil complete assembly for Main Turbine along with complete coupling (Mounted on oil tank)	Aux. oil pump is not in our design. AC motor driven MOP with coupling to be provided. Please confirm acceptance.	Bidder to offer one number motor driven oil pump complete assembly for Main Turbine along with complete coupling. Bidder to also refer General note 3 in page-30 of 31 of Part-A/Sub-Section-VI, Chapter-02/Section-VI regarding not applicable item.
1196	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 2 OF 31	A.6	Main oil pump complete assy (Turbine shaft Driven). (If turbine driven MOP is not there then no requirement).	Turbine shaft driven MOP is not applicable in our design. Hence, not considered. Please confirm acceptance.	It is clearly mentioned in the specification that the referred line item is to be supplied if bidder offer design envisages turbine shaft driven main oil pump.
1197	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 5 OF 31	I.13	Emergency stop valve (Set of all internals required to complete one valve assembly excluding body)	1 No. of servo valve will be supplied against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1198	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 5 OF 31	I.16	IP stop valve servomotor complete assembly	Servo valve is not applicable. Hence, not considered. Please confirm acceptance.	Bidder understanding is not correct. Bidder to please note that IP stop valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), trip solenoids, ATT solenoids and its position feedback transmitter, limit switches.
1199	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 5 OF 31	I.18	HP control valve servomotor complete assembly	1 No. of servo valve will be supplied against this clause. Please confirm acceptance.	Bidder understanding is not correct. Bidder to please note that HP control valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), trip solenoids, ATT solenoids and its position feedback transmitter, limit switches.
1200	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 5 OF 31	I.20	IP control valve servomotor complete assembly including actuator, yoke and its control.	1 No. of servo valve will be supplied against this clause. Please confirm acceptance.	Bidder understanding is not correct. Bidder to please note that IP control valve servomotor complete assembly includes complete actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), trip solenoids, ATT solenoids and its position feedback transmitter, limit switches.
1201	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 6 OF 31	I.30	Turbine Cylinders drain valves (complete replacement for an unit)	HP casing drain valves will be provided against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder to comply with the specification requirements.
1202	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 6 OF 31	I.34	Electro-hydraulic convertor assembly of Main turbine Governing system	Already covered in the clause no: I-14J-18J-20 of Group-B. Hence, not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1203	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 6 OF 31	I.38	HP Turbine Overload valve with servomotor assembly (If applicable)	Only OLV internals & servovalve of overload valve will be supplied excluding body. Please confirm acceptance.	Bidder understanding is not correct. Bidder to please note that HP Turbine Overload valve with servomotor assembly includes complete valve, actuator & its yoke assembly along with directional valve (Proportional valve/Servo valve as applicable), trip solenoids, ATT solenoids and its position feedback transmitter, limit switches.
1204	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	I.31	AC AOP motor for main turbine	AOP is not applicable in our design. Hence, not considered. Please confirm acceptance.	In case the specified item is not applicable, equivalent mandatory spares pertaining to the offered design shall be supplied by the bidder.

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1205	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	13.II	AC JOP motor for main turbine	Already considered in Clause: 8, Group-A of SECTION-V I, PART-A.SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR,page 2. Hence, not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1206	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	13.III	All DC Motor	EOP DC motor is already considered in clause : 10, Group-A of SECTION-V I, PART-A.SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR,page 2. Hence, not considered against this clause. JOP DC motor is already considered in clause : 9, Group-A of SECTION-V I, PART-A.SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR,page 2. Hence, not considered against this clause. Seal oil DC motor is already covered in clause : 15.5.2, Group-A of SECTION-V I, PART-A.SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR,page 3. Hence, not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1207	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	1.VI	LP outer & inner casing fasteners & fixing materials	LP1 & LP2 Turbine are identical. Hence, outer & inner casing fasteners & fixing materials considered for one LP Turbine of one unit. Please confirm acceptance.	Bidder to refer amendment No. TG-11 in this regard.
1208	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	1.VII	a) LP turbine atmospheric diaphragm (Complete set for replacement of one diaphragm assembly) with studs b) LP diaphragm sheets	(a) Atmospheric relief valve assembly will be provided (b) Rupture disk will be provided against this clause Please confirm acceptance.	Bidder's understanding is correct.
1209	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 10 OF 31	1.IX	Complete set of fitted keys and packers (Radial & Axial) of Turbine Sets which includes pedestal to base plate, pedestal to casing, casing to casing, casing to supports axial keys / radial keys / palm packers / lubric plates	Pedestal fitted keys will be provided against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1210	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 11 OF 31	1.XI	NRV's on Jacking oil line to all TG bearings (if applicable)	NRV is part of Bearing only. Same is considered in clause no: 1.1 (Group: B). Hence, not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1211	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 11 OF 31	1.XIV	Turbine gland steam leak-off valve complete assembly	In design there is no valves in Turbine gland steam leak-off line. Hence, not considered against this clause. Please confirm acceptance.	In case the specified item is not applicable, equivalent mandatory spares pertaining to the offered design shall be supplied by the bidder.
1212	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 11 OF 31	1.XIX	Sealing strips for oil guard rings of Turbine pedestals	We understand that this is Oil Retaining Ring (ORR) seal strip. Please confirm.	Bidder's understanding is correct.
1213	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 11 OF 31	1.XX	Basket strainer/ Filter for Lube oil / Control Fluid system in tank – if applicable	MOT Basket strainer will be provided. There is no tank in control fluid system. Hence, not considered. Please confirm acceptance.	Referred clause by bidder is incorrect. However, if applicable is already indicated against the referred item.Bidder to comply specification requirement.
1214	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 12 OF 31	1.XXV	Valve seat for HPSV,HPCV,IPSV, IPCV, HPBYPASS VALVE, HPBYPASS SPRAY VALVES, HP BYPASS SPRAY ISOLATION VALVE	Valve seats are already covered in clause no: 1-13J-15J-17J-19 of Group-B. Hence, Not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1215	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 12 OF 31	1.XXVI	HPSV, IPSV, spindle with cone	HPSV, IPSV, spindle with cone are already covered in clause no: 1-13J-15J-17J-19 of Group-B. Hence, not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1216	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 12 OF 31	2.I	Coupling assembly between valve & servomotor for HPSV, HPCV, IPSV, IPCV, HPBYPASS VALVE, HPBYPASS SPRAY STOP & CONTROL VALVE, LPBYPASS SV, LPBYPASS CV	Couplings are already covered in clause no: 1-13J-15J-17J-19 of Group-B. Hence, Not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1217	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 12 OF 31	2.II	Soft packing like gaskets/pressure seal/sealing ring, gland packing rings for HPSV, HPCV, HPBYPASS VALVE, HP BYPASS SPRAY STOP & CONTROL VALVE, IPSV, IPCV, LP BYPASS SV, LPBYPASS CV	Already covered in clause no: 1-13J-15J-17J-19 of Group-B. Hence, Not considered against this clause. Please confirm acceptance.	Bidder's understanding is not correct. Bidder is requested to supply the mandatory spares as specified.
1218	SUB-SECTION-VI	SUB-SECTION-VI CHAPTER-02 STEAM TURBINE GENERATOR	PAGE 12 OF 31	2.III	Servomotor spindle with piston for servomotors of HPSV, HPCV, IPSV, IPCV, HPBYPASS VALVE, LPBYPASS SV, LPBYPASS CV	Servomotor spindle is not applicable for HPSV, HPCV, IPSV, IPCV. Hence, not considered. Please confirm acceptance.	Bidder to offer Servomotor spindle with piston for servomotors for mentioned valves Bidder to also refer General note 3 in page-30 of 31 of Part-A/Sub-Section-VI, Chapter-02/Section-VI regarding not applicable item.
1219	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	11 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 5.1 Hydraulic pump & hydraulic motor drive for luffing system	Hydraulic direct drive is envisaged as per specification; hence, Hydraulic Motor is not applicable for luff system. Please confirm acceptance and issue an amendment suitably.	Bidder to refer Amendment No. MH-5.
1220	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	11 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 5.2 Hydraulic pump & hydraulic motor drive for slew mechanism 10 Slew gear Box	Slew gear box is envisaged as per specification under sr. no 10 hence, Hydraulic pump & hydraulic motor drive are not applicable for slew mechanism. Please confirm acceptance and issue an amendment suitably.	Bidder to refer Amendment No. MH-5.
1221	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	11 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 11 Gear Box of bucket wheel	Hydraulic direct drive is envisaged as per specification; hence, Gear Box of bucket wheel is not applicable. Please confirm acceptance and issue an amendment suitably.	Bidder to refer Amendment No. MH-5.
1222	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	12 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 18 Chain & chain sprockets	As per OEM, Chain & chain sprockets is not applicable for stacker reclaimers. Please confirm acceptance and issue an amendment suitably.	Bidder to refer Amendment No. MH-5.
1223	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	12 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 17 Drive assembly of cable reel drive 27 Energy Chain	As per specification, both cable reel drum and energy chain are envisaged for stacker reclaimers, hence, Bidder understands that mandatory spares shall be considered for offered option only. Kindly confirm Bidder's understanding.	Bidder to refer Amendment No. MH-5.
1224	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	11 OF 20 12 OF 20	R)	Mandatory Spares for STACKER/RECLAIMER Mechanical 12 i) Plummer blocks and bearings of (CRD) 22 Plummer block with bearing for cable reel drums	Duplicity observed for Plummer block with bearing for cable reel drums in sr no 12 & 22. In view of above, Plummer block with bearing for cable reel drums mentioned under sr no 22 is not considered as the same is already considered under sr no. 12. Please confirm acceptance and issue an amendment suitably.	Bidder to refer Amendment No. MH-5.
1225	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-04 COAL HANDLING PLANT	19 of 20	S)	Mandatory Spares for Mobile Headers i) Drive unit assy complete with motor, gear box etc.	As per specification, Mobile Headers are not envisaged; hence, the referred clause for mandatory spares is also not applicable. Please confirm.	Bidder's understanding is correct.
1226	SECTION-VI / PART A	IIA-16 ASH HANDLING SYSTEM	13 of 15	1.02.01	Water Facilities 1.02.01.01 : It is proposedraw water makeup. 1.02.01.02 : For the purpose of waterlapped from following sources: <u>Decanted water shall be pumped from owners' pumping system located at ash dyke. There shall be one nos. working AWRP Pump of 400 m3/hr flow rate each, as envisaged. Hence, maximum recovery water received inside plant shall be 400 m3/hr, accordingly pipeline within plant boundary upto terminal point shall be in Bidders scope.</u>	Bidder understands that there is no recovery water envisaged for stage-II ash handling system in view of combined (BA & FA) HCSO system and any excess water from existing ash dykes will disturb the water balance system of Stage-II, hence, the referred clause 1.02.01.02. i) of sub section IIA-16 is not applicable. Owner is requested to confirm the Bidder's understanding.	Bidder to follow specification requirement. Further Bidder to refer Amendment No. MH-23.

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1227	SECTION-VI / PART A IIA-16 ASH HANDLING SYSTEM	13 of 15	1.02.01	Water Facilities 1.02.01.01 : It is proposed.....raw water makeup. 1.02.01.02 : For the purpose of water.....tapped from following sources: 1) Decanted water shall be pumped from owners' pumping system located at ash dyke . There shall be one nos. working AWRS Pump of 400 m ³ /hr flow rate each, as envisaged. Hence, maximum recovery water received inside plant shall be 400 m ³ /hr, accordingly pipeline within plant boundary upto terminal point shall be in Bidders scope. Plant Water scheme	Owner is requested to confirm which case needs to be considered to develop the Plant water scheme: 1) Either combined (BA & FA) disposal to ash pond through HCSO system or BA disposal from dewatering bin through truck and dry FA disposal from HCSO cum FA silo through rail / closed truck. 2) Owner to also note that when BA disposal from dewatering bin through truck and dry FA disposal from HCSO cum FA silo through rail / closed truck then this 400 m ³ /hr water can not be used in ash handling system or any facilities of Stage-II. Hence, Owner is requested to provide the suitable option for the same with providing the following details: 1) Terminal point with coordinate or demarcation in layout. 2) Pipe size and available pressure at the terminal point. 3) Also confirm whether the AWRS pipe shall be connected to Bidder's ash water sump (i.e. of Stage-II) else Owner to specify, where these pipe shall be connected.	1. Bidder to note that Fly ash shall be transported to Ash Silos for further utilisation by rail and road. Bottom ash shall be transported to Dewatering bins for utilisation by road. However in case of non-utilization, Fly ash along with Bottom ash shall be disposed at existing bottom ash dyke. AWRS water will be available when ash slurry is to be disposed in bottom ash dyke. Bidder to design plant water scheme accordingly 2. 1) AWRS pipe shall be routed besides HCSO pipe as indicated in GLP. 2) Refer Amendment No. MH-23. 3) AWRS pipe shall be connected to Bidder's ash water sump (i.e. of Stage-II). Refer Amendment No. MH-1.	
1228	SECTION-VI / PART E General Layout Plan (Drg no. - *9587-999-POC-F-001*)	NA	NA	At present NTPC has indicated railway siding area, Classifier Silo and Main fly ash silo at FGL (+) 202. Hydro bins, HCSO facilities (Mixing tanks, HCSO Pump House, electrical and control building, silo utility building) located at FGL (+) 210 M. FA pipes and BA slurry pipes travels from main plant area (located at (+) 209 M) to AHP facilities besides railway siding.	Bidder understands that coarse ash and fine ash hoppers are not envisaged to locate on rail track as classified ash shall be transferred to main coarse and fine ash silos. Owner is requested to confirm the Bidder's understanding.	Bidder's understanding is correct. Coarse ash and fine ash hoppers are not envisaged to be located on rail track. The location of Coarse ash and fine ash hoppers shall be decided by Bidder during detail engineering.	
1229	SECTION-VI / PART E General Layout Plan (Drg no. - *9587-999-POC-F-001*)	NA	NA	At present NTPC has indicated railway siding area, Classifier Silo and Main fly ash silo at FGL (+) 202. Hydro bins, HCSO facilities (Mixing tanks, HCSO Pump House, electrical and control building, silo utility building) located at FGL (+) 210 M. FA pipes and BA slurry pipes travels from main plant area (located at (+) 209 M) to AHP facilities besides railway siding.	For shown location of AHP facilities in Plot Plan, Bidder has below concerns. a. Truck access to FA silo at FGL (+) 202 from road at (+) 210 area. b. Weighbridge facility, truck parking area at FGL (+) 202 c. There may be issue of feeding of FA from FA silo to Mixing tank d. Truck access to Hydro bins In view of above, Owner is requested to review the present arrangement for above mentioned concerns and provide suitable clarification. Also, Owner is requested to shift AHP facilities (hydro bins, Classifier area and HCSO Pump house along with mixing tanks) near to main plant area and add HCSO silos there for better system and layout point of view.	Bidder to please refer Amendment No. D2-16.	
1230	SECTION-VI, PART-B Part. E (A) Tender drawing.	SUB SECTION- G-03 LAYOUT PHILOSOPHY	14 of 14	1.08.00	Bottom flange level of Air-Preheaters (Both Primary and Secondary) hoppers and additional hoppers (if any) shall be fixed based on dry ash evacuation system as offered by the bidder taking care of clear height requirement between Boiler & ESP and considering unobstructed route for Fly Ash conveying pipes avoiding vertical bends. Coarse ash handling through lean slurry system	Discrepancy observed regarding evacuation of coarse ash handling system. Bidder understands that coarse ash shall be evacuated through lean slurry mode inline with referred P&ID no. 9596-155-POM-A-025.pdf	Bidder's understanding is correct. Coarse ash shall be evacuated through lean slurry mode. Bidder to also refer amendment No. LAY1-01 in this regard.
1231	Part. E (A) Tender drawing.	9596-155-POM-A-025.pdf	-	-	Coarse ash handling disposal shown to Dewatering Bin Economizer/Economizer outlet duct (if applicable) /APH/ SCR (design only) / and Duct Hopper (if applicable) Ash Handling Systems (Applicable for A & B Above)	Discrepancy observed regarding disposal of coarse ash handling system. Bidder understands that coarse ash shall be disposed to ash slurry sump and not directly to dewatering bin.	Bidder's understanding is correct. Coarse ash shall be disposed to ash slurry sump for further disposal to dewatering bin.
1232	SECTION-VI, PART-A	SUB-SECTION-IA-13 ASH HANDLING SYSTEM	4 OF 15	1.01.05. d)	In case of intermittent type bottom ash handling system, two lengths of APH and duct hopper ash slurry transportation MS pipelines with basalt lining (One no. independent pipe line for each intermediate ash slurry tank) or individual pipes from coarse ash pump as indicated in the flow diagram complete with basalt lined pipe bends, flanges, elbows, gaskets, nuts, bolts, structural steel supports and other accessories as specified and as required, from the outlet of Coarse ash slurry transportation pumps to the Ash Slurry Sump.	Kindly confirm Bidder's understanding.	
1232	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB SECTION-IA-03 BIOMASS	1 of 1	SUB-SECTION-IA-03	Due to presence of high volatile matter in biomass pellets, the mill and associated pulverised fuel piping (PF) systems shall be equipped with suitable & adequate fire detection system and all the PF pipes shall be provided with RTDs and temperature of coal pipes to be hooked upto UCS. Mill inerting system with auto operated valves (motorized or pneumatic) operable from Control room at mill inlet along with pressure gauge after valve shall be provided. Provisions for continuous monitoring of mill inlet air temperature (Min air temperature, Mill outlet temperature, mill current, Mill DP is to be made. Provision of view glass in mill feeder with adequate illumination to view presence of biomass pellets is to be made. The bunker area firefighting system shall be suitably reinforced to tackle biomass fire hazard also.	Please provide clarity of type of fire protection for PF pipe and Bunker area firefighting system.	Fire protection shall be provided as per FIRE PROTECTION AND DETECTION SYSTEM chapters of technical specification.
1233	TECHNICAL SPECIFICATION part A, section VI.	SUB-SECTION-A-12 PLANT UTILITIES	6 of 11	4.00.00 (a)	d) MWV Spray System 6) All cable trestles of main plant area (from transformer yard to chimney)	Bidder understands that majority of Cable trestle in main plant area (from transformer yard to chimney) are accessible from fire tender, hence its understood that Cable trestle between CD only required fire protection system. Please clarify.	Fire protection of all cable trestle as mentioned in technical specification shall be provided.
1234	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-A-01 EQUIPMENT SIZING CRITERIA	78 of 101	3.13.01	DESIGN PHILOSOPHY - Air conditioning system 16) A minimum design margin of ten (10) % shall be considered in design of AC Plant Capacity for each area. Twenty (20) % design margin shall be considered for the cooling tower capacity over the selected A/C capacity provided. Head of the pumps shall take into account min. ten (10%) margin on friction head. For pumps, continuous motor rating (at 50°C ambient) shall be at least 10% above the maximum load demand of the pump in the entire operating range.	It is understood that 20% design margin for cooling tower selection, shall be on calculated load. Selected AC system capacity will already include 10% design margin. And if above this 20% is added, total capacity will include 30% margin for cooling tower above calculated load. Thus effectively, cooling towers shall be selected for 10% design margin above the final selected AC system capacity which includes 10% design margin above calculated load. Please confirm bidders understanding.	As mentioned in technical specification Twenty (20) % design margin shall be considered for the cooling tower capacity over the selected A/C capacity. Accordingly cooling tower selection shall be designed.
1235	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION IA-10 WATER TREATMENT PLANT	1 of 12	1.01.01. j)	Interconnection with isolating valves pipes & fittings etc. to be provided between outlet header of clarified water tank of stage-II and outlet header of clarified water tank of stage-I.	Interconnection between clarified water storage tanks stage-I and stage-II is not feasible hydraulically as there is existing road between the stage-I and stage-II area. Owner is requested to delete the requirement.	Bidder's request reviewed, but not accepted. Bidder to comply with the specification requirements.
1236	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION IA-10 WATER TREATMENT PLANT	2 of 12	1.01.03. k)	Interconnection with isolating valves pipes & fittings etc. to be provided between outlet header of DM water storage tanks of stage-II and outlet header of DM water storage tanks of stage-I.	Interconnection between DM water storage tanks stage-I and stage-II is not feasible hydraulically as there is existing road between the stage-I and stage-II area. Owner is requested to delete the requirement.	Bidder's request reviewed, but not accepted. Bidder to comply with the specification requirements.
1237	SUB-SECTION-A-14 WATER TREATMENT PLANT	12.00.00	21 & 22 of 35	II-A : PT-CW System : 4100 m ³ /hr + 3% for sludge II- Clarifiers : Design Flow of Each Clarifier (Net Output Minimum) : 1850 m ³ /hr	Owner is requested to clarify the mismatch in the net output v/s capacity of each clarifier. Considering 1850 m ³ /hr capacity of each clarifier, the total capacity arrives at 5550 (1850*3) m ³ /hr which contradicts with net output of 4100 m ³ /hr Kindly review and correct it accordingly.	Bidder's proposal reviewed and no correction in specification is required. The capacities mentioned pertain to different equipments of clarification system. Bidder to comply with the specification requirements.	




