D-1-12(E)

Annexure-(E)

CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT

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.

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.

Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.

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).

Damping in Structures

The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:

a)	Steel structures	:	2%
b)	Reinforced Concrete Structures	:	5%
c)	Reinforced Concrete Stacks	:	3%
d)	Steel stacks	:	2%

Method of Analysis

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).

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.

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.

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.

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.

APPENDIX-I

SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT

The various site specific seismic parameters for the project site shall be as follows:

1) Peak ground horizontal acceleration : 0.14g

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

   a) for special moment resisting steel frames designed and detailed as per IS:800 : 0.035

   b) For special concentrically braced steel frames designed and detailed as per IS:800 : 0.026

   c) For special moment resisting RC frames designed and detailed as per IS:456 and IS:13920 : 0.021

   d) for RCC chimney, RCC Natural Draft Cooling Tower : 0.07

   e) for liquid retaining tanks (ground supported) : 0.042

   f) for steel chimney, Absorber tower, Vessels : 0.0525

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 : 0.07

Note: g = Acceleration due to gravity

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

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
In units of 'g' for SIPAT STPP

Period (Sec)	Damping Factor (as a percentage of critical damping)					
	0.80%	1%	1.60%	2%	3%	5%
≤ .04	1.0	1.0	1.0	1.0	1.0	1.0
.05	1.2262	1.1579	1.1467	1.1392	1.1299	1.1009
.06	1.4516	1.3487	1.3272	1.3104	1.2892	1.2449
.07	1.8388	1.6845	1.6345	1.5944	1.5666	1.5076
.08	2.3009	2.1316	2.0801	1.9571	1.8387	1.7396
.09	3.6683	3.3390	2.9378	2.6591	2.1409	1.9978
.10	4.5596	3.8254	3.3886	3.1526	2.4177	2.1830
.12	5.1376	4.4231	3.9292	3.6907	2.8694	2.4421
.14	5.4416	4.7467	4.2463	4.0499	3.2878	2.6563
.16	5.6857	5.0086	4.4829	4.2566	3.4812	2.8190
.18	5.8457	5.2097	4.6616	4.4118	3.5682	2.8920
.20	5.8971	5.3013	4.7794	4.5035	3.5972	2.9322
.22	5.9439	5.3612	4.8599	4.5652	3.6281	2.9490
.24	5.9729	5.3977	4.9076	4.5942	3.6383	2.9528
.26	5.9860	5.4369	4.9319	4.5793	3.6299	2.9406
.28	5.9850	5.4398	4.9291	4.5540	3.6028	2.9172
.30	5.9579	5.4239	4.8917	4.4231	3.5308	2.8770
.40	5.4248	4.7794	4.1453	3.5701	2.9584	2.5122
.50	3.8946	3.6309	3.1978	2.8761	2.4290	2.0867
.60	3.1651	3.0098	2.6638	2.4215	2.0334	1.7509
.70	2.6956	2.5674	2.3270	2.0885	1.7378	1.4899
.80	2.3345	2.2232	2.0418	1.8510	1.5498	1.3300
.90	2.0633	1.9548	1.8407	1.6892	1.4366	1.2224

APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
In units of 'g' for SIPAT STPP