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1238	SECTION – VI, PART-A SECTION – VI, PART-E	SUB SECTION- IIA-10 WATER TREATMENT PLANT SINGLE LINE FLOW & INSTRUMENTATION DIAGRAM OF PRE-TREATMENT PLANT 9587-999-POM-A-006	2 OF 12	1.01.02. c)	One (1) number filtered water reservoir (in twin sections located below the filters) of RCC Construction, filtered water sump and common filtered water pump house for PT –Potable water & PT-DM systems. Two separate filter water reservoirs are shown for Potable and DM Water	Owner is requested clarify the discrepancy regarding filter water reservoir for Potable Water and DM water between referred tender clause and P&ID of PT Plant.	Bidder to refer amendment no. WS1-02 in this regard.
1239	SECTION – VI, PART-B	SUB SECTION –VI CHAPTER-08 WATER SYSTEM	27 OF 28	3.00.00	Mandatory spares for ClO2 System Blowers: 1) Impeller with lock nuts and washers . . V-belts	Owner to note that air blower for ClO2 system is not applicable, hence, mandatory spares for air blower mentioned under referred clause are not applicable. Kindly review and delete the requirement.	Bidder to refer amendment no. WS1-08 in this regard.
1240	SECTION – VI, PART-B	SUB SECTION –VI CHAPTER-08 WATER SYSTEM	23 OF 28	2.02.00	5) Cartridge Filtration Units [For RO (DM)] 30% of total installed membranes in all the three streams/trains	Owner to note that membrane is not applicable for cartridge filter, hence, Bidder understands that it is 30% of total installed Filter cartridges in all the three streams/trains and not of installed membrane. Kindly confirm Bidder's understanding.	Bidder's understanding is correct.
1241	VI, PART-A	IIA-20 CONDENSATE POLISHING UNITS	1 OF 2	2.03.00	Inclusion of adequate resins for all the condensate polishers service vessels, resin storage vessels (2 nos.) in regeneration area and one (1) additional charge for use during commissioning stage of unit. Therefore, total number of charges supplied by bidder shall be either eleven (11) or nine (9) corresponding to offered configuration (4 x 33.33 % or 3 x 50%) of service vessels.	As per standard design of supplier of no. of resin storage vessel is 1 no. so, total number of charges supplied by Bidder shall be either ten (10) or eight (8) corresponding to offered configuration (4 x 33.33 % or 3 x 50%) of service vessels.	Bidder to refer amendment no. WS1-03 in this regard.
1242	VI, PART-A	IIA-20 CONDENSATE POLISHING UNITS	1 OF 2	2.04.00	CPU Regeneration facilities shall consist of but not limited to the following systems and equipments: a) b) One (1) set of regeneration facilities consisting of Resin separation vessel, Cation, Anion regeneration vessel(s), Resin make-up hopper, Mixed resin storage vessels (2 nos) etc.	No. of vessels in regeneration area will be as per standard design of supplier.	Bidder to refer amendment no. WS1-04 in this regard.
1243	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-2 STEAM TURBINE GENERATOR	26 OF 31	1.00.00	CPU/Regen Area Blowers 4 Gears	Owner is requested to delete the requirement of "Gear" as the same is not applicable.	Bidder to refer amendment no. WS1-06 in this regard.
1244	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-2 STEAM TURBINE GENERATOR	27 OF 31	1.00.00	Agitators 4 Any other agitator assembly with motor & gear box	Owner is requested to delete the requirement of "Any other agitator assembly with motor & gear box" as the same is not applicable.	Bidder to refer amendment no. WS1-07 in this regard.
1245	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-2 STEAM TURBINE GENERATOR	26 OF 31	1.00.00	CPU/Regen Area Pumps including N-pH & Backwash 6 Stuffing box for each type	Owner is requested to delete the requirement of "Stuffing box for each type" as the same is not applicable. Hence, Bidder understands that Stuffing box, if applicable, will be considered. Kindly confirm Bidder's understanding.	Bidder's understanding is correct. Bidder to refer amendment no. WS1-07 in this regard.
1246	TECHNICAL SPECIFICATION S SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	1 of 3	1.06.00	Fuel oil system a) Connection from existing LDO supply to pressurizing pump suction line as indicated in the tender drawing. b) Existing LDO storage tanks (2x4000 KL) for LDO return line from the boiler. c) Future interconnection tap off at common discharge line of existing LDO pumps	Bidder request owner to provide the following drawing/details for existing facilities :- 1) Routing of existing suction header along with branch pipe for bidder's suction pipe connection for pressurizing pumps. 2) GA Drawing of existing fuel oil storage tank showing the nozzle details for bidder's pipe connection at LDO storage tank. 3) GA Drawing of existing fuel oil pump house and dyke area 4) Details of existing OWS pit 5) Details of future discharge tap off size and pressure requirement.	Details shall be shared with the successful bidder.
1247	TECHNICAL SPECIFICATION S SECTION – VI, PART-A vs TECHNICAL SPECIFICATION SECTION – VI, PART-E	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS vs TENDER DRAWINGS	1 of 3 vs 37 of 85	1.06.00 vs 9587-001-POM-A-017	Fuel oil system c) Future interconnection tap off at common discharge line of existing LDO pumps Fuel oil Scheme - 9587-001-POM-A-017 Rev. B	Owner is requested to elaborate the requirement related to interconnection. We understand that bidder to consider one future interconnection tap off at common discharge line of bidder's supplied pressurizing pump. In addition there is one more tap off for "Existing Stage #1 LDO supply line" from bidders piping system as indicated Fuel oil Scheme - 9587-001-POM-A-017 Rev. B. Future interconnection tap off for existing LDO pumps is not clear.	The same is given towards interconnection with existing units.
1248	TECHNICAL SPECIFICATION S SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	1 of 3	1.06.00	Fuel oil system b) Existing LDO storage tanks (2x4000 KL) for LDO return line from the boiler.	Based on OEM, LDO return line (Long recirculation line) from boiler area to storage tank is not required. Bidder understand that OEM practice can be followed. Owner is requested to confirm bidder's understanding.	Specifications are clear. Bidder to comply the same. Further, specific details shall be discussed during detail engineering in line with the specifications requirements.
1249	TECHNICAL SPECIFICATION SECTION – VI, PART-E	TENDER DRAWINGS	37 of 85	-	Fuel oil Scheme - 9587-001-POM-A-017 Rev. B General Layout Plan - 9587-999-PCC-F-001 Rev. 0	1) Bidder request owner to provide the corridor for routing the bidder's fuel oil pressuring discharge pipe and return pipe in owner's stage-I facilities. 2) Fuel oil Scheme - 9587-001-POM-A-017 Rev. B : Indicates the tap off in pressuring discharge line with isolation valves "Existing Stage #1 LDO supply line". Accordingly, Bidder understand that Piping between Stage-I discharge piping and Stage-II discharge piping will not be in bidder's scope. 3) Owner is requested to provide the terminal point of tap off in pressuring discharge line.	1. The same shall be shared with the successful bidder. 2. The scope is marked in the fuel oil scheme - 9587-001-POM-A-017 Rev. B. 3. Bidder's query context w.r.t. the specific terminal point is not clear. Bidder to refer the tender fuel oil scheme for specific details.
1250	TECHNICAL SPECIFICATION S SECTION – VI, PART-A vs TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS vs SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	3 of 3 vs 2 of 66	4.01.00 vs 1.01.02	Exclusions - c) Fuel oil unloading & storage system Fuel Oil (a) Description of Fuel Oil Unloading & Storage System The fuel oil requirements for steam generator shall be drawn from the LDO tanks to be provided by the contractor. The fuel oil pressurizing, and firing system shall be in the scope of contractor. Bidder shall include all required piping, valves, fittings, instrumentation etc. unto the terminal point.	As per Exclusion, Fuel oil unloading & storage system is not in bidder's / contractor's scope. However clause 1.01.02 indicates LDO storage tanks in contractor scope. Bidder has found mismatch between two clauses, requested to re-look the requirement and update the specification suitably.	Bidder to refer the amendment No. SG1 in this regard.
1251	TECHNICAL SPECIFICATION S SECTION – VI, PART-A	SUB SECTION-A-22 SEPARATION OF PLANT DRAINS FROM STORM WATER DRAINS	3 of 3	1.11.00	Fuel oil handling Area The wash water from the FOPH area containing traces of oil shall be pumped to oil water separator RCC pit in the fuel oil unloading area. The decanted water shall be reused/recycled for the washing of fuel oil handling areas. Parallels, decanted water shall be collected in FOH area RCC pit/ sump(s) and pumped to Employer's waste service water sump (WSWS) located in LET plant.	Bidder understand that existing oil-water separator pit shall be available near existing fuel oil pump house. Bidder to discharge the oily water into existing oil water separator pit. Accordingly, Oil Water Separator Pit along with its decanted water pumps are not envisaged in bidder's scope. Customer is requested to confirm bidder's understanding.	The same shall be decided during detailed engineering, based on feasibility, meeting technical specification requirements.
1252	TECHNICAL SPECIFICATION S SECTION-VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	18 of 28	2.18.00	Fuel Oil System 18) Necessary approval is required from statutory authorities for the entire F.O. pumping installation. Contractor shall prepare all necessary drawings/data/documents as per the requirements of the Statutory Authority and obtain the necessary approval from the authorities	Bidder understand that approval is envisaged from statutory authority for bidder's supplied items only. Any approval for existing LDO system (including LDO tanks, dyke and pump house) are not in bidder's scope. Customer is requested to confirm bidder's understanding.	Bidder to note that the specified clause refers for the entire Fuel oil pumping installation. The same is applicable for the items/systems in bidder's scope. Contractor shall prepare all necessary drawings/data/documents as per the requirements of the Statutory Authority and obtain the necessary approval from the authorities.

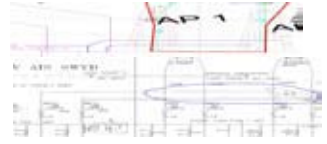
EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
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1253	TECHNICAL SPECIFICATION S SECTION-VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	27 of 28	6.00.00	Provision for ready plant for methanol firing The methanol as produced above (refer cl. 5.00.00) shall be utilized, as a co-firing fuel/support fuel, for future firing in the boilers under the package scope. The provisioning of methanol as a future fuel shall be for 30% BMCR load. The same shall be done by providing/identifying required space including necessary provisioning for pipe routings, cables etc. and for this purpose loads to be factored-in for the trestle design, cable design. The required space for this purpose has been shown in GLP. The space for the pumps, tanks etc. shall be kept for the above in fuel oil pump house and boiler area also. Also refer space provisioning requirements referred elsewhere in the specifications.	Please provide details of methanol system equipment i.e. pump capacity, quantity, size, pipe sizes, drain tank size, cable sizes etc. to plan and provide space requirement to be made provision of in the FOPH building and to be considered for trestle design.	The properties of methanol are already given. Bidder to accordingly consider the same along with BMCR load criteria towards factoring the same for the specified purpose.
1254	TECHNICAL SPECIFICATION S SECTION-VI, PART - B vs TECHNICAL SPECIFICATION S SECTION - VI, PART-A	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE vs SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	60 of 227 vs 3 of 3	TABLE-2 vs 4.01.00	LIST OF EQUIPMENT'S CONSIDERED FOR STATION AUXILIARY POWER CONSUMPTION g) Fuel Oil system: Unloading pumps of fuel oil system Exclusions - c) Fuel oil unloading & storage system	As per Tech spec Section-VI, Part-A, SS-II Clause 4.01.00, bidder understands that Fuel oil unloading pumps along with storage system are not in bidder's scope of work. Accordingly table-2 of SS G-04 to be updated. Please confirm and update.	Bidder to refer amendment No. SG1 in this regard.
1255	Section - VI, part A	SUB-SECTION-I-A PROVENNESS	1 of 36	1.0	Provenness of Turbine Set The offered LP turbine module should have been in successful operation for a period of not less than one (1) year prior to the date of techno commercial bid opening.	A) NTPC requires LP Turbine exhaust annulus area as part of provenness requirement for the offered TG module as mentioned in the Attachment-3K document. Bidder meets the above mentioned requirement with the reference module. NTPC to kindly note that there is a slight difference in blade height of the offered module from reference module. This is outcome of performance optimization as part load operation is gaining weightage due to renewable integration with the grid. Bidder understands the same is acceptable to NTPC. Please confirm. B) As per long term experience of LMTGMH, last stage blade height is considered as provenness requirement for defining equivalence between offered module and reference module. Kindly note that offered last stage blade height is already in operation for more than 1 year. Hence bidder request NTPC to consider last stage blade height as an alternative criteria for meeting the provenness requirement along with exhaust annulus area. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply Technical specification requirement.
1256	ATTACHMENT - 3) ANNEXURE-I TO ATTACHMENT-3K		168 of 401	3	ATTACHMENT - 3K LP Turbine : 3. Exhaust area provided / maximum possible	Kindly note that offered last stage blade height is already in operation for more than 1 year. Hence bidder request NTPC to consider last stage blade height as an alternative criteria for meeting the provenness requirement along with exhaust annulus area. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply Technical specification requirement.
1257	Section - VI, part A	SUB-SECTION-IV	6 of 76	1.01.02	CATEGORY-I GUARANTEES (i) Guaranteed Unit Heat rate at 800 MW under rated steam conditions @ 77 mmHg condenser pressure – Not more than 208 Kcal/kwh (ii) Guaranteed Unit Heat rate at 440 MW under turbine throttle steam pressure of 150 Kg/cm2 (a) rated main steam & reheat temperatures @ 77 mmHg condenser pressure – Not more than 2185 Kcal/kwh	Based on the available coal properties & boundary conditions provided in the specifications, Limiting values provided for Heat rate are too stringent & impossible to achieve. Bidder request owner to further increase the limiting values of Unit Heat rate @ 100% TMR & 55% TMR.	Bidder to comply Heat Rate guarantees as specified in Technical specification.
1258	Section - VI, part A	SUB-SECTION-IV	7 of 76	1.01.02	CATEGORY-I GUARANTEES (x) Unit Auxiliary power consumption : Not more than 42 MW	Limiting values provided for Unit Auxiliary power consumption are too stringent & impossible to achieve. Bidder request owner to further increase the limiting value for Unit Aux power.	Bidder to comply Unit Aux power consumption guarantee as specified in Technical specification.
1259	SECTION VI, PART-A	SUB SECTION-A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	28 of 28	-	Architectural Features for Steam Generator Enclosure Boiler structure being the heart of the power plant shall be architecturally treated to have an aesthetic appearance and shall be comparable with international buildings of repute. Boiler structure shall be in complete harmony with the main plant building surrounding structures and environment. Accordingly, to achieve the same following provision (not limited to) shall be applied. 1. Boiler enclosure shall be covered with colour coated metal sheeting. The metal sheet shall display a visually appealing painting (which will be informed later) on outside. The height covered for sheeting will be from boiler roof to Penthouse and 15 m below from penthouse. During Overhauling or repair, the covering should not restrict material movement from Top and Sides of the boiler. Accordingly, removable type sheet shall be provided for such location. Necessary approach and lugs shall be provided for this purpose.	Bidder would request to kindly remove this clause as the bidder is providing suitable boilers casing at the Roof and Penthouse. The additional requirement shall increase the heat and ventilation given in same area may not be suitable, which will create a space where carrying out any online maintenance or inspection work will not be possible. Kindly confirm acceptance.	Bidder to refer the complete clause along with S.N.#2 wherein ventilation aspect is also covered to obviate the heating. Bidder to accordingly design the system and comply the specifications requirements.
1260	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE	General		Chapter-1 Mandatory spares quantity mentioned in Mandatory spares list	Customer is requested to review the mandatory spare list provided for Steam Generator & associated auxiliaries as the mandatory spares quantum mentioned in the list are comparatively high as compared to Customer's previous projects of similar capacity. We have also observed that many of the spares requested by Customer are not in line with Bidder's/ Bidder's OEM standard practice/offers. Bidder would like to discuss mandatory spare list with Customer and request Customer to finalize the mandatory spares list before bid submission. Kindly accept our request.	Specifications requirements are clear. Bidder to comply with the specification requirements.
1261	SECTION - VI, PART-A	SUB-SECTION-I	5 OF 9	4.02.00	Pre-commissioning and commissioning activities The contractor's scope shall include all These quantities for both coal and fuel oil shall be compared with the respective quantities as quoted by various bidders. The quantities over & above the base value (minimum among the quoted figures for coal & fuel oil) shall be used as a loading factor and corresponding computed price (total for coal & fuel oil) shall be added to the quoted bid price for deriving the total bid price. The cost of coal & fuel oil shall be used as Rs. 1700/Ton (Rupees one Thousand seven Hundred and ninety only per ton of coal) Rs. 40,000/KL (Rupees Forty Thousand per KL of fuel oil) for such purpose.	Coal and Fuel oil consumption during pre-commissioning, commissioning activities upto the successful completion of Initial Operation is highly dependent on the factors like quality of coal, shutdown or backing down of unit due to reasons not attributable to the EPC contractor. Accordingly, we request Employer to remove the evaluation loading on Coal and Fuel oil (LDO) and specify the limit for commissioning upto which Coal and Fuel oil (LDO) will be issued free of cost by Employer.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1262	SECTION - VI, PART-A	SUB-SECTION-I	6 OF 9	4.02.00	There shall be no rebate to the Contractor if the coal & oil quantities as consumed during execution (up to the initial operation as above) remains lesser than the quoted consumption for oil and corrected quoted consumption for coal.	Bidder understands that if the coal & oil quantities, consumed by Bidder during execution (up to the initial operation as above) stage, remains lesser than the quoted consumption for oil and corrected quoted consumption for coal, the rebate will provide by Employer to Contractor as per the prevailing landed rate of coal and fuel oil at site at the time of execution. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the technical specification requirements.
1263	SECTION - VI, PART-A	SUB-SECTION-I	6 OF 9	4.02.00	For this purpose, Bidder's quoted coal consumption quantity shall be corrected for variation above/below 60% of rated load during the period of initial operation as per following:	a) We request Customer to clarify how coal consumption will be calculated. Kindly clarify whether the Coal Consumption will be calculated from coal feeder totalizer reading or from GCV basis. Kindly clarify. b) We understand that Customer will ensure that the coal and fuel oil quality/analysis will remain same as provided in Tender Specification during complete period of pre-commissioning, commissioning activities up to initial operation completion. Kindly confirm. c) We understand that the PC test (CA-T-1 as specified in tender specification) will be performed during the 720 hours trial operation. In case PC Test is delayed beyond 720 hours due to any reason attributable to Customer, the coal and fuel oil consumption required for additional period shall be provided by Employer free of any charge to Bidder. Kindly confirm.	a) Coal shall be calculated based on the available methods of measurements. b) Best efforts shall be made to maintain the specified fuel quality. c) Commissioning/Initial operation activities is totally in control of bidder. Any additional requirement (coal & fuel oil) which is specifically agreed by employer during the commissioning/initial operation activities (due to employer's requirement/reason) may be considered. Further, Bidder to comply with the specification requirements.
1264	SECTION-VI, PART-B	SUB-SECTION-E-60	-	-	INDICATIVE VENDOR LIST Provenness criteria for critical equipment(s) and bought out items	Kindly note that Employer has provided a list of approved sub-contractors/sub vendors for the items covered under provenness category for SG & associated auxiliaries. We understand that Bidder is not required to submit any qualification documents for the vendors' already approved by Customer and covered in this section. Bidder will submit qualification documents only for those vendors which are not covered in the approved vendor list provided in Tender Document and are proposed by Bidder for any items/system/equipment covered under provenness criteria. Kindly confirm that our understanding is correct.	Vendors to submit project specific documents as per Sub-QR requirements. Bidder to please comply specification requirements.
1265	SECTION-VI, PART-A	SUB-SECTION-I-A	-	-	ATTACHMENT - 3K	Kindly note that Employer has provided a list of approved sub-contractors/sub vendors for the items covered under provenness category for SG & associated auxiliaries. We understand that Bidder is not required to submit any qualification documents for the vendors' already approved by Customer and covered in this section. Bidder will submit qualification documents only for those vendors which are not covered in the approved vendor list provided in Tender Document and are proposed by Bidder for any items/system/equipment covered under provenness criteria. Kindly confirm that our understanding is correct.	Vendors to submit project specific documents as per Sub-QR requirements. Bidder to please comply specification requirements.