Period (Sec)	Damping Factor (as a percentage of critical damping)					
	0.80%	1%	1.60%	2%	3%	5%
1.00	1.8884	1.7874	1.6957	1.5844	1.3590	1.1532
1.10	1.7602	1.6695	1.5825	1.4899	1.2851	1.1037
1.20	1.6518	1.5564	1.4825	1.3955	1.2103	1.0503
1.30	1.5498	1.4619	1.3908	1.3104	1.1467	1.0148
1.40	1.4600	1.3730	1.3048	1.2281	1.0896	.9746
1.50	1.3693	1.2917	1.2281	1.1551	1.0373	.9344
1.60	1.2935	1.2112	1.1532	1.0887	.9821	.8923
1.70	1.2178	1.1411	1.0887	1.0176	.9372	.8549
1.80	1.1514	1.0812	1.0242	.9587	.8885	.8165
1.90	1.0850	1.0111	.9606	.9044	.8455	.7782
2.00	1.0204	.9549	.9072	.8567	.7969	.7426
2.10	.9690	.8988	.8577	.8118	.7482	.6996
2.20	.9185	.8511	.8147	.7772	.7062	.6519
2.30	.8801	.8109	.7810	.7389	.6669	.6154
2.40	.8455	.7782	.7473	.7090	.6285	.5771
2.50	.8090	.7445	.7155	.6744	.5995	.5387
2.75	.7333	.6706	.6407	.6014	.5341	.4536
3.00	.6566	.6061	.5808	.5406	.4714	.3910
3.25	.5920	.5509	.5210	.4798	.4162	.3535
3.50	.5369	.4976	.4705	.4302	.3732	.3227
3.75	.4910	.4602	.4312	.3910	.3311	.2956
4.00	.4536	.4228	.3966	.3564	.3012	.2750

D-1-12(F)

Annexure-(F)

QA REQUIREMENT

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.

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) Elongation	1/8" passes 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.

NTPC Limited

(A Government of India Enterprise)

SIPAT SUPER THERMAL POWER PROJECT
STAGE - III (1x800MW)

PART - D

ERECTION CONDITIONS OF CONTRACT

SECTION – VIB

TECHNICAL SPECIFICATION

FOR

EPC PACKAGE

BIDDING DOCUMENT NO.: CS-8003-001-2

PART - D

ERECTION CONDITIONS OF CONTRACT

1.00.00 GENERAL

1.01.00 The following provisions shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract which is to be performed at site. The erection requirements and procedures not specified in these documents shall be in accordance with the recommendations of the equipment manufacturer, or as mutually agreed to between the Employer and the Contractor prior to commencement of erection work.

1.02.00 The Contractor upon signing of the Contract shall, in addition to a Project Co-ordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and co-ordination of the Works to be performed at Site. Such a person shall function from the Site office of the Contractor during the pendency of Contract.

2.00.00 REGULATION OF LOCAL AUTHORITIES AND STATUTES

2.01.00 In addition to the local laws and regulations, the Contractor shall also comply with the Minimum Wages Act and the Payment of Wages Act (both of the Government of India) and the rules made there under in respect of its labour and the labour of its sub-contractors currently employed on or connected with the contract.

2.02.00 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully pay-able under the provisions of the Indian Boiler Regula-tions and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the Employer, shall be to the account of the Employer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor.

3.00.00 WELDING OF PRESSURE PARTS AND HIGH PRESSURE PIPING

The welding of all pressure parts and high pressure piping shall be in accordance with the following requirements:

3.01.00 Qualification of Weld Procedures

Only qualified welding procedures as per ASME Section IX shall be used by contractor at site. Procedure qualification records along with WPS shall be submitted to NTPC for review. Welding procedure shall indicate all essential and non-essential parameters as per ASME Section IX. Makes of welding consumables shall be subject to employer's approval.

3.02.00 Welder's Qualification

Only welders who are qualified in accordance with the latest applicable requirements of the Indian Boiler Regulations, shall be permitted to perform any welding work on the pressure parts and its attachment welding. In addition to such statutory qualification requirements, the welders shall also undergo a satisfactory pre-production qualification test to be conducted by the Contractor at site as per ASME Sec IX in presence of employer's representative(s), prior to performing work under these specifications. The services of an independent testing laboratory shall be retained by the Contractor to perform welder qualification tests for welders.

All the welders carrying out welding at site shall carry an identification badge, which shall indicate the category and the grade of welding for which they have been tested

and authorised to carry out welding.