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1266	SECTION-VI, PART-B	SUB-SECTION-E-00	-	-	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL Company name 'L&T-MHPS Boilers Private Limited'	The company name 'L&T-MHPS Boilers Private Limited' is mentioned for various items/systems in the sub-vendor list. Customer is requested to note that this company name is changed to 'L&T-MH Power Boilers Private Limited'. We request Customer to kindly use new company name (i.e. 'L&T-MH Power Boilers Private Limited') for approval in sub-vendor list in the application items/ systems for this project.	Requisite documents may be furnished for Name Change during detailed engg. for updation of records in line with NTPC system of sub vendor approval.
1267	Section - VI / Part-A	Sub-section-II D	5 OF 8	1.00.01	All steel structures shall be fabricated in factory, transported and erected at site. All factory-fabricated structures shall have bolted field connections. Coal bunkers with hoppers, Chimney flue liners, CW duct liners can either be fabricated at factory in segments transported and welded at site before erection or fabricated at site. For coal bunkers, hoppers and chimney flue liners, to prevent coal dust/flue gas leakages, the applicable field joints shall necessarily be welded. Note: Steel structures shall mean plant and non-plant building structures, boiler & ESP support structures, Coal, AHP structures, chimney flue liners support platforms & stairs, pipe and cable support structures.	Bidder would like to propose site fabrication of Boiler Ceiling Girder, Backend structure, pipe and cable support structures, secondary structure at project site meeting the specified field quality requirements. Bidder has sufficient experience of fabrication of these structural material at project site for various other customers. We request Customer to kindly allow the site fabrication of above structures.	Bidder's proposal is not accepted. Bidder to comply with the specification requirements.
1268	Section - VI / Part-A	II A-01	24 OF 28	2.30.00	7. Boiler to be provided with vacuum cleaning system network to ensure proper hygiene. In this context portable system to capture the ash around the boiler peripheral surface shall be provided alongwith net worked transmission of captured ash to a common location. Following specific elevations of Boiler requiring installation of vacuum cleaning arrangement in Boiler Front, Rear, LHS and RHS are also to be covered other than required areas: 1) Penthouse Floor 2) Gooseneck area floor covering both first pass and backpass. 3) Boiler Scaffolding door floor covering both first pass and backpass 4) Top wall blower ter floor covering both first pass and backpass 5) Top burner top floor covering both first pass and backpass 6) Burner bottom floor covering both first pass and backpass 7) S Panel (approx.8.5 to 9M)	Bidder will consider open grating for Boiler platforms at various elevations except oil prone areas in which chequered plates have been considered as per Tender specification. Hence, possibility of ash accumulation on the platforms around boiler peripheral is very less. Hence, Bidder would like to recommend that vacuum cleaning system for ash removal on platforms is not required. Customer is requested to delete this requirement from bidder's scope.	Bidder to comply with the installation of vacuum cleaning arrangements as per the specifications requirement.
1269	Section - VI / Part-A	SUB-SECTION-I-A	-	4.0	Provenness criteria for other equipments/ systems 4.23 Selective Catalytic Reduction System 4.24. Provenness criteria for critical equipment(s) and bought out items for SCR system	We have observed that the equipment/system/items covered under provenness are not aligned with Steam Generator package scope. E.g. Catalyst, ammonia handling system, etc. are not applicable for this package, however included in provenness criteria. NTPC is requested to review the provenness criteria and align it with SG package scope. Kindly confirm.	Bidder to refer the scope as defined in the specifications. Accordingly, subvendor supplied equipment's design & engineering as per package scope is included in bidder's scope. Bidder to comply the specifications requirements.
1270	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	8 of 15	3.06.00, h),d)	A spare capacity of about 10 % shall be kept for addition of loads during detail engineering as many of the LT loads cannot be predicted during the Rating selection of the Board.	Bidder understands that the 10% design margin shall be considered in LT switchboard sizing. Owner may please confirm bidder's understanding.	
	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL SPECIFICATION	9 of 15	3.06.00, k)	Each of the LV switchboards shall be designed for 1.1 times the required rating as a spare capacity.		Bidder to refer amendment No. Elec-11 in this regard.
1271	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	3 of 3	3.01.03	Employer shall provide one (1) number, 415 V, three phase 3-wire, 50 Hz feeder for UPS each at makeup water system and AWRS system. All required Cables from this feeder to Contractor UPS panel will be in contractors scope.	Details regarding the scope of supply of 230V UPS system for makeup water system and AWRS is not indicated in the part-B Document. Owner may please clarify regarding the scope of supply of UPS System.	
	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB-SECTION-III-C-05 POWER SUPPLY	1 of 10	-	-	Further, Bidder also requests Owner to specify the tentative distance from the UPS Panel to Load/DCS panels.	Please refer part-A. The scope of make up & AWRS power supply is already indicated in the scope of Bidder .Bidder to comply technical specification requirements.
1272	TECHNICAL SPECIFICATION SECTION - VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	3 of 3	3.01.04	Employer shall provide two (2) number, 415 V, three phase 3-wire, 50 Hz feeder for 24 VDC system each at makeup water system and AWRS system. All required Cables from these feeder to Contractor 24VDC panel will be in contractors scope.	Details regarding the scope of supply of 24V DC system for makeup water system and AWRS is not indicated in the part-B Document. Owner may please clarify regarding the scope of supply of DC System.	
	TECHNICAL SPECIFICATION SECTION - VI, PART-B	SUB-SECTION-III-C-05 POWER SUPPLY	1 of 10	-	-	Further, Bidder also requests owner to specify the tentative distance from the UPS Panel to Load/DCS panels.	Please refer part-A. The scope of make up & AWRS power supply is already indicated in the scope of Bidder .Bidder to comply technical specification requirements.
1273	Part-E2-Drawings	Dwg. No. 9587-999-POC-F-001-General Layout plan	-	-		Two towers are shown in background for Champa and Raigarh kotra line. Kindly clarify and provide firm location of towers.	Location of towers will be provided during the detailed Engineering. Bidder has to do site visit also for better understanding. Kindly refer revised GLP.
1274	Part-E2-Drawings	Dwg. No. 9587-999-POC-F-001-General Layout plan	-	-		SS-1 & LM-1 is located under new tile transmission line corridor between stage-I & Stage-II. Bidder understands that relocation of any existing structures overlapping with new T line is not under bidder's scope.	Bidders understanding is not correct. Bidder to refer amendment No. Elec-1-04 in this regard.
1275	Part-E2-Drawings	Dwg. No. 9587-999-POC-F-001-General Layout plan & Dwg. No. 9587-999-POE-J-002-SLD 400KV Switchyard	-	-		It is observed that sufficient space for bus-sectionalization is not available in the layout. Kindly clarify & so that bidder can have idea for estimating required modification. Further, Bidder understands that the structure/equipment present in Lara I switchyard expansion area shall be available for Bidder's use.	1. Sufficient space is available to execute the scope of work shown in tender SLD as per owners preliminary assessment. The area has also been physically shown to bidders during pre bid conference. 2. Bidder's query is not clear.


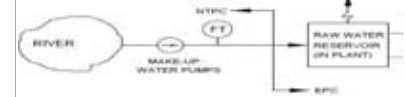


EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1276	Part-E2-Drawings	Dwg. No. 9587-999-POC-F-001-General Layout plan & Dwg) No. 9587-999-POE-J-002-SLD 400kV Switchyard				Owner to kindly confirm how new connection from new bay to Kotra line is planned. Bidder is unable to plan/estimate details in this area due to non-availability of actual drawings.	Employer has decided for IPS Tube connection from new bays to Kotra line during the preliminary assessment. Bidder shall have a choice of providing a better proposal which can be decided during the detailed Engineering only.
1277	Part-A, Section-VI	Sub section-IB ELECTRICAL SYSTEM / EQUIPMENTS	Page 9 of 20	CI.No-1.16.02	400kV Overhead Transmission Line : One (1) No. of 400kV Double Circuit interconnecting overhead Tie line between Lara Stage-I and Stage-II Switchyard with Twin Moose Conductor on towers	Bidder understands from the SLD 400kV Switchyard Drawing No-9587-999-POE-J-002, interconnecting tie line between proposed LARA-II AIS switchyard with stage-II AIS switchyard in stage-I area shall be QUAD Moose. As per the referred clause, Interconnection of outgoing Line bays of stage-II AIS switchyard in stage-1 area with existing tower shall be with Twin Moose. Please confirm whether bidder understanding is correct and resolve the discrepancy.	Interconnecting overhead Tie line between Lara stage-I and Stage-II shall be Quad Moose only. Bidder to refer amendment No. Elec1-10 in this regard.
1278	Part-A, Section-VI	Sub section-IB ELECTRICAL SYSTEM / EQUIPMENTS	Page 10 of 20	CI.No-1.16.03	Bidder's scope shall also include the complete interconnection of Earth grid with existing Earth grid of Stage-I switchyard.	As per the referred clause, scope includes the complete interconnection of Earth grid with existing Earth grid of Stage-I switchyard. In this regard, kindly provide the earthmat layout of existing Stage-I Switchyard.	Will be provided during the detailed engineering.
1279	Part-A, Section-VI	Sub section-IB ELECTRICAL SYSTEM / EQUIPMENTS	Page 13 of 20	CI.No-1.16.07 (h)	Bus bar protection for all 400kV bays under present scope shall be in bidder's scope.	Bidder understands that the existing 400kV Busbar protection shall be extended for the proposed 400kV Lara-II AIS Switchyard extension at Stage-1 area. In this regard, please furnish the following details: a) Make & Model number b) Type of Bus bar protection - Centralized (or) Decentralized? c) If decentralized type, whether Bay units are already available for the bays proposed under this package. Further, if new Busbar protection is required to be provided, we request Owner to confirm the requirement, as the new Busbar protection need to be considered for the existing bays (in Lara-I SWYD) + new bays (Lara-II SWYD in Stage-I area).	1. Bidder understanding is not correct. Existing bus bar protection shall not be extended to Lara-II AIS switchyard extension at Stage-I Area. 2. Dedicated and separate busbar protection schemes shall be provided for Stage-II AIS Bays in Stage-II area and Stage-II AIS Bays in Stage-I Area.
1280	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (i)	Bidders scope shall include interconnection of outgoing line bays of LARA-Stage-II AIS switchyard with the existing Tower of LARA-I Raigarh-Kotra line. Any modifications required for this purpose shall be in the scope of the bidder.	Bidder understands both the existing Raigarh (Kotra) Line from Lara-I & the proposed outgoing line from Lara-II AIS switchyard (in Stage-1 area) will be connected to the same transmission tower & shall follow the same TL route. In this regard, Please confirm type of existing tower and whether tower has the capability to carry two more circuits.	1. Bidders understanding is not correct. Existing connection to stage-I switchyard to be dismantled. Bidder to refer amendment No. Elec1-04 in this regard.
1281	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (i)	Bidders scope shall include interconnection of outgoing line bays of LARA-Stage-II AIS switchyard with the existing Tower of LARA-I Raigarh-Kotra line. Any modifications required for this purpose shall be in the scope of the bidder.	Please clarify whether the existing line stringing from SWYD gantry to the TL tower for the D/C Lines to Raigarh (Kotra) from Lara-I AIS SWYD need to be dismantled after connecting the proposed outgoing line bays from Lara-II AIS SWYD to the existing Stage-1 TL tower	Complete dismantling of stringing is not required. Only dismantling of dropper Connection from bay to the line shall be removed.
1282	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (i)	Bidders scope shall include interconnection of outgoing line bays of LARA-Stage-II AIS switchyard with the existing Tower of LARA-I Raigarh-Kotra line. Any modifications required for this purpose shall be in the scope of the bidder.	Scope of work include interconnection of O/G line bays in Lara-II AIS switchyard with the existing tower of Lara-I to Raigarh (Kotra) line. As the proposed interconnecting line shall cross the existing D/C Champa line, to avoid line crossings, we propose to connect the outgoing line from Lara-II AIS switchyard (in Stage-1 area) to the existing tower at the height of equipment bus level. Please confirm.	Bidder shall have a choice of connecting the outgoing line from LARA-II AIS Switchyard extension (in stage-I Area) to existing tower of Raigarh-kotra line at the height of equipment bus level or any other level which can be decided during the detailed Engineering only. Bidder to refer amendment No. Elec1-04 in this regard.
1283	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (i)	Bidders scope shall include interconnection of outgoing line bays of LARA-Stage-II AIS switchyard with the existing Tower of LARA-I Raigarh-Kotra line. Any modifications required for this purpose shall be in the scope of the bidder.	Bidder requests Owner to provide the layout section drawings indicating the height of line stringing for the existing Champa D/C line from Lara-I AIS Switchyard.	Will be provided during the detailed engineering.
1284	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (ii)	FOTE equipment , FODP JB, Fiber Approach cable etc required at 400 KV Switchyard at Lara STPP Stage-II shall be in the bidder's scope.	Bidder understands following as per SAS architecture Drawing No-9587-999-POE-J-003: a) Existing FOTE equipment shall be used as it is for the D/C lines to Champa & Raigarh from Stage-I SWYD b) The Lines between Stage-I & II are connected at Station level of SAS and hence separate FOTE is not required for the same c) Bidder shall consider FOTE only for the D/C lines to HVDC substation. d) Bidder does not envisage any FOTE Equipment for the remote end HVDC station Please confirm.	a) Bidder's understanding is correct. However, any extra Hardware/Software needed for this is in the scope of the Bidder. Bidder to note that in the existing system, FOTE is available for one channel and PLCC is being used for the other channel. b) Bidder's understanding is correct. c) Bidder's query is not clear. d) Bidder's understanding is correct.
1285	Part-A, Section-VI	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS AND OWNERS INPUT	Page 2 of 3	CI.No-2.00.00 (b) (ii)	FOTE equipment , FODP JB, Fiber Approach cable etc required at 400 KV Switchyard at Lara STPP Stage-II shall be in the bidder's scope.	Please confirm the following w.r.t the FOTE Equipment at the ISTS Pooling station remote end substation: a) Make & Model number b) Transmission Capacity (STM-1/STM-4/STM-16)	Will be provided during the detailed engineering.
1286	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 0 GENERAL ELECTRICAL REQUIREMENTS	Page 2 of 15	CI.No-1.12.00	In fire hazardous areas like gas/ liquid fuel storage/ handling areas, lighting fixtures, and switchgears shall be flame proof.	Bidder requests Owner to kindly provide the details regarding presence of any hazardous area for the current scope of work. Bidder understands that in general Switchyard shall be located in a non-hazardous atmosphere. Please confirm	As mentioned in cl. No. 1.12.00, gas/liquid fuel storage/handling areas shall be considered as fire hazardous areas. In addition to the above, any other handling/storage area as per applicable Indian safety standards shall also be considered as fire hazardous area.
1287	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 0 GENERAL ELECTRICAL REQUIREMENTS	Page 12 of 15	CI.No-3.08.00	(i) simultaneous operation of the maximum number of breakers & associated equipment's in case of bus fault in the switchyard.	The battery for Switchyard shall be sized by considering the worst case condition as tripping of all circuit breakers connected to one Main bus in the event of a busbar fault. Please confirm.	Bidders understanding is correct only for cl. No.3.08.00(i). However Bidder has to do the battery sizing as mentioned in clause no.3.08.00 of B-0 General Electrical Requirements.
1288	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 13 SUBSTATION AUTOMATION SYSTEM	Page 7 of 46	CI.No-6.08.03	Necessary hardware/software to ensure provision for Remote Interface with RLDC shall also be provided by the contractor.	a) As per the referred clause, Bidder shall provide necessary hardware & software only at the LARA substation end and ensure data availability in the SAS Gateway for RLDC communication. b) Bidder does not envisage any supply of Hardware & software at RLDC end. c) Also Bidder does not envisage any RLDC integration works in the present scope of this package. Please confirm.	a) Bidders understanding is correct. However, bidder shall demonstrate availability of desired data at the output of the gateway. b) Bidders understanding is correct. c) Bidder's understanding is correct. However, any Hardware/software required for point (a) is in the bidder's scope.
1289	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 13 SUBSTATION AUTOMATION SYSTEM	Page 10 of 46	CI.No-7.02.00	Merging Units (MU) for Conventional CT and VT	Please confirm whether SAS at Lara-II SWYD (in stage-2 area) to be considered with Conventional SAS control (or) with Process bus based Digital SAS.	Stage-II AIS bays including extension bays in stage-I area shall be process bus based SAS only.
1290	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 13 SUBSTATION AUTOMATION SYSTEM	Page 25 of 46	CI.No-11.03.00	PMUs shall be considered for 400kV line bays except 400kV Tie Line Bays and shall be installed in switchyard control room and adjacent to line BPU panels.	As per referred clause, PMUs shall be considered for 400kV line bays except 400kV Tie Line Bays. Bidder shall not consider any PMU in Bidder's scope as there is no Line bays in the present scope of work except Tie Lines. Please confirm.	Bidders understanding is correct. For future lines (line-3 and 4) as marked in Switchyard SLD of tender drawings, PMU shall be provided in case future line bays are in the bidder scope.
1291	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 13 SUBSTATION AUTOMATION SYSTEM	Page 25 of 46	CI.No-11.03.00	The offered panel mounted PMUs shall be complete in all respect so that they can be installed at the substation and can communicate with Phasor Data Concentrator (PDC).	As per the referred clause we presume that PMU integration with PDC is not in the scope of Bidder. Only the required hardware & software required at LARA Substation end is in present scope. Please confirm.	Bidder's understanding is correct.
1292	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 17 SWITCHYARD ELECTRICAL	Page 3 of 97	CI.No-1.01.17	No lighting fixture shall be mounted on gantries, they shall be mounted on Lightning Masts/ High lighting masts only.	Bidder proposes to consider mounting of light fixtures on towers, gantries & building structures in addition to lighting masts to achieve better uniformity for illumination of the Switchyard. Please confirm.	Bidders Proposal is not acceptable. Bidder Must adhere to the technical Specifications only.
1293	Part-B, (BOOK 2 OF 5 - ELECTRICAL) Section-VI	SUB-SECTION-B - 17 SWITCHYARD ELECTRICAL	Page 3 of 97	CI.No-1.01.21	Two nos. of suitable separate power supply from existing LT switchgear shall be provided to each AC kiosk to cater power supply to panels and AC separately	Bidder understands that power supply to AC kiosk for the control & protection panels belongs to LARA Stage-II switchyard bays in stage-I area are extended from Existing LT switchgear in LARA Stage-I as per the referred clause. Please confirm.	Bidder to refer amendment No. Elec1-08 in this regard.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1294	Part-B, (BOOK 2 OF 5 – ELECTRICAL) Section-VI	SUB-SECTION-B – 17 SWITCHYARD ELECTRICAL	Page 4 of 97	CJ.No-1.01.30	Scope of work at Existing LARA Stage-I (2X800MW) 400kV Switchyard	As the scope of work involves Bus extension of LARA stage-1 Switchyard. Please provide overall equipment layout (including plan & section views) of LARA stage-1 Switchyard.	Will be provided during the detailed engineering.
1295	Part-B, (BOOK 2 OF 5 – ELECTRICAL) Section-VI	SUB-SECTION-B – 17 SWITCHYARD ELECTRICAL	Page 5 of 97	CJ.No-1.01.30 (x)	The Bidder shall provide SWGR / MCC/ AC Boards & DC Boards for further distribution of 415V AC supply, 220V DC supply for the requirement of Present scope of Bays and these Boards shall be placed in Existing LARA Stage-I SWYD panel room.	Please confirm whether sufficient space available for placing SWGR / MCC/ AC Boards & DC Boards for further distribution of 415V AC supply, 220V DC supply for the requirement of Present scope of Bays in Existing LARA Stage-I SWYD panel room.	Sufficient space is available for placing of SWGR/MCC/AC Boards & DC Boards in MCC Room of switchyard service switchgear.
1296	Part-B, (BOOK 2 OF 5 – ELECTRICAL) Section-VI	SUB-SECTION-B – 17 SWITCHYARD ELECTRICAL	Page 7 of 97	CJ.No-1.12.01	The validity period of reports shall be as per CEA Guidelines for the validity period of Type test(s) conducted on Major Electrical Equipment in power Transmission- May2020 & with latest amendments for the from the date of bid opening.	Bidder understands that the validity period of type test reports shall be as per CEA Guidelines for the validity period of Type test(s) conducted on Major Electrical Equipment in power Transmission-May2020 & with latest amendments, from the date of bid opening as per the referred clause. Please confirm.	Bidder's understanding is correct.
1297	Part-E2-Tender drawing	-	-	-	SLD 400kV Switchyard Drawing No-9587-999-POE-J-002	Please confirm whether CSD is required for Generating transformers bays and associated tie bays.	CSD is not required for GT bays. Bidder has to refer the Tender drawing: 9587-999-POE-J-002.
1298	Part-E2-Tender drawing	-	-	-	SLD 400kV Switchyard Drawing No-9587-999-POE-J-002	Please confirm whether bidder can choose one and half breaker scheme with I-type configuration instead of D-type configuration as shown in the referred SLD.	Bidder can choose I-type configuration subjected to land availability. Bay configuration in I-Type shall be subjected to Employers Approval.
1299	Part-E2-Tender drawing	-	-	-	SLD 400kV Switchyard Drawing No-9587-999-POE-J-002	All lines shown with wave trap except interconnection line at LARA-II AIS SWYD in stage-1 area. Bidder understands that same is required for interconnection line at stage-1 area. 4 Nos wave traps along with support structures shall be considered in Bidder's scope of work. Please confirm.	Refer revised tender SLD.
1300	Part-E2-Tender drawing	-	-	-	SAS Architecture Drawing No-9587-999-POE-J-003	Please confirm whether the SAS for extension of LARA-II 400kV AIS SWYD bays in stage-1 area shall be integrated with existing SAS in Existing LARA-I SWYD control room.	Extension stage-II bays in stage-I area shall not be integrated in stage-I SAS but it shall be integrated in new SAS of stage-II.
1301	Part-E2-Tender drawing	-	-	-	SAS Architecture Drawing No-9587-999-POE-J-003	Please provide the following w.r.t the existing SAS in LARA-I SWYD Control room. a) Make of SAS/RTU b) Model number of SAS/RTU c) Availability of spare ports d) Communication protocol (IEC 61850 or IEC 60870-5-101 or IEC 60870-5-104) of existing relays with substation automation system/RTU e) Existing SAS architecture drawing.	Will be provided during the detailed engineering.
1302	Part-E2-Tender drawing	-	-	-	SAS Architecture Drawing No-9587-999-POE-J-003	Bidder understands that interconnection between SAS at LARA-II SWYD Control room to SAS at Existing LARA-I SWYD control room will be through OPGW wire as per the referred drawing. Please confirm.	Extension of Stage-II SAS to stage-I control room shall be done through OPGW Wire. Necessary hardware/software for this purpose shall be provided by the bidder.
1303	Part-E2-Tender drawing	-	-	-	SAS Architecture Drawing No-9587-999-POE-J-003	Bidder understands that from SAS architecture, process bus based Digital SAS control is required for LARA-II Switchyard in stage-II area and conventional BCU based control (without process bus) is required for LARA-II Switchyard in Stage -I area (Extension of LARA-I 400kV AIS SWYD). Please confirm.	Bidders understanding is not correct. All 400kV bays of stage-II shall be process bus based only.
1304	General	-	-	-	Dynamic short circuit test	Bidder does not envisage any repetition of Dynamic short circuit test for the following: i) Generating Transformer ii) Station Transformer iii) Unit Transformer Bidder requests Owner to accept the theoretical evaluation of the ability of transformer to withstand dynamic effects of Short circuit (as per IEC 60076-5) either - by comparison with a reference transformer which has passed the short-circuit test successfully (or) - by check against the manufacturer's design rules for short-circuit strength.	Bidders Proposal is not acceptable. Bidder Must adhere to the technical Specifications only.
1305	General	-	-	-	Line lengths	Please Furnish the line length of outgoing 400kV lines to Raigarh (Kotra) proposed from LARA-II Switchyard (in Stage-I area), in order to choose the appropriate protection & communication interfaces.	Existing distance from LARA-I to Raigarh (kotra) is 18 kms.
1306	General	-	-	-	General-PLCC & FOTE	Bidder does not envisage any remote end supply of PLCC & FOTE equipment. Please confirm.	Bidder's understanding is correct.
1307	General	-	-	-	Remote end Relays	Bidder does not envisage any remote end Line differential protection relays in the scope of this package. If required, the same shall be supplied as a loose item. Respective remote end owner shall install & integrate the same in to their system Please confirm.	Bidder's understanding is correct. However, differential relays for tie line between stage-II and Stage-I Extension shall be in bidders scope.
1308	General	-	-	-	ERT Data	Please provide ERT data of Stage-I area required for earthing design of proposed LARA stage-II AIS Switchyard in Stage-I area.	Will be provided during the detailed engineering.
1309	General	-	-	-	PQM	Bidder understands that no Power Quality meters are envisaged in Bidder's scope as the same is not mentioned in specification. Please confirm.	Bidder's understanding is correct.
1310	General	-	-	-	Remote end Relays	As per specification clause-11.2.5, both Main-1 & 2 protections for 400kV line bays are Distance protections. However, as per SLD, Drg. No. 9587-999-POE-J-006, both Main-1&2 protections are Line differential protections. In this regard, Bidder proposes as follows: a) For 400kV lines interconnecting LARA-II SWYD in Stage-2 & Stage-1, Line differential protection shall be provided b) For 400kV lines to Raigarh (Kotra) from proposed LARA-II Switchyard (in Stage-I area), we shall consider Line differential protection c) For the 400kV lines to ISTS Pooling station, we propose Line distance protection as the distance is 85km. Please confirm.	a) Bidder's understanding is correct. b) Bidder's query is not clear. c) Bidder's understanding is correct.
1311	General	-	-	-	Protection panel for Outgoing line to Raigarh (Kotra) Line	As the Raigarh (Kotra) Line bays are getting transferred from LARA-I SWYD to LARA-II SWYD (in stage-I area), Bidder understands that the existing protection panels can be used for the respective bays. Please confirm.	Bidders understanding is not correct. New protection panels with process bus shall be provided for raigarh-kotra line also.
1312	Section-VI, Part-B	D-1-12(E)	2 of 08	D-1-12(E)	In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1).	Proposed Switchyard portions, all building plan is rectangular and moreover height also very limited (i.e) G or G+1 Structures, hence bidder proposes seismic loading consideration in "X" & "Y" direction only as per IS 1893 and no need to consider "Z" direction (Vertical) acceleration in switchyard buildings. Please confirm.	Bidder to comply with the specification requirements.
1313	SECTION- VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0	-	-	General	Terminal point location of Ash HCSO piping and AWRS piping 	Bidder understand that terminal point for Ash HCSO pipes and AWRS pipe is near 2600S and 600W (Near WT-3) as indicated in GLP where ash pipe corridor crosses the plant boundary. Owner to confirm	Bidder's understanding is correct.
1314	SECTION- VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0	-	-	General	Existing Fuel Oil pump house area switchgear facility	Existing fuel oil pump house area electrical building does not have space to accommodate switchgear room. Request NTPC to specify requirement of switchgear room for the proposed pumps and misc. loads in existing stage-I FOPH area.	Bidder's understanding is not correct. New building for FOPH shall be considered. However, supply can be drawn from existing switchgear after installation of additional panels for feeding power supply to stage-II LT loads subjected to the space and transformer capacity margin availability.
1315	General	-	-	-	Land dumping site construction power and water	Bidder understand that Construction power and construction water will be arranged by NTPC at land dumping site.	Bidder understanding is not correct. Bidder will have to make their own arrangements.




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1316	SECTION - VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0		General	Oily water separator for Stage-II	Bidder understand that existing OWS to be utilized for stage-II also. However the location of stage-I Oily water separator in fuel oil area is too far from proposed Fuel oil stage-II pump house area. Please confirm.	Bidder to provide the system inline with the functional requirement. All necessary provisions shall be ensured accordingly by the bidder based on the given layout.
1317	SECTION - VI, PART - A	Sub section IIA-16	13 of 15	1.02.01.02	Decanted water shall be pumped from owners' pumping system located at ash dyke. There shall be one no. working AWRS Pump of 400 m ³ /hr flow rate (owners' pumping system), is envisaged	NTPC is requested to provide Water quality available from Stage-I AWRS system at terminal point. The AWRS water is decanted water from bottom ash dyke of stage-I.
1318	SECTION - VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0	Sub section IIA-12	4 of 11	4.00.00	Fire water storage tanks and pumping system provided in Stage-I shall be used for fire water requirements for Stage-II also. Fire water mains (Hydrants & Spray) shall be interconnected at multiple locations suitably.	Request Owner to provide existing stage-I fire water network along with pressure available at various terminal points. Details (flow, head, quantity) of existing fire water pumps is already enclosed at Annexure - III of SUB SECTION-A-18 Fire Protection & Detection System. Tap off points for hydrant and spray system shall be finalised during detailed engineering.
1319	SECTION - VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0	SUB SECTION-II A-01	27 OF 28	5.00.00	Space for Hydrogen Generation Plant (154 m x 159 m) Sr. No. 4 H2 Requirement - Space 34400 m ² .	There is discrepancy in the area requirement mentioned in Plot Plan and Part-A of specification for Hydrogen generation plant. Owner is requested to confirm actual space provision to be provided. Bidder to follow specification requirement of area as per Sec VI, Part A, II A-01 clause 5.00.00 of 34400 m ² .
1320	TECHNICAL SPECIFICATION SECTION-VI, PART-A AUXILIARY STEAM SYSTEM P&ID, DRG. NO. XXXX-999-PCM-A-006, REV. A	SUB-SECTION-II TERMINAL POINTS	1 of 3	1.01.01, a)	TP for Auxiliary Steam interconnection for Auxiliary Steam Station Header with existing Stage-I with motorized isolation valve as indicated in the tender drg. 	Auxiliary steam TP is not available in tender drawing. Owner to identify the same in tender drawing. Suggestive route for auxiliary steam from existing plant area to be identified in tender GLP considering existing plant facilities. Bidder understand that the aux. steam pipe can be routed on existing trestle/structure of stage I wherever possible. Owner to confirm. Request owner to provide above requested details and the pipe/cable trestle layout of Stage-I. Bidder to refer Amendment No. PIP1-08.
1321	SECTION - VI, PART - B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	10 of 14	39 (VII)	A walkway of 600mm (minimum width) with hand rails & toe guards shall be provided all along length of the gallery of pipe & cable trestle for maintenance of cables where the height of trestle is more than 3 m	We understand that 600mm width platform is required to be provided for cable trestle only or for cable tray tier in case of combined pipe and cable trestle. Please confirm Bidder's understanding. The width of 600mm is required in case of only cable routing also and when both pipe and cable is routed.
1322	SECTION - VI, PART - B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	10 of 14	39 (VII)	...wherever fly ash handling pipes are routed, grating platform all along the length and for full width of the gallery and trestle of that tier shall be provided.	Bidder understand that required grating will be provided only below the containing fly ash conveying pipes. No grating is envisaged on the tier where all water and air pipes will be installed. Please confirm bidder understanding. Bidder's understanding is correct.
1323	SECTION - VI, PART - B	SUB SECTION- G-03 LAYOUT PHILOSOPHY	6 of 14	1.03.00, (57)	An area of 3000 sqm to be kept near chimney for owner facility (required for carbon capture).	Bidder understand that dimension of carbon capture area may slightly modify (keeping total required area same as 3000 sqm) to accommodate FGD/ESP control building facilities near Chimney area. Please confirm. Bidder's understanding is correct.
1324	SECTION - VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0		-	-	Ammonia unloading, storage & handling system	Request owner to indicate Ammonia storage in the tender GLP for planning of other facilities. Ammonia Storage area shall be placed in the block containing the cooling towers of size 70meterX50 Meter (approx). This shall be discussed and decided during the detailed engineering.
1325	SECTION - VI, PART - E, PLANT WATER SCHEME, DRG. NO. 9587-999-PCM-A-037, REV. A	LAYOUT AND DETAILS OF RAW WATER RESERVOIR, DRG. NO. 9587-001-POC-A-007, REV. 0			Terminal point of Make-up water 	Request owner to provide Terminal point location and details of Make-up water pipe and indicate in tender GLP Raw water reservoir drawing. Bidder to refer Amendment No. D2-16.
1326	SECTION - VI, PART - E, PLANT WATER SCHEME, DRG. NO. 9587-999-PCM-A-037, REV. A				Butterfly valve inside the pit 	Bidder propose for ease of operation, sluice gate arrangement at inlet of Raw water sump in place of butterfly valve. Please confirm. Reference clause is not matching with query raised. However, Sluice valve with appropriate MOC as per specification may be accepted in place of butterfly valve.
1327	SECTION - VI, PART - E, PLANT WATER SCHEME, DRG. NO. 9587-999-PCM-A-037, REV. A	LAYOUT AND DETAILS OF RAW WATER RESERVOIR, DRG. NO. 9587-001-POC-A-007, REV. 0			2 nos. of 900NB outer diameter MUW pipe for stage III 	Bidder understand that pipes for stage III are not applicable and not required to be supplied. Please confirm. Confirmed. Bidder to refer Amendment No. D2-16.
1328	SECTION - VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0				Pipe / cable trestle on both side of Boiler.	We understand that pipe / cable trestle on LHS / RHS on both boilers are indicative and bidder may plan pipe / cable trays as per their standard design requirement. Please confirm. Bidder to comply with specification requirement. Further, Bidder to also refer amendment No. LAY1-03 in this regard.

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1329	SECTION- VI, PART - E, PLANT WATER SCHEME, DRG. NO. 9587-999-POE-A-037, REV. A	-	-	-	-	Potable water to colony (pipe line up to plant boundary TP)		Request owner to provide Potable water terminal point for Colony in GLP.		Potable water for colony is not in Bidder's scope of work, please refer amendment no. WS1-19 & 20 in this regard.
1330	TECHNICAL SPECIFICATION SECTION – VI, PART-B Part-E2-Tender drawing	SUB-SECTION : B-17: SWITCHYARD	17 of 97	2.12.01, a	1	3.06.00, k)		Rated continuous current - Minimum: 3150A/2000A at rated ambient temperature current capacity as per the SLD. Rating of CB is indicated as 3150A for both Phase-I extension and for Phase-II	Bidder understands that 400kV Circuit breaker rating shall be 3150A for both Phase-I extension and for Phase-II. Please confirm.	Bidder's understanding is correct. 3150 A CB rating shall be considered for both Stage-I Extension and Stage-II bays.
1331	Section-VI, Part-E	GLP 9587-999-POC-F-001	-	-	-	-		Owner may please provide Layout of existing make up water pipe lines fouling in 50 m interconnecting transmission line corridor.		Will be provided during the detailed engineering.
1332	SECTION-VI, PART A	SUB SECTION –IB PROJECT INFORMATION	2 of 22	11.00.00	-	-		The requirements of the construction power supply for the project would be met from the stage-I 11 kV Miscellaneous Switchgear located in Stage-I area. Necessary 11 kV interconnection, Ring main/ LT sub-stations shall be provided by the bidder for the required power plant area.	Bidder understand that construction power from stage-I 11 kV Miscellaneous Switchgear shall be routed through stage-I area either by cable or overhead line. Please confirm bidder's understanding.	Bidder's understanding is correct.
1333	General	-	-	-	-	-		11 kV line passing through the switchyard area for Stage-II	Bidder understand that the shifting of 11 kV line passing through Stage-II Switchyard area shall be re-routed by Owner. Please confirm.	Bidder's understanding is correct.
1334	General	-	-	-	-	-		11 kV line passing through the stock pile area of Stage-II project.	Bidder understand that the shifting of 11 kV line passing through stock pile area of Stage-II project shall be re-routed by Owner. Please confirm.	Bidder's understanding is correct.
1335	General	-	-	-	-	-		11 kV line passing through the stage-II area for existing NTP colony	Bidder understand that the shifting of 11 kV line for existing colony power supply passing through the Stage-II project area shall be re-routed by Owner. Please confirm.	Bidder's understanding is correct.
1336	General	-	-	-	-	-		Stage-I Switchyard - Civil works related details required	Bidder request Owner to provide following Civil drawing for Stage-I Switchyard: 1. Layout of Foundation drawing 2. Existing indoor cable trench drawing and section 3. Details of Tower foundation Drawing 4. Details of Equipment Foundation Drawing 5. Switchyard panel room layout drawing 6. Existing Drain layout drawing 7. Fencing Details	Will be provided during the detailed engineering.
1337	General	-	-	-	-	-		Stage-I Switchyard - Electrical works related details required	Bidder request Owner to provide following Electrical drawing for Stage-I Switchyard: 1. Switchyard equipment layout (plan & section) 2. Existing Earthmat layout 3. Existing cable trench layout 4. Existing control building layout 5. Existing Lightning Protection (DSLPL) Layout 6. Existing Outdoor Illumination Layout 7. Visual monitoring system (VMS) layout 8. Earthmat drawing 9. Tower profile with height details of first tower of Champa and Kotra line	Will be provided during the detailed engineering.
1338	SECTION – VI, PART-B SECTION – VI, PART-B SECTION – VI, PART-B SECTION – VI, PART-B	B-01 B-02 B-03 B-07	21 of 25 3 of 4 10 of 11 6 of 7	14.02.00 10.01.00 28.02.00 06.01.00	-	-		LIST OF TYPE TESTS TO BE CONDUCTED LIST OF TYPE TESTS TO BE CONDUCTED LIST OF TYPE TESTS TO BE CONDUCTED LIST OF TYPE TESTS TO BE CONDUCTED	The referred clauses of tender specification ask to perform type test for various equipment. Bidder suggest to submit type test report instead of conducting actual type test for these tests. Owner may please accept.	Bidder to refer the clause no: 1.21.00 of Subsection - IIB - Electrical Systems/Equipments.
1339	General	-	-	-	-	-		Power supply for proposed pumps & misc. load in Stage-I FOPH area.	Bidder understands that the power supply for proposed pumps & misc. load in existing stage-I FOPH area shall be available from stage-I FOPH MCC . Owner may please confirm. Owner may please confirm that the necessary shutdown of existing CHP system shall be provided by Owner while re-routing of existing cable trestle in front of opening at TP-4.	Bidder's understanding is not correct. New building for FOPH shall be considered. However, supply can be drawn from existing switchgear after installation of additional panels for feeding power supply to stage-II LT loads subjected to the space and transformer capacity margin availability.
1340	SECTION – VI, PART-A	SUB-SECTION-III TERMINAL POINTS & EXCLUSIONS	1 of 3 3 of 8	1.04.00 1.14.00	-	-		a) Feed from Employer's TP-4 of Stage-I to Stage-II CHP Stage-I to CHP Stage-II interconnection shall be done at TP-4. The cable trestle on the RHS will foul with the opening envisaged for connection of conveyor gallery. This relocation of cable trestle to be carried out in EPC work.	Owner may please confirm that the necessary shutdown of existing CHP system shall be provided by Owner while re-routing of existing cable trestle in front of opening at TP-4.	Will be considered during the erection and commissioning phase.
1341	Section-VI, Part-E Section-VI, Part-E	GLP 9587-999-POC-F-001 9587-999-POE-I-002	-	-	-	-		Area below the extended Main Bus I & II of Lara-I switchyard beyond champa line Main Bus I & II of Lara-I is extended above the space indicated for bus sectionalisation. Necessary modification for installation of Bus section is in bidder's scope.	Bidder understands that the unequipped area below the extended Main Bus I & II of Lara-I switchyard beyond champa line towards Stage-I expansion side shall be utilised for accommodating bus-sectionaliser bay. Owner may please confirm.	Bidder's understanding is correct.
1342	Section-VI, Part-A Section-VI, Part-B	SUB-SECTION-IIB ELECTRICAL SYSTEM / EQUIPMENTS B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	19 of 20 19 of 36	4. a. 1.01.02	-	-		Type test report validity a. Power Transformers (GT, UT, ST, ICT) and Reactors- 5 years b. OLTC- 10 years c. Power transformer Bushing / Reactor Bushing (132kV and above class- 7 years d. Neutral Grounding Resistor- 10 years e. Neutral Grounding Resistor- 10 years f. Auxiliary oil filled transformer and dry type transformers- 5 years The Type Test reports should be of a transformer which is generally similar to the transformer being offered as per IEC 60076-5, Annexure-B and also identical to the offered transformer	Bidder requests Owner to extend acceptance of type test report validity period for the referred transformers/components to at least 10 years or higher .	Bidder's Proposal is not acceptable. Bidder must comply to the technical specifications.
1343	Section-VI, Part-A	SUB-SECTION-IIB ELECTRICAL SYSTEM / EQUIPMENTS	8 of 20	1.15.00	-	-		Construction Power The charges for the actual energy consumed by the bidder (Energy Charges Only) shall be recovered by the Employer based on prevalent rate of DISCOM and type of connection used.	Bidder requests Owner to provide construction power on free of charge basis to Bidder as per industry practice.	Bidder's Proposal is not acceptable. Bidder must comply to the technical specifications.

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1344	SECTION – VI, PART-A	SUB-SECTION-III CIVIL WORKS	8 of 8	2.03.00	Disposal of surplus excavated material in NTPC Land outside plant boundary(including dressing the top surface) and compacting the same by mechanical means in layers(not exceeding 300mm thickness.	Bidder understands that the approach road to NTPC acquired land identified for disposal of surplus earth will be constructed by Owner prior to commencement of construction work. Please confirm.	The approach road to NTPC acquired land is under construction by NTPC.
1345	SECTION – VI, PART-E TENDER DRAWINGS				General layout plan 9587-999-POC-F-001	As informed during site visit, entry and exit gate during construction can be constructed near WT-5 (co-ordinate 625E/2695S). Bidder requests Owner to indicate the aforesaid gate location in tender GLP.	If required, location to be finalised during detailed engineering.
1346	SECTION-VI, PART-A	SUB-SECTION-III ELECTRICAL SYSTEM / EQUIPMENTS	11 OF 20	1.16.03	Dismantling of existing fencing roads, temporary sheds and building, foundations, re-routing of pipelines above the ground and below the ground available in present scope of bays is also in the scope of the bidder.	Bidder requests owner to furnish list of facilities to be dismantled in the scope of EPC Contractor. These drawings are required so that bidder can estimate the extent of dismantling and re-routing work.	Bidder to refer CI no 2.00.00 Sub-section-I, Intent of Specification, Part-A/Section- VI of technical Specification.
1347	SECTION – VI, PART-A	SUB-SECTION-III CIVIL WORKS	1 OF 8	1.00.00	SCOPE OF CIVIL, STRUCTURAL & ARCHITECTURAL WORKS OF EPC PACKAGE The scope of civil, structural and architectural works shall include topographical survey, detailed geotechnical investigation, site clearance, dismantling of existing structures/substructures/facilities, site levelling, preparation of design documents and drawings and getting approval of the same from the Employer and construction of all civil, structural and architectural works including supply of all construction materials for all buildings, equipment and facilities for the project.	Bidder requests owner to provide list of existing structures/substructures/facilities to be dismantled. Also, bidder request owner to provide existing drawings to estimate the extent of dismantling work.	Bidder to refer CI no 2.00.00 Sub-section-I, Intent of Specification, Part-A/Section- VI of technical Specification.
1348	Section VI, Part B	Subsection A -15	13 of 43	4.01.00	Woodtimber shall not be used as construction material in any part of the cooling tower. Bidder may offer MOC of components different than that specified below Material of Construction 4.01.00 Woodtimber shall not be used as construction material in any part of the cooling tower. Bidder may offer MOC of components different than that specified below based on his proven practices, however allowing of such MOC shall be under employer's discretion. Material of Construction RCC IDCT Pultruded FRP IDCT	Bidder understands that either FRP or RCC cooling towers are only acceptable. Please confirm.	Bidder's understanding is correct. Bidder to comply with the specification requirements.
1349	SECTION VI PART-B	D-1-5	8 OF 86	5.02.08	The Pipe- Cable Gallery shall be Structural Steel Superstructure with Steel Truss (Lattice Girder) having a general span of 15.0m/20.0m. The steel truss shall be supported on 2 legged / 4 legged trestles the arrangement of which shall be developed by the Bidder. Trestles for pipe and cable galleries shall also be of structural steel.	Bidder request to allow supporting of cable trays outside conveyor gallery (shown in figure below) at locations where sufficient space for separate cable gallery structure is not available. 	Bidder to comply with the specification requirements.
1350	SECTION-VI, PART-B	D-1-6 D-1-12	8 OF 25 2 OF 8	6.03.03 D-1-12(E)	Design of steel structures shall be done by the working stress method. Design shall be as per provisions of IS 800:1984 and other relevant IS standards. Design/Detailing for Ductility for Structures - The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.	Bidder understands that design of steel structure is carried out as per IS 800:1984 by working stress method. Hence, Bidder understands that ductile design of steel structure is not required. Please confirm.	Bidder to refer Amendment No. D2-06.
1351	SECTION-VI, PART-B	D-1-5	75 OF 86	5.23.17.01	For Track hopper/Wagon Tippler & transfer houses peripheral drains (Brick drains with steel gratings provided around the building) shall lead the water / coal slurry to a local RCC pit (of 2 Cu. M. capacity) near each facility to allow settling of coal. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge to a coal slurry settling pit. Refer tender drawing: 9587-001-POC-A-003 	Track hopper, pent house & crusher house building FGL is at RL+202.00. Stage II CSSP FGL is at RL+208.00 Connection of coal slurry drain of track hopper, pent house & crusher house to CSSP is difficult owing to difference in FGL's. Option 1: Bidder proposes to keep CSSP FGL at RL+202.00 in order to facilitate drainage of coal slurry into CSSP. Option 2: Bidder suggest to connect coal slurry drains of aforesaid facilities with existing Stage I coal slurry drainage network. In this regard, bidder request to provide detailed drawings of Stage-I coal slurry drainage network.	Option 2 is not feasible. However, further details shall be finalised during detail engineering.
1352	SECTION-VI, PART-B	D-1-5	76 of 81 39 of 86	5.23.18 5.08.00	All open RCC drains shall have removable steel gratings designed for loads as specified under loading clause. Open RCC rectangular section, unless required otherwise due to functional requirement, shall be provided for all drains. Refer Tender drawing 9587-001-POC-A-06 	Said clauses are contradictory. Tender drawing of roads does not indicate grating cover over drain. Bidder request owner to specify the areas where drains shall have removable steel grating. For all other areas, bidder understands that open drains without grating will be provided as shown in tender drawing.	5.23.18 clause is applicable for coal laden drains in CHP area.
1353	Section-VI, Part A	Sub-Section-VI, Chapter-2, Steam Turbine Generator	28 of 31	1.00.00 (4)	Process Actuated Switch Devices -As applicable for this package, as per the following items: i) Temperature switches: 1 no. of each range and type ii) Pressure switches: 1 no. of each range and type iii) Differential Pressure switches: 1 no. of each range and type iv) Level switches: 1 no. of each range and type v) Flow switches: 1 no. of each range and type	Bidder would like to clarify that as per CPU OEM, transmitters are used instead of process actuated switches and spares for transmitters are already indicated in CI. No. 1.00.00 (1). Hence, Bidder request customer to delete spares requirement for process actuated switches.	Bidder to comply with the specification requirements.
1354	Section-VI, Part A	Sub-Section-VI, Chapter-2, Steam Turbine Generator	29 of 31	1.00.00 (7)	4. Complete Turbidity Analyzer (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum) 5. Dissolved O2 Analysers (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum) (if applicable) 6. Turbidity analysers (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum) (if applicable)	a) Bidder wish to inform that Turbidity analyzer spares are repeated. Please refer Sr. No. 4 and Sr. no. 6. Please delete repeated clauses. b) Bidder wish to clarify that Turbidity analyzer and Dissolved O2 analyzer are not applicable as per CPU OEM design. Bidder understands that since Turbidity analyzer and Dissolved O2 analyzer are not required as per OEM design, spares for these analyzers shall be considered as not applicable. Please confirm.	a. Bidder to refer amendment No. C&I-1-01. b. Bidder to comply with the specification requirements.
1355	Section-VI, Part A	Sub-Section-VI, Chapter-2, Steam Turbine Generator Handling Plant	29 of 31	3.00.00	3. Solenoid valves (if applicable)- 2 nos. 6. Air Lock relays- 2 nos. of each type	Bidder wish to clarify that solenoid valves and air lock relays are not required as per CPU OEM design. Bidder understands that since solenoid valves and air lock relays are not required as per OEM design, spares for these items shall be considered as not applicable. Please confirm.	Bidder to comply with the specification requirements.

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1356	Section-VI, Part-A	Sub-Section-VI, Chapter-4, Coal Handling Plant	18 of 20	II (N)	VIBRATION MONITORING SYSTEM i) Vibration pick up: 2 Nos. ii) Pick-up cable: 1 Length iii) Vibration monitor module and other cards: 1 no. of each type iv) Power Supply: 1 No. v) Relays: 2 nos. of each type vi) Indicating lamps/ LEDs: 5 nos. of each colour	a) Bidder wish to clarify that Relays are not applicable for Vibration monitoring system as per tender specifications. Hence, spares for relays are not applicable. Please confirm. b) Bidder wish to clarify that Vibration system for Boiler drives, CHP drives, FGD drives and other BOP drives shall be common. However, separate spares are indicated for vibration monitoring system in CHP section, Gypsum handling plant section and C&I spares section. Bidder understands that since Vibration system is common spares indicated under C&I section of spares is to be considered, spares indicated under CHP section & Gypsum handling plant section are not applicable. Please confirm.	
		Sub-Section-VI, Chapter-9, Gypsum Handling Plant	9 of 11	II (E)	VIBRATION MONITORING SYSTEM i) Vibration pick up: 2 Nos. ii) Pick-up cable: 1 Length iii) Vibration monitor module and other cards: 1 no. of each type iv) Power Supply: 1 No. v) Relays: 2 nos. of each type vi) Indicating lamps/ LEDs: 5 nos. of each colour		a. Bidder to comply with the specification requirements.
		Sub-Section-VI, Chapter-12, Control & Instrumentation	4 of 10	2.00.00(1)	Vibration Monitoring System i) Sensors along with interfacing cables (*If prefab cable or prefab extension cable is used same should be supplied in proportion); 20% or minimum 2 nos of each make and type whichever is more ii) Power Supply Module Cards: 5 nos. of each make and type iii) Driver / Interface Cards & all other electronic cards: 5 nos. of each make and type		B. refer note-04 .SUB-SECTION-VI CHAPTER-12 CONTROL & INSTRUMENTATION.
1357	SECTION-VI, PART-B	ANNEXURE-SS1	16 of 22	9.05.03	2X100% capacity Glycol/Water/Glycol-Water pump with 1X100% capacity Glycol/Water/Glycol-Water heater shall be provided for recirculation and heating of Glycol/Water/Glycol-Water mixture for each ammonia vaporizer	Based on bidder's earlier project experience, indirect water bath type vaporiser shall be considered for ammonia heating and vaporising. Accordingly, Bidder will offer this scope. Employer is requested to kindly agree.	Bidder to comply with the specification requirements.
1358	SECTION-VI, PART-B	ANNEXURE-SS1	16 of 22	11.06.00	For neutralization of waste ammonia in waste water retaining basin, chemical dosing system along with agitator(s) shall be provided. Two (02) sump pumps shall be provided in a 1.5 m deep pump well at the corner of the retaining basin. Sump pump shall be used to supply waste water at PH not more than 8 up to the Water Treatment Plant. The pump sump shall be monitored by pH-analyzer.	Waste diluted ammonia shall be routed to ash slurry pump system without neutralisation system as the both ash and waste diluted ammonia are alkaline in nature. Accordingly, Bidder will offer this scope. Employer is requested to kindly agree.	This shall be decided during detailed engineering in line with the specifications requirements.
1359	SECTION-VI, PART-A	SUB SECTION-II A-01	9 OF 28	2.13.01	Two (2) nos. of axial type, constant speed variable pitch controlled FD fans each with drive motor, base plates, foundation bolts & nuts, inlet bird and trash screen, suitable arrangement to prevent rain water entry to fan motor, coupling and coupling guard and acoustic silencer. Each fan shall be provided with bearing lubrication and hydraulic blade pitch control unit(s) consisting of:	Bidder would like to clarify that the Fan shall be directly placed on the foundation similar to all previous Projects executed for Employer. Thus Base Plate not required as part of BIDDER'S OEM design. However, drive motor shall have its own base plate. Kindly confirm acceptance.	The details shall be decided during detail engineering based on the equipment/system offered, in line with the specifications requirements.
1360	SECTION-VI, PART-A	SUB SECTION-II A-01	9 OF 28	2.13.02	Two (2) nos. two stage ID fans (Axial type, Constant speed, variable pitch controlled) each with drive motor, base plates, foundation bolts and nuts, inlet box, discharge case, coupling, coupling guard and suitable arrangement to prevent rain water entry to fan motor. Each ID fan shall be provided with bearing lubrication and hydraulic blade pitch control unit(s) consisting of:	Bidder would like to clarify that the Fan shall be directly placed on the foundation similar to all previous Projects executed for Employer. Thus Base Plate not required as part of BIDDER'S OEM design. However, drive motor shall have its own base plate. Kindly confirm acceptance.	The details shall be decided during detail engineering based on the equipment/system offered, in line with the specifications requirements.
1361	SECTION-VI, PART-A	SUB SECTION-II A-01	13 OF 28	2.15.04	Two (2) numbers of two stage axial PA fans for each steam generator, with hydraulic blade pitch control system each with motor, base plates, foundation bolts, inlet box, inlet bird and trash screen, inlet rain water canopy, inlet cone, diffuser, coupling, coupling guard and silencer.	Bidder would like to clarify that the Fan shall be directly placed on the foundation similar to all previous Projects executed for Employer. Thus Base Plate not required as part of BIDDER'S OEM design. However, drive motor shall have its own base plate. Kindly confirm acceptance.	The details shall be decided during detail engineering based on the equipment/system offered, in line with the specifications requirements.
1362	SECTION-VI, PART-B	SUB SECTION-A-02	36 OF 67	12.06.00 (a)	The fans shall be statically and dynamically balanced before shipment.	Bidder would like to clarify that the blades will be balanced statically, and hubs will be balanced dynamically at OEM workshop. The combination of these will therefore be a balanced rotor. Kindly confirm acceptance.	Specification requirement is clear & bidder to comply with the specification requirements.
1363	SECTION-VI, PART-B	SUB SECTION-A-02	36 OF 67	12.06.00 (b)	Balancing of each fan shall be checked and adjusted at site, if necessary.	Bidder would like to clarify that blades and Hub will be balanced separately at OEM workshop and in view of this site balancing is not required. Kindly confirm acceptance.	Specification requirement is clear & bidder to comply with the specification requirements.
1364	SECTION-VI, PART-B	SUB SECTION-A-02	37 OF 67	12.06.00(c)	Natural frequency of all fan components shall be established by vibration testing to ensure that no part of the wheel is adversely excited by any force generated at operating speeds.	The OEM shall carry out natural frequency test for one set of blades for one Hub for the first set of fans as per OEM practices. Natural frequency test is not required for other rotating parts. Kindly confirm acceptance.	Specification requirement is clear & bidder to comply with the specification requirements.
1365	SECTION-VI, PART-B	SUB SECTION-A-02	37 OF 67	12.06.00(d)	d) The fan blade shall be subjected to natural frequency test. The other components of ID & FD fan wheels need not be subjected to natural frequency test if supplier can prove that these components are very rigid and have very high natural frequency compared to the operating frequency of respective fans giving justification.	OEM shall carry out natural frequency test for one set of blades for one Hub for the first set of fans as per BIDDER'S OEM practices. Natural frequency test is not required for other rotating parts. Kindly confirm acceptance.	Specification requirement is clear & bidder to comply with the specification requirements.
1366	SECTION-VI, PART-B	SUB SECTION-A-02	38 OF 67	12.10.00	a) The fan casing shall be split to provide easy removal of the fan hub/impeller for replacement and repairs.	Kindly note that OEM design consists of rolling diffuser / inlet box for onsite maintenance, diffuser (in case of single stage and two stage fans) and inlet box (in case of two stage fans only) are mounted on rails for easy maintenance of hubs and blades. However, Fan components like inlet box and diffuser will be supplied in split for ease of transportation and handling at site. Kindly confirm acceptance.	Bidder to comply the specifications requirements. Further details shall be discussed during detail engineering in line with the specifications requirements.
1367	SECTION-VI, PART-B	SUB SECTION-A-02	35 OF 67	12.04.00	ID Fan - Abrasion and wear resistant, high BHN steel having minimum 8.0mm thickness or 12mm mild steel with liner of thickness 10mm (min.). Alternatively, 22 mm thickness casing of mild steel is also acceptable.	The OEM proposes the following based on OEM proven design practice: a) Inlet Box- 6 mm Mild Steel b) Impeller Casing- 20 mm Mild Steel c) Intermediate Piece- 8 mm Mild Steel d) Diffuser- 6 mm Mild Steel Kindly confirm acceptance.	Bidder to comply the specifications requirements. Further details shall be discussed during detail engineering in line with the specifications requirements.
1368	SECTION-VI, PART-A	SUB SECTION-II A-01	11 OF 28	2.14.01	14) Forced lubrication system for bearing of each air heater shall be provided and shall include two (2) x 100% capacity oil pumps with motor, two (2) x 100% oil coolers and two (2) x 100% oil filters etc.	OEM proposes sump type lubrication for top & bottom bearing with applicable accessories for completeness of lubrication system. Kindly confirm acceptance.	Bidder to comply the specifications requirements.
1369	SECTION-VI, PART-B	SUB SECTION-A-02	17 OF 67	9.01.03	Heating Element - a) Cold end - Made of Corten steel of minimum 1.2 mm thickness Made of carbon steel minimum 0.8 mm thick. Hot end element height shall be selected to avoid any ammonium bisulphate (ABS) condensation b) Hot end -	OEM proposes the following heating element thicknesses based on design and experience 1. Hot End - 0.6 mm / MS 2. Hot Intermediate- 0.6 mm / MS 3. Cold End - 0.8 mm / LACR Kindly confirm acceptance.	Specifications requirements are clear and bidder to comply the specifications requirements.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1370	SECTION-VI, PART-B	SUB SECTION-A-02	17 OF 67	9.01.03	(ii) The maximum air-in-leakage to flue gas of the Steam Generator with coal shall be guaranteed and demonstrated along with the Boiler PG test. The Contractor shall also demonstrate that the drift in air heater leakage (percentage change in air-in-leakage) does not exceed 1%, one year after demonstration of above guaranteed air-in-leakage. Within this period of operation all air heater leakage demonstrations are completed there will be no need for any shut down for seal replacements or any internal adjustments. The seal design/construction shall be such that the above requirements are satisfied.	Employer is requested to note that the air heater sealing system and leakage will be adversely impacted by operating conditions which is beyond the control of BIDDER. For example, operating the air heater with gas flow and little to no air flow (bottle-up) will result in extensive wear and damage to the hot end radial seals, hot end sector plates, hot end circ seal (and possibly its holding bar) and cold end axial and circ seals. Similarly, operation at elevated gas temperature may result in larger than expected rotor capping/turn-down, resulting in seal wear and possible damage to the seals and cold end sector plates. Demonstration of guaranteed leakage values is contingent upon the air heater sealing system being in the as-designed condition as called for in the ASME PTC 4.3 test code. The code recommends that the sealing system be inspected, and all necessary repairs carried out, just prior to guarantee testing to ensure that the equipment is suitable for testing. Based on various testing experience in last few scenarios it was noticed that the RAPH is being operated within initial 3000 hours including bottling-up and elevated temperature scenarios as indicated above, which in turn impact the part and thereby by the performance as informed above. Hence, the OEM do not recommend the leakage guarantee demonstration after 3000 hours of operation and demonstration of 1% drift one year after the initial demonstration/operation, unless until all the sealing system and related parts are under as designed condition as stated in first paragraph / necessary repairs to be carried out as required. Kindly confirm acceptance.	The specified requirements are based on the criticality of the equipment as also given the coal & ash type towards the unit performance. Bidder to comply the specifications requirements.
1371	SECTION-VI, PART-B	SUB SECTION-A-02	18 OF 67	9.01.03	APH Guarantee Condition 1. Air Leakage (at 100% TMCRC i.e. 800 MW unit load for design coal) – 10% (Max.) 2. Design Ambient Temperature & Relative Humidity: 25 deg C& 60% RH 3. Excess Air – 20% 4. The maximum air-in-leakage to flue gas after 3000 hours continuous operation of the Steam Generator with coal shall be guaranteed. 5. Contractor shall demonstrate that the air-heater air-in-leakage do not exceed the guaranteed or specified value (whichever is lower) as per description at Sub section-A-01 & A-02, Part-B (Mechanical), of Technical specifications.	RAPH and boiler PG test shall be conducted parallelly as readings required for both test are similar. RAPH test should not be linked with running hours. Kindly confirm acceptance.	The same is linked with running hours. Specifications requirements are clear and bidder to comply the specifications requirements.
1372	SECTION-VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	17 OF 66	9.01.03	Air Heater drive system (i) 1 No. peripheral / centrally mounted AC VFD drive, with gear box and automatic clutching/decutching facility. Alternatively, centrally mounted APH AC VFD Drive system having sufficient space for mounting emergency drive and having handling facility with proven experience may also be acceptable. (ii) 1 No. independent air motor drive, with its gear box and automatic clutching, decutching facility for rotation during non-availability of A.C. drive system. (iii) An air receiver tank of storage capacity adequate to operate air pre-heater using air motors for 10 minutes (minimum) with no air make-up during this period. Air motor valve for air supply from air receiver tank to APH shall have lock open arrangement.	OEM shall provide 1no. Centrally mounted AC VFD Drive, 1 No. air motor drive, mounted on common gear box with automatic clutching / decutching arrangement. Kindly confirm acceptance.	Specifications requirements are clear and bidder to comply the specifications requirements.
1373	SECTION-VI, PART-A	SUB SECTION-VI	1 of 3	1.01.00	a) The list of mandatory spares considered essential by the Employer is indicated in this chapter. The bidder shall indicate the prices for each and every item in the Schedule of mandatory Spares whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item in the Bid Forms and Price Schedules. Whenever the quantity in mentioned in "sets" the bidder has to give the item details and prices of each item.	Employer is requested to note that many of the items indicated in the spares list for SG & Auxiliaries (Chapter-1) is not applicable and the same has not been identified by Customer for Employer's information. We have listed such spares as per Bidder's standard practice in this clarification sheet for Employer's information. Bidder would like to clarify that in case any spares is not applicable for Bidder (as mentioned in the clarification sheet), Bidder will not consider such spares. We understand that in such case, Bidder is not required to provide any rebate for contract stage. Kindly confirm. However, in any case, such spares are found applicable during contract stage, the same shall be provided by bidder without any cost implication.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items. Further Bidder may also refer respective replies against such listed queries.
1374	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	7 of 38	1.06.00 (1.1)	1.1 Rollers/tyres/grinding balls / roller liners - 2 sets	Employer is requested to note that as per Bidder's standard design, Roller Liners will be considered. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Here bidder has to provide Grinding Element.
1375	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	7 of 38	1.06.00 (1.2)	1.2 Bull ring segments/ bowl / rings / Table liners	Employer is requested to note that as per Bidder's standard design, Table liners considered. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Here bidder has to provide Grinding Element.
1376	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	7 of 38	1.06.00 (2)	2. Gear box internals (except bearings & seals)	Employer is requested to note that Bidder has considered following spares: a) Bevel stage: Gear Wheel & Pinion. b) Planet stage: Sun pinion, Planet gear & Annulus gear (Ring Gear) This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Gear box internals include Gears, shafts, couplings between shafts, thrust pads etc. This clause include all gear box internal spares except bearings & seals.
1377	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	7 of 38	1.06.00 (3)	3. Complete Gear Box	Employer is requested to note that complete gear box (excluding lub oil system, Instruments & coupling) considered. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1378	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	7 of 38	1.06.00 (4)	4. Bearings for mills	Employer is requested to note that we understand that Bidder to provide spares for bearings for mills except bearings of Gear box. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1379	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (7)	7. Liners with brackets & fasteners	Employer is requested to note that we understand that Ceramic tiles for classifier, Middle housing, deflector plates will be considered as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1380	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (9)	9. Multiport outlet & liners	Employer is requested to note that Bidder will consider Outlet port with Ceramic tiles as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1381	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (10)	10. Mill main shaft/yoke	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1382	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (11)	11. Spring	Employer is requested to note that Spring is not applicable as offered mill is with Hydraulic Loading Cylinder. Bidder has considered Hydraulic loading cylinder which is mentioned in a. no. 13 below. Hence, this spare is not applicable as per bidder's standard practice and not envisaged by bidder. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1383	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (12)	12. Roller Journal Assembly (without grinding roll)	Employer is requested to note that Bidder has considered Roller Journal Assembly without Roller Liner as per Bidder's standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.

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1384	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (14)	14. Filter Cartridges	Employer is requested to note that Bidder has considered 'Filter element for Hydraulic loading system' as per Bidder's standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1385	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (16.4)	16.4. Bow hub assembly/Ring seat	Employer is requested to note that Bidder has considered Grinding Table assembly excluding Liner, Mill Bottom, Air seal rings, Hub Skirt & Scraper assembly as per Bidder's standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1386	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (17)	17. Lube Oil System	Employer is requested to note that the lubrication system is applicable for Mill Gear Unit. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1387	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (17.1)	17.1 Pump & Motor coupling	Employer is requested to note that Bidder has considered coupling between Pump & Motor as per Bidder's standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1388	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (17.2)	17.2 Pump assembly	Employer is requested to note that Bidder has considered Pump, Coupling & Motor are considered in Sl. no. 17.1 & 23 respectively. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1389	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (17.4)	17.4 Filters	Employer is requested to note that Bidder has considered Filter for Lub oil system. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1390	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (17.5)	17.5 Pressure regulator	Employer is requested to note that Bidder has considered pressure relief valve as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1391	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (18)	18. Oil cooler assembly for coal mills	Employer is requested to note that Oil coolers for Hydraulic loading system & Gear Unit Lubrication system is considered by Bidder as per Standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1392	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (19)	19. Bearings for gear box	Employer is requested to note that all antifriction bearings for Gear Unit are considered as mentioned below as per Bidder's standard practice: 1. Input Pinion Bearings 2. Bevel Gear Bearings 3. Planetary Gear Bearings Bidder has not considered Thrust pads & radial Bush as the same is not envisaged as per Bidder's standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	All bearings of gearbox are to be supplied.
1393	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (23)	23. Mill lube oil motor	Employer is requested to note that Bidder has considered Motor for Gear unit Lub system is considered as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1394	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (25)	25. Mill lower skirt	Employer is requested to note that Bidder has considered lower air seal ring with gaskets, retainers & hardware as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1395	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (26)	26. Labyrinth seal assembly	Employer is requested to note that Bidder has considered upper air seal ring with Gaskets, Retainers & hardware as per Bidder's standard practice. As mill bottom is already considered in sr. no. 15.4, hence not envisaged by Bidder. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1396	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	8 of 38	1.06.00 (28)	28. Mill Scraper assembly	Employer is requested to note that Bidder has considered Hub Skirt with Scraper Assembly as per Bidder's standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1397	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	1 of 38	1.01.00 (A)	4. Coll Saddle Clamp/Alignment band / Male & Female sliding Spacers / Sliding Hooks /Straight Shields for boiler tubes & Profile Shields for Boiler tube bends/ Tube clamps	Employer is requested to note that male & female castings are applicable as per Bidder's standard design. Hence, bidder has considered spares for Male & Female Casting accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1398	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	2 of 38	1.01.00 (C)	4. Coll Saddle Clamp/alignment band / Male & Female sliding Spacers / Male and Female connectors/ Sliding Hooks / Shields for boiler tubes & Profile Shields for Boiler tube bends/Swage tube/ Forged items forming integral part of pressure parts	Employer is requested to note that male & female castings are applicable as per Bidder's standard design. Hence, bidder has considered spares for Male & Female Casting accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1399	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	2 of 38	1.01.00 (D)	2. Bends 100Nos. of each size, type, thickness, radius and material. 50 Nos supply tubes, bends/offset bends (not covered in above)	There is duplication of spares in this clause. Employer is requested to note that Bidder will supply 100 Nos of tube bend of each size, type, thickness, radius and material only. Hence, the requirement of 50 Nos of supply tubes, bends/offset bends should not be envisaged. Employer is requested to kindly confirm. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1400	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	2 of 38	1.01.00 (E)	5. Male & Female connectors, male female couplings spacers and alignment bands	Employer is requested to note that Male & Female Casting are applicable as per Bidder standard design. Hence, Bidder has considered spares for Male & Female Casting only. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1401	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	2 of 38	1.01.00 (E)	9. Spacer Tube connectors and stoppers	Employer is requested to note that the requirement of Spacer Tube connectors and stoppers are not applicable as per the bidder standard design. Bidder would like to consider any alternate spares for the same. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1402	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	3 of 38	1.01.00 (F)	5. Male & Female connectors, male female couplings spacers and alignment bands	Employer is requested to note that Male & Female Casting are applicable as per Bidder standard design. Hence, Bidder has considered spares for Male & Female Casting only. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1403	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	3 of 38	1.01.00 (F)	9. Spacer Tube connectors and stoppers	Employer is requested to note that the requirement of Spacer Tube connectors and stoppers are not applicable as per the bidder standard design. Bidder would like to consider any alternate spares for the same. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1404	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	3 of 38	1.01.00 (G)	5. Male & Female connectors, male female couplings spacers and alignment bands	Employer is requested to note that Male & Female Casting are applicable as per Bidder standard design. Hence, Bidder has considered spares for Male & Female Casting only. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1405	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	4 of 38	1.01.00 (G)	9. Spacer Tube connectors and stoppers	Employer is requested to note that the requirement of Spacer Tube connectors and stoppers are not applicable as per the bidder standard design. Bidder would like to consider any alternate spares for the same. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1406	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	4 of 38	1.02.00 (A)	Water wall header 2. Yoke plate with fasteners	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1407	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	4 of 38	1.04.00 (A)	1. Complete Pump & Motor Assembly	Employer is requested to note that Bidder has considered spares for pump and motor assembly excluding motor cooler. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	The specification includes Complete Pump & Motor Assembly including motor cooler and other accessories for complete replacement of the installed pump assembly in boiler. Bidder to comply with the specification requirements.
1408	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	4 of 38	1.04.00 (A)	5. Impeller wear rings	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1409	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	4 of 38	1.04.00 (A)	8. Gland packings	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1410	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	5 of 38	1.05.00 (A)	1. Fan rotor assembly (excluding servo motor, blade & coupling)	Employer is requested to note that bidder would like to offer following spares: (1 +1) No. Hub & 1 No. Shaft Only without blades. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder has to supply Fan rotor assembly, consists of main bearing assembly & rotor assembly (excluding servo motor, blade & coupling). This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1411	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	5 of 38	1.05.00 (A)	4.1 Fan Bearing	Employer is requested to note that bidder has considered main bearings only for this item. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1412	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	5 of 38	1.05.00 (A)	4.2 Fan bearing Housing	Employer is requested to note that Bearing Housing is not recommended as per the OEM. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is the main bearing housing assembly of fan. Same has to be supplied by bidder. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1413	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	5 of 38	1.05.00 (A)	5.4 Metallic rings	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.

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1442	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	9 of 38	1.07.00	9. Worm wheel	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1443	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	9 of 38	1.07.00	10. Feeder gate	Employer is requested to clarify that only 2 Nos of Feeder inlet gate is required. Bidder has currently considered only inlet gates. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1444	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	9 of 38	1.08.00 A)	Coal Burners/ Coal Pipe Bends(for tangential firing) 1. Coal compartment assembly	Employer is requested to note the following repetition: 1) Coal Compartment assembly - 2 sets is mentioned in sl. no. 1.08.00 A) (1). Employer has mentioned Coal Nozzle castings -1 set in sl. no. 1.08.00 A) (5). Also, Adjustable Coal Nozzle tips - 1 set is mentioned in 1.08.00 A) (6). To avoid this repetition, Bidder would like to consider coal compartment assembly - 2 sets only as mentioned in sl. no. 1.08.00 A) (1) which will include coal nozzle castings as well as coal nozzle tips covered in other places as mentioned above. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder shall supply each spares separately as per Specification. Bidder proposal is not acceptable. Bidder to comply with the specification requirements.
1445	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	9 of 38	1.08.00 A)	5. Coal nozzle castings	Employer is requested to note the following repetition: 1) Coal Compartment assembly - 2 sets is mentioned in sl. no. 1.08.00 A) (1). Employer has mentioned Coal Nozzle castings -1 set in sl. no. 1.08.00 A) (5). Also, Adjustable Coal Nozzle tips - 1 set is mentioned in 1.08.00 A) (6). To avoid this repetition, Bidder would like to consider coal compartment assembly - 2 sets only as mentioned in sl. no. 1.08.00 A) (1) which will include coal nozzle castings as well as coal nozzle tips covered in other places as mentioned above. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder shall supply each spares separately as per Specification. Bidder proposal is not acceptable. Bidder to comply with the specification requirements.
1446	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	9 of 38	1.08.00 A)	6. Adjustable coal nozzle tips	Employer is requested to note the following repetition: 1) Coal Compartment assembly - 2 sets is mentioned in sl. no. 1.08.00 A) (1). Employer has mentioned Coal Nozzle castings -1 set in sl. no. 1.08.00 A) (5). Also, Adjustable Coal Nozzle tips - 1 set is mentioned in 1.08.00 A) (6). To avoid this repetition, Bidder would like to consider coal compartment assembly - 2 sets only as mentioned in sl. no. 1.08.00 A) (1) which will include coal nozzle castings as well as coal nozzle tips covered in other places as mentioned above. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder shall supply each spares separately as per Specification. Bidder proposal is not acceptable. Bidder to comply with the specification requirements.
1447	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	1. Support Bearing	Employer is requested to note that Bidder will provide bottom bearing only as per OEM standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1448	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	2. Guide Bearing	Employer is requested to note that Bidder will provide top bearing only as per OEM standard practice. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1449	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	3.Pump assembly	Employer is requested to note that Bidder has proposed sump oil lubrication system. Pump assembly is not applicable for sump oil lubrication system, hence spares for pump assembly are also not applicable for sump oil lubrication systems. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1450	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	3.2 Pump Motor	Employer is requested to note that Bidder has proposed sump oil lubrication system. Pump assembly is not applicable for sump oil lubrication system, hence spares for pump motor are also not applicable for sump oil lubrication systems. In case Employer does not accept Bidder's proposal, Bidder will provide spares as mentioned below. Pump motor: 1 no. for top bearing and 1 no. for bottom bearing. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1451	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	3.3 Pressure regulator	Employer is requested to note that Bidder has proposed sump oil lubrication system. Pump assembly is not applicable for sump oil lubrication system, hence spares for pressure regulator are also not applicable for sump oil lubrication systems. In case Employer does not accept Bidder's proposal, spare for pressure regulator/relief valves are not envisaged as the same is inbuilt in pumps which covered in point no. 3.1 above. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1452	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	3.4 Filters	Employer is requested to note that Bidder has proposed sump oil lubrication system. Pump assembly is not applicable for sump oil lubrication system, hence spares for filters are also not applicable for sump oil lubrication systems. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1453	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	3.5 Pump Motor coupling	Employer is requested to note that Bidder has proposed sump oil lubrication system. Pump assembly is not applicable for sump oil lubrication system, hence spares for pump motor coupling are also not applicable for sump oil lubrication systems. In case Employer does not accept Bidder's proposal, Bidder will provide spares as mentioned below. Pump motor coupling: 1 no. for top bearing and 1 no. for bottom bearing shall be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1454	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	9.1 Speed reducer Gears, pinions & shaft	Employer is requested to note the complete speed reducer spares are asked in sl. no. 9. The spare asked in sl. no. 9.1 (Speed reducer Gears, pinions & shaft) is already included in sl. no. 9 (i.e. complete speed reducer spares). Hence, Bidder would like to supply spares as per sl. no. 9 (complete speed reducer spares) only. Employer is requested to consider our request to delete the spare covered in sl. no. 9.1 (i.e. speed reducer Gears, pinions and shaft). This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1455	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	9.2 Speed reducer Bearings	Employer is requested to note the complete speed reducer spares are asked in sl. no. 9. The spare asked in sl. no. 9.2 (i.e. Speed reducer bearings) is already included in sl. no. 9 (i.e. complete speed reducer spares). Hence, Bidder would like to supply spares as per sl. no. 9 (complete speed reducer spares) only. Employer is requested to consider our request to delete the spare covered in sl. no. 9.2 (i.e. speed reducer bearings). This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1456	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	9.3 Speed reducer Seals & gaskets	Employer is requested to note the complete speed reducer spares are asked in sl. no. 9. The spare asked in sl. no. 9.3 (i.e. Speed reducer Seals & gaskets) is already included in sl. no. 9 (i.e. complete speed reducer spares). Hence, Bidder would like to supply spares as per sl. no. 9 (complete speed reducer spares) only. Employer is requested to consider our request to delete the spare covered in sl. no. 9.3 (i.e. Speed reducer Seals & gaskets). This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1457	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	9.4 Speed reducer Clutch assembly	Employer is requested to note the complete speed reducer spares are asked in sl. no. 9. The spare asked in sl. no. 9.4 (i.e. Speed reducer Clutch assembly) is already included in sl. no. 9 (i.e. complete speed reducer spares). Hence, Bidder would like to supply spares as per sl. no. 9 (complete speed reducer spares) only. Employer is requested to consider our request to delete the spare covered in sl. no. 9.4 (i.e. Speed reducer Clutch assembly). This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1458	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	10 Fluid coupling (if NA then other applicable coupling)	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1459	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	11 of 38	1.10.00 (B)	11 Other couplings with inserts & fasteners	Employer is requested to note that shrink disc coupling between shaft and gear box will be provided as per Bidder's standard specification. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1460	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	12.1 Worm & worm wheels for gear reducer	Bidder would like to clarify that 1 set = 1 no. Geared motor assy for hot end and 1 no. geared motor assy. for cold end. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1461	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	12.2 Coupling	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1462	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	12.3 Bearing & seals for spec reducer	Employer is requested to note that this spare is already covered in sl. no. 12.1 above. Hence, Employer is requested to note that these spares are not applicable and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1463	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	12.7 Rotary Chain Box Assembly	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.

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1464	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	14. Bushings for worm gear reducer	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1465	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	16. Rack & Pinion Assy	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1466	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	18 Air preheater guide bearing and support bearing tube oil pump motor (if Applicable)	Employer is requested to note that this spare is already covered in sl. no. 3 "Lubricating system of support & Guide bearing". Hence, Employer is requested to note that these spares are not applicable and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1467	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	20 Air preheater blower motor	Employer is requested to note that Bidder proposes to provide one no. Cold end Soot Blower Motor only as it can be used for hot end soot blower as well, if required. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1468	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	12 of 38	1.10.00 (B)	25 Lub oil Cooler	Employer is requested to note that this spare is already covered in sl. no. 3 "Lubricating system of support & Guide bearing". Hence, Employer is requested to note that these spares are not applicable and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1469	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	13 of 38	1.12.00	2. HEA spark rod (including special cables from exciter)	Employer is requested to note that Bidder proposes to provide HEA spark rod without spark tip. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder's understanding is correct.
1470	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	13 of 38	1.13.00	1a Motor for water wall deslagger	Employer is requested to note that this motor spare is already covered in Sl. No. 1, hence deslagger motor not considered separately. Hence, Employer is requested to note that these spares are not applicable and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1471	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	13 of 38	1.13.00	3 a) Motor for long retractable soot blower	Employer is requested to note that this motor spare is already covered in Sl. No. 9 below, hence long retractable Soot Blower motor not considered separately. Employer is requested to note that these spares are not applicable and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1472	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	14 of 38	1.13.00	6.1 Long retractable soot blower	Employer is requested to note that Bidder proposes to provide Bearings shall be provided. However, oil seals are not applicable. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1473	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	14 of 38	1.13.00	6.2 Water wall deslagger	Employer is requested to note that Bidder proposes to provide Bearings shall be provided. However, oil seals are not applicable. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1474	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	14 of 38	1.13.00	12. Complete power pack assembly for Long Retractable soot blower	Employer is requested to note that Rotary / insert / retract motion is accomplished by single motor, which is considered above, separate Power pack assembly is not applicable hence spare not considered. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1475	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	14 of 38	1.13.00	14.1 Set of Gears & shaft (Spur & worm)	Employer is requested to note that this spare is not applicable as per OEM standard. OEM is having rack & pinion design and a single motor is capable of both rotary as well as traverse motion. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1476	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	14 of 38	1.14.00 (A)	4. Locking pin set	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1477	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (B)	4. Locking pin set	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1478	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (B)	10. Set of Washer	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1479	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (C)	4. Locking pin set	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1480	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (C)	10. Set of Washer	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1481	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (D)	4. Locking pin set	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1482	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (D)	10. Set of Washer	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1483	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	E-1. Spares for Electromatic Relief Valves	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to clarify their supply. In case Electromatic Ball Valve (EBV) is only supplied in place of Electromatic Relief Valves (ERV), then additional mandatory spares for EBV as listed in E-2 shall be supplied against E – 1 spares for ERV.
1484	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	2.2 Spring for main valve	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1485	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	2.4 Seal bushing for main valve	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1486	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	2.6 Bushing for pilot valve	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1487	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	2.8 Seal ring	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1488	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	E-2. Spares for Electromatic Ball Valves	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	In case Electromatic Relief Valves (ERV) is supplied in place of Electromatic Ball Valve (EBV), then additional mandatory spares for ERV as listed in E-1 shall be supplied against E – 2 spares for EBV.
1489	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	15 of 38	1.14.00 (E)	1. Complete Electromatic ball valve	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	In case EBV is supplied in place of ERV, then Complete EBV (Electromatic Ball Valve) assembly shall be supplied for complete replacement of installed EBV in Boiler.
1490	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.14.00 (E)	2. Spares for above:	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1491	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.14.00 (E)	2.1 Ball and seat assembly	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1492	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.14.00 (E)	2.2 Gasket	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1493	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.14.00 (E)	2.3 Packing Gland Flange	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1494	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.14.00 (E)	2.4 Packing ring	Employer is requested to note that either Electromatic Relief Valves or Electromatic Ball Valves shall be supplied. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1495	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.15.00	4. Valve plug	Employer is requested to note that this spare means "Plug of the Valve" as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Valve plug means plug of the valve if plug and stem supplied separately. However if plug and stem is supplied as a one piece, then whole set of plug and stem to be supplied against valve plug.
1496	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.16.00	Reheater Spray Block Valve Spares	Employer is requested to note that as per Bidder's standard practice ON/OFF valve is considered for block valve for reheater spray. Bidder will provide Mandatory spare accordingly. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1497	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.16.00	4. Valve plug	Employer is requested to note that bidder understands that this spare means "Plug of the Valve" as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Valve plug means plug of the valve if plug and stem supplied separately. However if plug and stem is supplied as a one piece, then whole set of plug and stem to be supplied against valve plug.
1498	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	16 of 38	1.17.00	1. Boiler main stop valve assy	Employer is requested to note that complete valve assembly except the valve body, valve actuator will be supplied by Bidder. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Boiler main stop valve assembly shall include valve body, valve actuator and the assembly to be supplied for complete replacement of installed valve in boiler.
1499	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	17 of 38	1.18.00	4. Gland packings	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1500	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	17 of 38	1.19.00	4. Gland packings	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1501	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	17 of 38	1.19.00	5. Pressure seal rings	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	This is part of detail engineering. Bidder is requested to supply the mandatory spares as specified. Further Bidder to please also refer provisions specified in Mandatory spare chapter sub-section-VI, Part-A/section-VI.
1502	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	24 of 38	2.01.00	6. Furnace and Flame viewing system	Employer is requested to note that the spares considered for this items is covered under 6.1 & 6.2 mentioned below. Accordingly, Bidder will offer spares for sl. no. 6.1 & 6.2 as mentioned below. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1503	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	24 of 38	2.01.00	6.1 Flame Cameras	Employer is requested to note that Furnace TV Mandatory Spares: Electronic Modules of Furnace Camera are not user replaceable, hence Camera Electronics is not considered part of Mandatory Spare, however complete Camera is offered as per Mandatory Spare. No commercial rebate shall not be applicable for such items. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1504	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	24 of 38	2.01.00	8. Acoustic steam Leak Detection system (ASLD)	Employer is requested to note that the spares considered for this items is covered under 8(i) & 8(ii) mentioned below. Accordingly, Bidder will offer spares for sl. no. 8 (i) & 8(ii) as mentioned below. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	specification requirements are clear. Bidder to comply with the specification requirements.
1505	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	25 of 38	2.01.00	10. Any other instruments (If applicable)	Employer is requested to note that no other Instruments are considered other than that are specifically mentioned above. Accordingly, Bidder will not provide any additional spares for this item. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1506	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	25 of 38	2.01.00	11. Any other control system (If applicable)	Employer is requested to note that no other Instruments are considered other than that are specifically mentioned above. Accordingly, Bidder will not provide any additional spares for this item. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to comply with the specification requirements.
1507	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	25 of 38	2.02.00	c) Analyser for De-NOx/ SCR system (Dust monitor, Ammonia Slip analyser, NOx analyser etc.)	Employer is requested to note that this spare is not applicable for SRDS plant. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer amendment No. C&I-1-05.
1508	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	26 of 38	2.05.00	Pneumatic actuator assembly	Employer is requested to note that the control valves (isolation/block valves) already covered under category Light oil system under 1.11.00/foot blower under 1.13.00/spray control valves Valves under 1.14.00/Aux PRDS under 1.20.00/Aux boiler under 1.21.00 are not required to cover in this category. Accordingly, bidder will not consider these spares. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder's understanding is not correct. Bidder to provide Pneumatic actuator assembly under clause 2.05.00.
1509	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	27 of 38	3.00.00	1. Friction block	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1510	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	27 of 38	3.00.00	Guide roller of each type	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1511	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	27 of 38	3.00.00	Time device	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1512	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	27 of 38	3.00.00	Auxiliary relay	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1513	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	Transmitters	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1514	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	21 (a) Fan	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1515	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	23 Pinion	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1516	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	B (1) Friction block	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1517	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	B (2) Guide roller of each type	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1518	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	28 of 38	3.00.00	B (5) Time device	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1519	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	29 of 38	3.00.00	B (8) Auxiliary relay	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VI/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.

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 Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1520	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	29 of 38	3.00.00	B (15) Transmitters	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1521	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	29 of 38	3.00.00	B (21 a) Fan	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1522	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER -1 SG & AUXILIARIES	29 of 38	3.00.00	B (23) Pinion	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to please refer clause 13.00.00 of section-VII/Part-A, sub-section-VI Mandatory spares chapter page 3 of 3 regarding not applicable items.
1523	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	1 of 3	2.00	5. Spare gaskets/pressure seal gaskets for NRV of all sizes	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-01.
1524	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	1 of 3	2.00	6. Spare set of gaskets for safety valves, relief valves and safety relief valves of all sizes	Employer is requested to note that Bidder shall supply these spares if applicable as per OEM standard design. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-01.
1525	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	1 of 3	2.00	9. Complete gate valves assembly up to the size of 50 NB	Employer is requested to note that these spares are not applicable as there is no Angle valve upto size 50 NB in the Bidders' design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-02.
1526	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	2 of 3	2.00	13. Gasket for each flanged connection on high pressure steam and feed line.	Employer is requested to note that these spares are not applicable as per bidder standard there is no flange connection in the PCP system and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-03.
1527	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	2 of 3	2.00	14(a) safety valves, relief valves and safety relief valves up to 50 NB size	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04.
1528	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER - 06 PIPING	2 of 3	2.00	15 b Steam trap & Y strainer above 25 NB & up to 50 NB	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-05.

EPC PACKAGE FOR LARA SUPER THERMAL POWER PROJECT, STAGE-II (2x800 MW)
Clarification No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-9587-001R-2

1529	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	2 of 3	2.00	15C Steam trap & Y strainer above 25 NB & up to 50 NB	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-05.
1530	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 1) Mandatory spare requirements of Valves and specialties for power cycle piping systems (Sub Section: A-07 of Part-A of Technical Specifications) specified above does not include items/valves/specialties which are already specified/covered elsewhere in this Technical specification for mandatory spare requirement.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1531	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 2) Wherever complete valve assembly as mandatory spare has been specified above for power cycle piping, it shall include complete gear operator/ box assembly which forms part of original valve assembly/supply.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1532	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 3) Mandatory spares for valve actuators (for Pneumatically, Hydraulically & Electrically operated valves) shall be supplied as per actuator quantity/details specified elsewhere in this technical specification for mandatory spare requirement.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1533	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 4) Mandatory spare requirement for complete valve assembly above 50NB in power cycle piping systems shall include Gate valve, Globe valve, check valve, safety valve, Angle valve, butterfly valve etc.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1534	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 5) In case the quantity of mandatory spares so calculated happens to be a fraction, the same shall be rounded off to next higher whole number. For example 10% of 11 is equal to 1.1, then it should be rounded as 2 instead of 1.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1535	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 6) Mandatory spares for valves above 50NB made of A105 / A216 WCC installed on 15NICKMO5 (EN 1.6368) / ASTM A335 Grade P36 piping shall be supplied with suitable matching pieces (in welded condition with valve ends at valve manufacturing works).	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1536	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER – 06 PIPING	3 of 3	-	Note 7) Wherever Mandatory spares are specified as "per unit", Total Mandatory spares quantity shall be arrived by multiplying the specified quantity with number of units under the package.	Employer is requested to note that in case there is one no. valve only of particular type, class and size then only one no. of mandatory Spare shall be supplied and accordingly the mandatory spares will be supplied. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder to refer Amendment No. PIP1-04, 06 & 07.
1537	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	23 of 36	2.01.00(2)	Coal feeder	1. Coal Feeder Mandatory Spares: Controllers of Coal Feeder system is not user serviceable as it involves programming of the system after installation, hence will not be considered as Electronics 2. Mandatory Spares shall be provided as applicable per OEM. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1538	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	23 of 36	2.01.00(6)	Furnace and Flame viewing system	Employer is requested to note that these spares are not applicable as per the bidder's standard design and not envisaged. Also, there is no equivalent item for this spare. This point is raised to clarify bidder's offering to Employer. Kindly confirm acceptance.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1539	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	26 of 38	2.05.01	CONTROL VALVES, ACTUATORS & ACCESSORIES (FOR ALL SERVICES UNDER THIS CHAPTER)	Spares terminology will depend on OEM as approved by Customer. Customer shall accept as per OEM specific terminology as per Customer approved vendors. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1540	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	26 of 38	2.05.02	PNEUMATICALLY OPERATED ISOLATION / BLOCK VALVES, ACTUATORS & ACCESSORIES (FOR ALL SERVICES UNDER THIS CHAPTER)	Spares terminology will depend on OEM as approved by Customer. Customer shall accept as per OEM specific terminology as per Customer approved vendors. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1541	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	26 of 38	2.06.00	MICROPROCESSOR BASED / PLC BASED /ELECTRONIC BASED CONTROL PANEL (IF APPLICABLE)	Spares terminology will depend on OEM as approved by Customer. Customer shall accept as per OEM specific terminology as per Customer approved vendors. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1542	SECTION-VI, PART-A	SUB SECTION-VI MANDATORY SPARE- CONTROL AND INSTRUMENTATION	27 of 38	2.08.00	Electrical Actuators	Mandatory Spares shall be provided as applicable per OEM. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1543	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-12 CONTROL & INSTRUMENTATION	1 of 10	1.00.00	DISTRIBUTED DIGITAL CONTROL MONITORING AND INFORMATION SYSTEM (DDCMIS)	Spares terminology will depend on OEM as approved by Customer. Customer shall accept as per OEM specific terminology as per Customer approved vendors. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1544	SECTION-VI, PART-A	SUB-SECTION-VI CHAPTER-12 CONTROL & INSTRUMENTATION	5 of 10	2.00.00-2 (II)	Oxygen Analyzer (Low & High Temp.)	Mandatory Spares shall be provided as applicable per OEM. Any item not applicable for the OEM design will not be considered and commercial rebate shall not be applicable for such items.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1545	SECTION – VI, PART-A	SUB-SECTION-VI CHAPTER -01	24 OF 38	2.01.00	OTHER RELATED CONTROL AND INSTRUMENTATION SYSTEMS / EQUIPMENTS	Customer is requested to clarify following understanding: 1. In case the spares indicated for any equipment/system in the spare list are not applicable to the particular design offered by the bidder/OEM, the bidder should offer spares applicable to offered design with quantities indicated in the spare list. 2. Bidder will consider the price for applicable item only. There will be No pass-on / commercial rebate during Contract stage due to any spare not applicable as per bidder/OEM offered design (but indicated in the mandatory list).	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.
1546	SECTION – VI, PART-A	SUB-SECTION-VI-AII Chapters	All pages		LIST OF MANDATORY SPARES FOR SG & AUXILIARIES	Bidder clarify that if Mandatory spares duplicated at different clauses in Mech/ Elec/ C&I sections, bidder will consider the spare as per the section where higher qty is specified. Other sections will be ignored for the same spares	Mandatory spares mentioned against each clause to be supplied. Bidder to comply with the specification requirements.
1547	SECTION – VI, PART-A	SUB-SECTION-VI-AII Chapters	All pages		LIST OF MANDATORY SPARES FOR SG & AUXILIARIES	Customer is requested to add the below point: Whenever the quantity is mentioned in "set" or "sets" and the definition is not specified, bidder to consider set/sets requirement for one equipment only.	Will be as per NTPC Specification and shall be binding on bidder. Bidder to comply with the specification requirements.
1548	SECTION – VI, PART-A	SUB-SECTION-VI CHAPTER -01	26 OF 38	2.05.01	Pneumatic and electro-hydraulic actuator assembly	Bidder clarify regarding spare for electrohydraulic actuator as below a) Complete assembly will be provided in case of self contained E/H actuator b) For oil skid type, the applicable components will be provided as per OEM recommendation.	Bidder to comply with the specification requirements.
1549	SECTION – VI, PART-A	SUB-SECTION-VI	17 OF 38	1.20.00 A	Valve trim set for all control valves supplied under this package (except for SHR/RH spray,H CPRDS & L CPRDS CV for which spares are covered under separate clause) Valve trim (including cage, plug, stem, seat rings, guide bushings, gland packing, gaskets etc.)	Bidder understands that this clause is applicable for H CPRDS De-superheater & Low Temp De-superheater Spray control Valves	As per specification this clause is not applicable for H CPRDS De-superheater & Low Temp De-superheater Spray control Valves. This clause is applicable for all valve trim set supplied under this package except H CPRDS De-superheater & Low Temp De-superheater Spray control Valves.

1	VI / A	IIA-04	2 of 6	3.00.00	A common limestone and slurry preparation system as already provisioned at Lara-I (2 x 800 MW) units shall be utilized for Lara-II (2X800MW) with suitable interconnections. For this purpose the contractor shall supply interconnection system from existing stage-I limestone slurry storage tanks with necessary pipings, fittings, supports and isolation & control valves to the stage-II absorbers. The isolation and control valve shall be provided at both end (Limestone slurry storage tanks of Stage-I and absorber(s) inlet of stage-II). The details as shown in respective limestone grinding system P&IDs are indicative, However the scope is limited to interconnections as above.	As per FGD Milling System, it seems that milling system is in bidder scope whereas in part-A tender specification it is mentioned that common limestone & slurry preparation system is already provisioned at Lara-I. Kindly clarify the scope of supply for FGD milling system. Bidder request customer to provide GA, floorplan and necessary Details of the existing Limestone slurry tank which is required to arrive the tentative arrangement.	The complete limestone grinding and slurry preparation system is in bidder's scope. Bidder to refer amendment No. SG2 in this regard.
2	9587-001-POM-A-023				Scheme of FGD Milling System		
3	SECTION VI, PART A	IIA-14	Page 1 of 2	1.00.00	Space provision to be kept for Limestone unloading, Conveying, crushing, storage and feeding to day silo.	We are considering entire LHP system as exclusion. Please confirm.	Bidder to refer Amendment MH-34.
4	VI PART-B	D-1-2	1 OF 1	02.02.02	VI PART-B	We understand that Civil & Structural works for Limestone Handling system is not under the scope of Bidder.	Bidder to refer Amendment no D3-03. D3-04
5	VI / A	IIA-04	2 of 6	3.00.00	A common limestone and slurry preparation system as already provisioned at Lara-I (2 x 800 MW) units shall be utilized for Lara-II (2X800MW) with suitable interconnections. For this purpose the contractor shall supply interconnection system from existing stage-I limestone slurry storage tanks with necessary pipings, fittings, supports and isolation & control valves to the stage-II absorbers. The isolation and control valve shall be provided at both end (Limestone slurry storage tanks of Stage-I and absorber(s) inlet of stage-II). The details as shown in respective limestone grinding system P&IDs are indicative, However the scope is limited to interconnections as above.	As per FGD Milling System, it seems that milling system is in bidder scope whereas in part-A tender specification it is mentioned that common limestone & slurry preparation system is already provisioned at Lara-I. Kindly clarify the scope of supply for FGD milling system. Bidder request customer to provide GA, floorplan and necessary Details of the existing Limestone slurry tank which is required to arrive the tentative arrangement.	The complete limestone grinding and slurry preparation system is in bidder's scope. Bidder to refer amendment No. SG2 in this regard.
6	9587-001-POM-A-023				Scheme of FGD Milling System		
7	SECTION-VI, PART-B	SUB-SECTION-A-05	569 of 1046	6.01.00	A common limestone and slurry preparation system as already provisioned at Lara-I (2 x 800 MW) units shall be utilized for Lara-II (2X800MW) with suitable interconnections.	Bidder request owner to ensure that the fineness of limestone slurry shall be min.90% through 325 mesh size for spray type absorber.	Bidder to refer amendment No. SG2 in this regard.
8	SECTION-VI, PART-B	SUB-SECTION-A-05	569 of 1046	6.01.00	A common limestone and slurry preparation system as already provisioned at Lara-I (2 x 800 MW) units shall be utilized for Lara-II (2X800MW) with suitable interconnections.	As per our understanding the existing limestone slurry preparation system is for JBR type absorber having limestone slurry having fineness of min. 90% through 200 mesh. Limestone slurry having this fineness cannot be used for the spray tower type FGD system. Hence, Bidder request owner to kindly include the complete limestone handling & slurry preparation system for this project.	Bidder to refer amendment No. SG2 in this regard.
9	SECTION-VI, PART-B	SUB-SECTION-A-05	576 of 1046	9.01.00	Contractor shall provide sumps of adequate capacity in the each absorber area, limestone grinding area and gypsum dewatering area for containing the over flow from the respective systems.	As already available limestone grinding and slurry preparation arrangement is to be used for lara Stg-2 project, bidder understands that sump for limestone grinding area is not to be considered for this project. Please confirm.	As the complete limestone grinding and slurry preparation system is in bidder's scope, the sump for limestone grinding area is also in bidder's scope. Bidder to refer amendment No. SG2 in this regard.
10	SECTION- VI, PART - E, GENERAL LAYOUT PLANT, DRG. NO. 9587-999-POC-F-001, REV. 0	General	--	--	Routing of Fuel oil and Limestone slurry pipes from existing Stage-I to Stage-II facility	Bidder to take fuel oil and Limestone slurry from Stage-I to Stage-II. Request Owner to provide Existing Pipe cum cable trestle drawing of Stage-I area.	Bidder to refer Amendment no D3-03. D3-04

11	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENNE SS	11 OF 36	4.19	<p>Ash Handling System</p> <p>4.19.1 The Bidder/ its Sub- vendor(s) should be supplier of ash handling system(s) and should have executed ash handling system(s) involving design, engineering, manufacturing/got manufactured, supply, erection /supervised erection and commissioning/ supervised commissioning for-</p> <p>(a) Wet Bottom Ash handling system comprising either a jet pump system in conjunction with water impounded Bottom Ash Hopper or a submerged Scraper Chain Conveyor system designed for the following conveying capacities for pulverized coal fired boilers: Jet Pump System : 50 tonnes/hour (dry ash basis) or more per jet pump.</p> <p>Submerged Scraper : 20 tonnes/hour (dry ash basis) Chain Conveyor System or more per Conveyor. The reference Bottom Ash Handling systems should be of the same type i.e. jet pump system or submerged scraper chain conveyor system as is being offered by the Bidder/ its Sub- vendor.</p> <p>(b) Pneumatic fly ash handling system for conveying fly ash from ESPs of a single pulverized coal fired boiler unit by either: (i) Pressure conveying system designed for 30 TPH or more conveying capacity. OR (ii) Vacuum conveying system designed for 30 TPH or more conveying capacity per vacuum extractor. The reference fly ash handling systems should be of the same type i.e. pressure system or vacuum system, as is being offered by the Bidder/ its Sub-vendor. An individual boiler unit having its own independent fly ash handling system up to wetting units/ dry dust collection buffer hoppers/intermediate Silos which includes, among others, independent fly ash handling equipment below ESP hoppers, independent ash conveying piping up to wetting units/ dry dust collection buffer hoppers can be considered as a plant for meeting the requirement above. And</p> <p>(c) Pneumatic Fly Ash Transportation System for transporting fly ash from pulverised coal fired boiler unit having capacity of not less than 20 TPH for a conveying distance of not less than 500 meter including fly ash storage silo. Further, a transportation system provided for an individual boiler unit having dedicated transportation vessels below dry dust collection buffer hoppers and dedicated piping from dry dust collection buffer hoppers/ intermediate Silos to storage silos, including storage silos can be considered as a plant for meeting the requirement above.</p> <p>(d) Complete high concentration ash slurry disposal system for handling not less than 40 tons of ash per hour for pulverised coal fired power stations which includes, among others, positive displacement ash slurry pumps & piping system with associated controls.</p> <p>Notes to Clause no. 4.19.1 (i) An individual boiler unit having its own independent bottom ash handling system of either the jet pump system type or submerged scraper chain conveyor system type can be considered as a plant for meeting the requirement of 4.19.1 (a) above. (ii) The activity of design and engineering under 4.19.1 (a), (b), (c) & (d) should have been carried out by the Bidder/ its Sub-vendor(s) and not through any external design agency/agencies. (iii) The systems mentioned at 4.19.1 (a), (b),(c) & (d) above, should have been in successful operation in at least one (1) plant for at least two (2) years. For the purpose of qualification, the experience as at 4.19.1 (a), (b), (c) & (d) above in separate plants also is permissible. (iv) For reference fly ash handling systems, the design capacity of conveying from ESPs to wetting units/buffer hoppers/intermediate Silos and of transportation from buffer hoppers/ intermediate Silos to storage silos will be the capacity which the client (of the reference plant against which the Bidder / its Sub-vendor is seeking qualification) must have specified in its contract documents.</p>	<p>In view of limited qualified ash handling vendor at present, Bidder requests Owner to modified the AHP provenness criteria mentioned under 419.1 as follows:</p> <p>4.19.1 The Bidder/ its Sub- vendor(s) should be supplier of ash handling system(s) and should have executed ash handling system(s) involving design, engineering, manufacturing/got manufactured, supply, erection /supervised erection and commissioning/ supervised commissioning for-</p> <p>(a) Wet Bottom Ash handling system comprising either a jet pump system in conjunction with water impounded Bottom Ash Hopper or a submerged Scraper Chain Conveyor system designed for the following conveying capacities for pulverized coal fired boilers: Jet Pump System : 50 tonnes/hour (dry ash basis) or more per jet pump.</p> <p>Submerged Scraper : 20-12 tonnes/hour (dry ash basis) Chain Conveyor System or more per Conveyor. The reference Bottom Ash Handling systems should be of the same type i.e. jet pump system or submerged scraper chain conveyor system as is being offered by the Bidder/ its Sub- vendor.</p> <p>(b) Pneumatic fly ash handling system for conveying fly ash from ESPs of a single pulverized coal fired boiler unit by either: (i) Pressure conveying system designed for 30 TPH or more conveying capacity. OR (ii) Vacuum conveying system designed for 30 TPH or more conveying capacity per vacuum extractor. The reference fly ash handling systems should be of the same type i.e. pressure system or vacuum system, as is being offered by the Bidder/ its Sub-vendor. An individual boiler unit having its own independent fly ash handling system up to wetting units/ dry dust collection buffer hoppers/intermediate Silos which includes, among others, independent fly ash handling equipment below ESP hoppers, independent ash conveying piping up to wetting units/ dry dust collection buffer hoppers can be considered as a plant for meeting the requirement above. And</p> <p>(c) Pneumatic Fly Ash Transportation System for transporting fly ash from pulverised coal fired boiler unit having capacity of not less than 20 TPH for a conveying distance of not less than 500 meter including fly ash storage silo. Further, a transportation system provided for an individual boiler unit having dedicated transportation vessels below dry dust collection buffer hoppers and dedicated piping from dry dust collection buffer hoppers/ intermediate Silos to storage silos, including storage silos can be considered as a plant for meeting the requirement above.</p> <p>(d) Complete high concentration ash slurry disposal system for handling not less than 40 tons of ash per hour for CFBC/ pulverised coal fired power stations which includes, among others, positive displacement ash slurry pumps & piping system with associated controls. Ash Slurry pump may be supplied by customer/end user as free issue as per Bidder's design.</p> <p>Notes to Clause no. 4.19.1 (i) An individual boiler unit having its own independent bottom ash handling system of either the jet pump system type or submerged scraper chain conveyor system type can be considered as a plant for meeting the requirement of 4.19.1 (a) above. (ii) The activity of design and engineering under 4.19.1 (a), (b), (c) & (d) should have been carried out by the Bidder/ its Sub-vendor(s) and not through any external design agency/agencies. (iii) The systems mentioned at 4.19.1 (a), (b),(c) & (d) above, should have been in successful operation in at least one (1) plant for at least two (2) years. For the purpose of qualification, the experience as at 4.19.1 (a), (b), (c) & (d) above in separate plants also is permissible. (iv) For reference fly ash handling systems, the design capacity of conveying from ESPs to wetting units/buffer hoppers/intermediate Silos and of transportation from buffer hoppers/ intermediate Silos to storage silos will be the capacity which the client (of the reference plant against which the Bidder / its Sub- vendor is seeking qualification) must have specified in its contract documents.</p>	Bidder to comply Technical specification.
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12	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENNE SS	11 OF 36	4.19	<p>4.19.2 The Bidder/ its Sub- vendor who has executed ash handling systems but does not meet the requirements under clause 4.19.1 in part or in full can also participate provided it has executed at least the following systems of ash handling plant involving design, engineering, manufacturing/got manufactured, supply, erection/supervised erection and commissioning/ supervised commissioning :</p> <p>a) Bottom ash handling system comprising either a jet pump system in conjunction with water impounded Bottom Ash Hopper or submerged scrapper chain conveyor system.</p> <p>b) Fly Ash Handling System for conveying fly ash from ESPs in dry form involving pneumatic conveying systems of vacuum or pressure type.</p> <p>The systems mentioned at 4.19.2 (a) and 4.19.2 (b) above should have been in successful operation in at least one (1) plant for two (2) years and should have been installed for pulverized coal fired boiler units generating not less than 40 TPH of ash per boiler.</p> <p>And collaborates/ associates with party(ies) who meet(s) either the total requirement or the balance part under 4.19.1 (a) ,(b), (c) & (d) above which the Bidder/ its Sub- vendor itself is not able to meet.</p> <p>In such a case, the Bidder/its sub-vendor shall be required to furnish a 'letter of support' from Collaborator/ Associates for successful performance of the relevant system valid for a period of seven (7) years or up to the end of defect liability period of the contract whichever is later, as per the format enclosed with the bidding documents.</p> <p>The 'letter of support' should be submitted at the time of placement of order on the approved sub-vendor.</p> <p>Note to Clause no. 4.19.2:</p> <p>For design and engineering activity referred under paras 4.19.2 should have been carried out by either the Bidder/its Sub- vendor or through design agency/agencies having experience for reference systems. In case of Collaborator(s)/associate(s) (meeting the balance part of total requirement under clause 4.19.1, the activity of design and engineering for the reference systems should have been carried out by them.</p>	<p>In view of limited qualified ash handling vendor at present, Bidder requests Owner to modified the AHP provenness criteria mentioned under 419.2 as follows:</p> <p>4.19.2 The Bidder/ its Sub- vendor who has executed ash handling systems bulk material handling system but does not meet the requirements under clause 4.19.1 in part or in full can also participate provided it has executed at least the following systems of ash handling plant involving design, engineering, manufacturing/got manufactured, supply, erection/supervised erection and commissioning/ supervised commissioning :</p> <p>a) Bottom ash handling system comprising either a jet pump system in conjunction with water impounded Bottom Ash Hopper or submerged scrapper chain conveyor system.</p> <p>ba) Fly Ash Handling System for conveying fly ash from ESPs in dry form involving pneumatic conveying systems of vacuum or pressure type or in wet slurry mode.</p> <p>b) Bulk material handling system, comprising of belt conveyors having a minimum design capacity of 800 TPH The systems mentioned at 4.19.2 (a) and 4.19.2 (b) above should have been in successful operation in at least one (1) plant for two (2) years and should have been installed for pulverized coal fired boiler units generating not less than 40 TPH of ash per boiler.</p> <p>And collaborates/ associates with party(ies) who meet(s) either the total requirement or the balance part under 4.19.1 (a) ,(b) & (c) above which the Bidder/ its Sub- vendor itself is not able to meet.</p> <p>Collaborate(s)/Associate(s) with party who meet(s) the total requirement under 01.01.01 (a), (b) and (c) above, which the bidder himself is not able to meet.</p> <p>In such a case, the Bidder shall be required to furnish Collaboration agreement and Deed of Joint Undertaking jointly executed by the Bidder and the collaborator(s) / Associate(s) and each executant, shall be jointly and severally liable to employer for successful performance of the relevant system, as per the format (Annexure- A) enclosed along with bid. The collaboration agreement should be submitted along with the bid. In such a case, each Collaborator/ Associate shall be required to furnish a bank guarantee after placement of order as follows:</p> <p>i. INR 60 Lakh (Rupees Sixty Lakh) for Collaborator/ Associate for Jet pumping system, Vacuum Conveying System and Pressure Transportation System.</p> <p>AND</p> <p>Collaborate(s)/Associate(s) with party who meets the requirement under 01.01.01 (d) above which the bidder himself is not able to meet.</p> <p>In such a case, the Bidder shall be required to furnish Agreement of Support jointly executed by the Bidder and the collaborator / Associate for successful performance of the HCSD system as per the format (Annexure-B) enclosed along with bid. The Agreement of Support should be submitted along with the bid.</p>	Bidder to comply Technical specification.
13	SECTION-VI, PART-A	SUB-SECTION-I-A PROVENNE SS			<p>4.19.3: Suggested New Route for Ash Handling System</p>	<p>In view of limited qualified ash handling vendor at present, Bidder requests Owner to accept below mentioned new qualification route for ash handling package:</p> <p>4.19.3 The Bidder should be an Engineering, Procurement and Construction (EPC) organization and should have executed, in the last 10 years, large industrial projects on EPC basis (with or without civil works) in the area of power, steel, oil & gas, petrochemical, fertilizer, Flue Gas Desulphurisation and / or any other process industry with the total value of such projects being INR 5,000 million or more. At least one of such projects (in single or multiple contract) should have a total contract value of INR 2,000 million or more. These projects shall be in successful operation for a period of not less than one (1) year prior to the date of Techno-Commercial bid opening.</p> <p>AND</p> <p>Collaborate(s)/Associate(s) with party who meet(s) the total requirement under 4.19.1 (a), (b) and (c) above, which the bidder himself is not able to meet.</p> <p>In such a case, the Bidder shall be required to furnish Collaboration agreement and Deed of Joint Undertaking jointly executed by the Bidder and the collaborator(s) / Associate(s) and each executant, shall be jointly and severally liable to employer for successful performance of the relevant system, as per the format (Annexure- A) enclosed along with bid. The collaboration agreement should be submitted along with the bid. In such a case, each Collaborator/ Associate shall be required to furnish a bank guarantee after placement of order as follows:</p> <p>i. INR 50 Lakh (Rupees Fifty Lakh) for Collaborator/ Associate for Jet pumping system, Vacuum Conveying System and Pressure Transportation System.</p> <p>AND</p> <p>Collaborate(s)/Associate(s) with party who meets the requirement under 4.19.1 (d) above which the bidder himself is not able to meet.</p> <p>In such a case, the Bidder shall be required to furnish Agreement of Support jointly executed by the Bidder and the collaborator / Associate for successful performance of the HCSD system as per the format (Annexure-B) enclosed along with bid. The Agreement of Support should be submitted along with the bid.</p>	Bidder to refer Amendment MH-43.

14	Letter dated 17.12.2022	<p>Notes for clause 4.2.1, 4.2.2 and 4.2.3 j) For qualification under clause 4.2.1, a firm can meet the requirements stipulated under clause 4.2.1 above either singularly or collectively along with its Subsidiaries.</p> <p>In such a case, the Bidder/its sub-vendor shall be required to furnish a letter of technical support from Collaborator / Associate / Holding company along with all its subsidiaries extending support to the holding company / Associate or collaborator for complying requirements of clause 4.2.1 for successful performance of CW pumps, as per the format enclosed in the bidding document. This letter of technical support should be submitted to Employer prior to the placement of order on approved sub-vendor.</p>	<p>We understand that QR requirement mentioned under clause no 4.2.2 and 4.2.3 of CWP provenness calls for letter of technical support from collaborator/associates who in turns meets the requirements of clause no-4.2.1 as the bidder/sub-vendor has prior experience of CWP of flow 15000 m3/hr or more and not meeting qualification requirement as per clause 4.2.1.</p> <p>From above, it is clear that if a bidder/sub-vendor is qualifying under clause no-4.2.1, then the bidder/sub-vendor is not required to furnish any letter of technical support as the bidder/sub-vendor itself qualifies on its own.</p> <p>Hence this notes (j) is not required and M/s NTPC is requested to delete this requirement for bidder/sub-vendor meeting qualification requirement under clause no-4.2.1.</p> <p>Or</p> <p>customer is requested to add followings to the existing clause</p> <p>"In-case the bidder/sub-vendor has already manufactured, supplied and commissioned (singularly/collectively along with collaborator) and which is in successful operation and meeting the qualifying requirement under 4.2.1 and now has fully acquired the technology from the collaborator under technology transfer agreement, letter of technical support from the collaborator can be waived off. Bidder to submit document supporting complete technology transfer.</p>	<p>Bidders proposal is not acceptable. Provenness criteria is inline with Previous NTPC Tenders. Hence Bidder has to follow the provenness as specified in bid documents.</p>
15	Letter dated 09.12.2022		<p>Final Fed water Temperature NTPC has indicated minimum FFWT as 305 deg C in the tender. Since Lara-II is a EPC package wherein bidder is required to optimize the steam cycle within the boundary conditions considering SG efficiency and TG cycle heat rate mentioned in specification so as to meet the required unit rate, hence NTPC is requested to allow bidder to optimize final feedwater temperature. In case NTPC still insists for limiting value of FFWT, minimum value may be kept in the range of 295-300 deg C for optimum configuration of steam cycle.</p>	<p>Final feed water temperature is based on cycle optimisation and NTPC experience in past project. Bidder to comply with the specification requirements.</p>
16	Letter dated 06.12.2022		<p>Unit Heat Rate at 100% TMCR specified in Lara tender is 2081 Kcal/Kwh. We understand that this value has been arrived at, by considering Turbine Heat Rate as 1800 Kcal/Kwh and Boiler Efficiency as 86.5%. However, based on the available Coal properties & calculation criteria defined in the specifications, best possible Boiler Efficiency that can be achieved is 86.1% @ 100% TMCR & 86% @ 55% TMCR.</p> <p>In case Boiler efficiency of 86.5% @ 100% TMCR is required to be achieved for Lara and other ongoing 800 MW project, NTPC is requested to modify the coal properties & align it to the recently concluded NTPC Talcher project. Based on the coal properties of NTPC Talcher project, the best possible Boiler efficiency that can be achieved is 86.5% @ 100% TMCR & 86.4% @ 55% TMCR.</p>	<p>Bidder to refer Technical Amendment-01A in this regard.</p>
17	Letter dated 06.12.2022		<p>NTPC has provided the following limiting values for Unit Auxiliary power consumption. Unit Auxiliary Power consumption at 100% TMCR - 42 MW The above mentioned Unit Auxiliary power consumption values are very stringent & impossible to achieve. Our present working of Unit Aux power is ~45 MW. Reducing Unit Aux power consumption by 3 - 3.5 MW from our end is impossible. We request NTPC to increase the limit for Unit auxiliary power by atleast 1-1.5 MW. Accordingly, we suggest the following:</p> <ul style="list-style-type: none"> • Unit Aux power value to be kept same for Lara & other ongoing 800 MW project • Unit Aux power value for Lara & other ongoing 800 MW project to be increased to 43 MW 	<p>Bidder to comply Unit Aux power consumption guarantee as specified in Technical specification.</p>


EPC Package for Lara Super Thermal Power Project, Stage II (2 X 800 MW)
Amendment No. 1 to Technical specification Section VI of Bidding Document No.: CS-9587-001R-2


S. No.	SPECIFICATION REFERENCE				Existing	Read as
	Section / Part	Sub-Section	Clause No.	Page No.		
D-1-01	VI / B	D-1-7	7.00.00	1 TO 12	Sub-Section D-1-7	Refer revised Sub-section D-1-7 at Annexure A
D-1-02	VI / B	D-1-12 ANNEXURE (C)	----	----	Sub-Section D-1-12 Annexure (C)	Refer revised Sub-Section D-1-12 Annexure(C) at Annexure-B.

Doc No.: CS-9587-001R-2-TECH-AMDT. 01	EPC Package for Lara Super Thermal Power Project, STAGE II (2 X 800MW)	Amendment No. 01 to Technical Specifications Section-VI
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CLAUSE NO.	TECHNICAL REQUIREMENTS 		
7.00.00	FOUNDATION SYSTEM AND GEOTECHNICAL DATA		
7.01.00	<p>Soil Data</p> <p>Owner has carried out detailed geotechnical investigation at the project site. Bore logs data and Bearing capacity for design of foundations are given at Annexure - C of this specification. The detailed geotechnical investigation report comprising of Boreholes, Laboratory tests, Chemical analysis, etc for the sub-strata prevailing at site would be made available for the Bidder's study at the Owner's office, if required. The onus of correct assessment / interpretation and understanding of the existing subsoil condition / data lies with the Bidder. In case, bidder feels that the available data is inadequate, he may carry out his own geotechnical investigation. Further, if any change in layout or for any area not covered in the provided geotechnical data, the bidder has to carry out geotechnical investigation in the area at no cost to Owner. Geotechnical investigation work shall got executed by the Contractor through the agencies as mentioned in Clause No. 7.07.01. However, no time extension shall be given on account of soil investigation carried out by the Bidder. The geotechnical investigation report shall be prepared with detailed recommendations regarding type of foundation and allowable bearing pressure for various structures/ facilities and other soil parameters. Net allowable bearing pressure shall be limited to Table-1 and Table-1a of Annexure-C. The report shall be submitted for Owner's approval prior to commencement of design of foundation.</p> <p>Bidder may refer enclosed topographical survey drawing and general layout plan along with borelogs for variation in existing/ natural ground level (NGL) and finished ground level (FGL). Wherever ash/coal deposit/brick-bats etc. is found the same shall be treated as filled up soil.</p> <p>7.01.01 The furnished borelog details are specific to the co-ordinates where the boreholes have been carried out and are provided for bidder's information only. Soil profile in the proposed area may vary with respect to the borelogs enclosed for bidder's information. Bidder has to consider all such variations in his estimation, over the extent of the work to be carried out. The Bidder should note that nothing extra whatsoever on account of variation between soil data collected by Owner and that found by the Bidder during geotechnical investigation by him or during execution of works, shall be Payable.</p> <p>7.01.02 Tank Foundations</p> <ol style="list-style-type: none"> The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any. Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to III. Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%. Other requirements of tank foundations shall be as per IS 803 and as specified elsewhere in the specifications. <p>7.02.00 Foundation System</p> <p>The requirements for the foundation system to be adopted are as given in subsequent clauses. Depending upon the depth of competent strata/stratum, type of structures, functional</p>		
LARA STPP STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO:	SUB-SECTION CIVIL WORKS FOUNDATION SYSTEM	PAGE 1 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS		
<p>7.02.01</p>	<p>requirement of facility, extent of cutting / filling, suitable open or pile foundation shall be adopted with approval of owner.</p> <p>General Requirements</p> <p> a) All structures/equipment shall be supported on suitable open foundations (isolated, combined, raft) or pile foundation depending on type of structures/facilities, sub-strata, topography etc. b) The roads, ground floor slabs, trenches, pipe pedestals (except thrust blocks), channels/drains and staircase foundation with foundation loading intensity less than $4 T / M^2$ may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil. c) No other foundation (other than as mentioned in (b) above and (g) below) shall rest on the filled up ground / soil. d) All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards. e) The water table for design purpose shall be considered at Finished Ground Level. f) A combination of open and pile foundations shall not be permitted under the same equipment / structure / building. g) Foundation for equipments on ground floor </p> <p> For equipments of static weight upto 1.5 T, the equipment may be supported on the ground floor slab by locally thickening the slab. Thickening of the ground floor slab shall be done upto an extent of about 0.6 m beyond the plan area of the equipment on all the sides. Further, the load intensity below the equipment shall be limited to $4T/m^2$. Other requirements of floor slab and compaction below the floor slab shall be adhered, as specified elsewhere in the specifications. </p> <p> For equipment's of static weight between 1.5 T and 20 T, the equipment may be supported on compacted sand filling from Natural Ground Level (NGL) or excavation level of nearby footing whichever is deeper with the load intensity below the equipment limited to $4T/m^2$. The minimum depth of foundation is 1.0m below FFL. Other requirements of sand compaction below the foundation shall be adhered, as specified elsewhere in the specifications. </p> <p> For equipment of static weight more than 20 T, the equipment foundation shall be taken to the founding level or shall be built up with PCC from the level as mentioned in the Table 1 and Table 1a. The pedestal of equipment foundation or the foundation Block shall be isolated from the adjoining floor slab by providing bitumen impregnated fiber board of minimum 50 mm thick, conforming to IS: 1838 all around the equipment pedestal for the full depth of the floor slab. </p> <p>7.02.02</p> <p>Open Foundations</p> <p>In case open foundations are adopted, following shall be adhered to.</p> <p> a) The minimum width of foundation shall be 1.0 m. b) In case of soil, minimum founding level shall be 1.0m below Finished ground level (FGL) or, 1.0m below Natural ground level (NGL) whichever is lower. In case of rock, minimum founding level shall be 0.6m below Finished ground level (FGL) or, 0.6m below Natural ground level (NGL) whichever is lower. For meeting the bearing capacity and /or functional requirement lower depth to be adopted based on requirement. c) It shall be ensured that all foundations of a particular structure/ buildings/ facility shall rest on one bearing stratum. d) Wherever the intended bearing sub-strata is virgin soil stratum but the actual stratum encountered during foundation excavation consists of filled up soil at founding level, </p>		
<p>LARA STPP STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO:</p>	<p>SUB-SECTION CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 2 OF 7</p>

CLAUSE NO.	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> 		
	<p>under such cases either the foundation shall be lowered completely into the virgin stratum or the filled up soil upto the virgin layers shall be removed and built up through PCC (1:4:8) up to designed foundation level.</p> <p>e) Wherever the intended bearing stratum is weathered rock, but the actual strata encountered during excavation consists of both overburden soil and weathered rock at founding level, under such cases, the overburden upto the weathered rock level including 0.5 m into the weathered rock shall be removed and built up through PCC (1:3:6) upto the designed founding level. Thus, maintaining the same founding level for all the footings of a structure.</p> <p>f) The last layer of about 300 mm before reaching the founding level shall be excavated carefully by such equipment so that soil / rock at the required level will be left in its natural condition.</p>		
7.03.00	Special Requirements		
7.03.01	Details of treatment for foundations / underground structures required to counteract soil / water chemical environment, cement type, grade of concrete, type of reinforcement, cover to reinforcement and protective coating to foundations, etc. shall be as mentioned in Annexure-C of this specification		
7.04.00	Excavation, Filling and Dewatering		
7.04.01	For excavation works, comprehensive dewatering with well point or deep wells arrangement, if required, shall be adopted. Scheme for dewatering and design with all computations and back up data for dewatering shall be submitted for the owner's information. The water table shall be maintained at 0.5m below the founding depth.		
7.04.02	Excavation for shallow foundations shall be covered with PCC immediately after reaching the founding level. In case of any local loosening of soil or any loose pockets are encountered at founding level during excavation the same shall be removed and compensated by PCC M7.5. The final layer of about 300 mm thickness above the founding level shall be excavated by suitable means, so as to avoid disturbance to founding stratum.		
7.04.03	<p>Backfilling in Power House & Boiler Area Backfilling around foundations, trenches, sumps, pits, plinths, etc. shall be carried out with sand in layers not exceeding 300 mm compacted thickness and each layer shall be compacted to minimum 80% of relative density.</p> <p>Backfilling in other area Backfilling around foundations, pipes, trenches, sumps, pits, plinths, etc. shall be carried out with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non cohesive soils. Rock pieces having size less than 150 mm and interstices filled with soil may be used for backfilling around foundation, plinths etc. and shall be compacted to minimum of 85% of original stack of material after filling the interstices.</p>		
7.04.04	Founding level for trenches/channels shall be decided as per functional requirement. The bottom of excavation shall be properly compacted prior to casting of bottom slab of trenches / channels.		
7.04.05	CBR tests for pavement/road design shall be carried out by the Contractor after earth filling (if applicable) has been completed upto the formation level.		
7.04.06	The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding of material or article from any bank or side of such excavation which is more		
LARA STPP STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO:	SUB-SECTION CIVIL WORKS FOUNDATION SYSTEM	PAGE 3 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS		
<p>7.05.00</p> <p>7.05.01</p> <p>7.05.02</p> <p>7.06.00</p> <p>7.07.01</p>	<p>than one and a half meter above the footing by providing adequate piling, shoring, bracing etc. against such bank or sides.</p> <p>Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.</p> <p>EXCAVATION IN ROCK</p> <p>Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.</p> <p>Controlled blasting shall be done by a specialised agency duly approved by Engineer. All controlled blasting shall be done by using time delay detonators (i.e. excel type).</p> <p>a) Contractor shall engage an agency expert in blasting such as, NIRM (National Institute of Rock Mechanics), CMPDIL, Central Institute of Mining and Fuel Research Dhanbad, Dept. of Mining of Govt. Institutions etc. to design detailed blasting scheme and get the same approved from Engineer before carrying out the blasting operation. All blasting shall be done as per the approved blasting scheme & initial blasting operations shall be done under the supervision & guidance of the representative of the blasting expert.</p> <p>b) All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards, etc. pertaining to the acquisition, transport, storage, handling and use of explosives, etc. shall be strictly followed.</p> <p>c) The Contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as per explosives act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive Materials.</p> <p>d) The Contractor shall be responsible and liable for any accident and injury / damage which may occur to any person or property of the project or public on account of any operations connected with the storage, transportation, handling or use of explosive and blasting operations.</p> <p>Sheeting & Shoring</p> <p>The contractor shall ascertain for himself the nature of materials to be excavated and difficulties, if any, likely to be encountered in excavation while executing the work. Sheet piling, sheeting and shoring, bracing and maintaining suitable slopes, drainage, etc. shall be provided and installed by the Contractor, to the satisfaction of the Engineer.</p> <p>Geotechnical investigation work may be got executed by the Contractor through the following suggested agencies</p> <ol style="list-style-type: none"> 1. C.E.TESTING COMPANY Pvt. Ltd, Kolkata 2. Cengrs Geotechnica Pvt. Ltd, New Delhi 3. KCT Consultancy Services, Ahemdabad 4. M.K. Soil Testing Laboratory, Ahemdabad 5. Secon Private Limited, Banglore 6. Soil Engineering Consultants, New Delhi 7. CEG Test House and Research Centre Private Limited, Jaipur 8. Geomarine Consultants Pvt Ltd., Chennai 9. Soiltech India Private Limited, Pune 		
<p>LARA STPP STAGE-II (2X800MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO:</p>	<p>SUB-SECTION CIVIL WORKS FOUNDATION SYSTEM</p>	<p>PAGE 4 OF 7</p>

Annexure-C

SOIL DATA AND FOUNDATION SYSTEM

Employer has carried out geotechnical investigation in the proposed area. Logs of boreholes of proposed area are enclosed with this Annexure.

- a) The minimum founding level and the corresponding net allowable bearing pressure shall be as given in Table – 1 below (**except CWPH, FOPH, Switchyard, crusher house and stacker reclaimer area**).

Table-1

Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m ²		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
In case of foundation stratum is soil			
1.0m below NGL	8	10	12
2.0m below NGL	12	18	22
3.0m below NGL	15	22	25
4.0m below NGL	20	25	28
5.0m below NGL	25	28	30
6.0m below NGL	30	35	35
7.0m below NGL	35	40	40
8.0m or more than 8.0m below NGL	45	45	45
In case of founding stratum is rock			
0.6m embedment into weathered rock	35	35	35
1.0m embedment into weathered rock	40	40	40
2.0m embedment into weathered rock	50	50	50
3.0m embedment into weathered rock	52	52	52
3.5m or more than 3.5m embedment into weathered rock	55	55	55

The minimum founding level and the corresponding net allowable bearing pressure for **CWPH, FOPH, crusher house, Switchyard and stacker reclaimer area** shall be as given in Table – 1a below.

Table-1a

LARA STPP STAGE-II (2X800MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO:	SUB-SECTION CIVIL WORKS FOUNDATION SYSTEM	PAGE 5 OF 7
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Founding Depth/ Stratum	Net Allowable Bearing Pressure T/m ²		
	Isolated and combined footings including raft for 25mm permissible settlement in case of soil and 12mm in case of rocky strata	Isolated and combined footings for 40mm permissible settlement in case of soil and 12mm in case of rocky strata	Rafts (width > 6m) for 75mm permissible settlement in case of soil and 12mm in case of rocky strata
	Width upto 6.0m		
In case of foundation stratum is soil			
1.0m below NGL	8	10	12
2.0m below NGL	10	12	22
3.0m below NGL	14	15	24
4.0m below NGL	14	16	28
5.0m below NGL	15	18	30
6.0m below NGL	16	19	31
7.0m below NGL	17	21	33
8.0m or more than 8.0m below NGL	19	23	35
In case of founding stratum is rock			
0.6m embedment into weathered rock	35	35	35
1.0m embedment into weathered rock	40	40	40
2.0m embedment into weathered rock	50	50	50

For Finished ground level (FGL) refer General layout plan (GLP)

To determine the Natural Ground Level (NGL) the following two tender drawings titled "TOPGRAPHICAL SURVEY OLD SURVEY DATA FOR NGL PURPOSE" and "TOPGRAPHICAL SURVEY (EXISTING GROUND LEVEL)" shall be referred. Further the above two tender drawings shall also be referred in conjunction with borelog data attached at Annexure to this chapter.

The NGL for any particular structure/facility shall be the lowest of all the NGLs mentioned in the extent of the building/facility.

The NGL of any point shall be the lowest of the levels at (a) TOPGRAPHICAL SURVEY OLD SURVEY DATA FOR NGL PURPOSE (b) TOPGRAPHICAL SURVEY (EXISTING GROUND LEVEL) and (c) Borelog data attached at Annexure to this chapter.

In case any loose/soft pockets is encountered at founding level, the same shall be removed completely upto the hard strata and filled up with PCC (1:4:8).

The net allowable bearing pressure higher than above mentioned values shall not be permitted. At intermediate levels the bearing capacity shall be same as the net allowable bearing pressure corresponding to the immediate shallower level mentioned above.

For open foundations, the total permissible settlement shall be governed by IS: 1904 / IS: 13063 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:

Isolated & Raft (Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	25 mm
Isolated & Strip (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	40 mm
Raft (other than Main power house, TG Area Footings, Boiler, Mill, Bunker Footings & Fans) resting on soil	75 mm
Foundations in Weathered rock / rock	12 mm

In case the total permissible settlement is to be restricted to less than as above specified from functional requirements, then the net allowable bearing pressure shall be reduced after review in consultation with Engineer.

c) Special Requirements:

i) Chemicals in ground water and subsoil, as observed during investigation are:

Chemical	Sulphates	Chlorides	pH
Ground Water	60-120 mg/L	57-88 mg/L	7.64-7.95
Sub-soil	<0.05%	0.007-.010	5.04-8.32

ii) In view of the above, the following shall be adopted.

Cement Type	As specified elsewhere in the specifications
Concrete Grade	As specified elsewhere in the specifications
Type of Reinforcement	As specified elsewhere in the specifications
Cover to Reinforcement	As specified elsewhere in the specifications