3.03.00 **Records**

Welders performance shall be monitored regularly and record of their performance shall be maintained by contractor in a manner acceptable to the employer. Contractor shall maintain such records including record of procedure qualification & welder qualification and hand-over to the employer at the end of work.

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.

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.

Main contractor to ensure the availability of sufficient nos of welding equipment during the each phase of project construction so as not to impede the progress of the project

4.00.00 HEAT TREATMENT

4.01.00 Heat Treatment -Pre-heating, post-heating and post-weld heat treatment operations of all welds, shall be performed in accordance with the requirements of applicable code and WPS . Local post weld heat treatments shall be adopted only in cases where it is normally impracticable to subject the entire assembly as such for stress relieving operations. Heating may be by means of electric induction coils or electric resistance coils as acceptable to employer. Oxyacetylene flame heating or exothermic chemical heating methods will not be permitted. 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 / IIOT sensors duly password protected with a connectivity to remote server /Cloud . All hardware and software required to meet above intent shall be in the scope of bidder.

4.02.00 After setting up the weld joint for heat treatment operation, the Employer's signature shall be obtained on the strips chart of the recorder prior to starting of heat treatment cycle. The right hand corner of the strip chart at the starting point of the heat treatment cycle shall contain details like the weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding Schedule (as specified at clause no 7.00.00- of this chapter) etc.

4.03.00 Heat Treatment - weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding. Schedule shall be mentioned on data for identification.

5.00.00 WELD EDGE PREPARATION

Preparation at site of weld joint shall be in accordance with details acceptable to the Employer. Wherever possible, machining or automatic flame cutting shall be used for edge preparation. Hand flame cutting will be permitted only where edge preparation otherwise is impractical. All slag shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of the Employer. Flame cutting of alloy steel pipe shall be avoided. Wherever such cutting is done, a 200mm length at the cut face shall be removed by machining. Pneumatic hand tools such as edge preparation, tube cutting machine can be used.

6.00.00 CLEANING AND SERVICING

6.01.00 The inside of all tubes, pipes, valves and fittings shall be free from dirt, and loose scales before being erected. All the pipelines shall be thoroughly blown and/or flushed. 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. A system for recording of all such operations shall be developed and maintained in a manner to ensure that no obstructions are left inside the tubes and no tubes are left uncleaned and untested.

6.02.00 All valves and valve actuators, and dampers and damper actuators, if any, shall be thoroughly cleaned and serviced prior to pre-commissioning tests and/or Initial Operations of the plant. A system for recording of such servicing operation shall be developed and maintained in a manner acceptable to the Employer and to ensure that no valves or dampers including their actuators are left unserviced.

6.03.00 All interior surfaces of the turbine shall be thoroughly cleaned prior to boxing - up to remove all traces of oil preservations.

7.00.00 FIELD WELDING SCHEDULE

The Contractor shall submit to the Employer, a certified and complete field welding schedule for all the field welding activities to be carried out in respect of the pressure parts involved in the equipment furnished and erected by him, at least 90 days prior to the scheduled start of erection work at site. Such schedule will be strictly followed by the Contractor during the process of erection. The above field-welding schedule to be issued by the Contractor shall contain the following:

(a.) Drawing No (s)

(b.) Location of the weld

(c.) Size of the weld (outside diameter and thickness)

(d.) Type of joints

(e.) Material specifications

(f.) Size of fillet on backing ring, when the type of joint is with backing ring

(g.) Electrode/ filler metal specifications

(h.) Number of welds per unit

(i.) Quantity of filler metal per weld

(j.) Indication of required Non-destructive Examination (NDE) for each weld

(k.) Pre-heat temperatures for welding

(l.) Process of welding

(m.) Post-welding heat treatment temperature ranges, duration, under as specified at clause no 4.00.00 of this chapter entitled "Heat Treatment".

(n.) Qualification details of weld procedures to be adopted as specified at clause no 3.01.00 of this chapter entitled 'Qualification of Weld Procedures'.

8.00.00 SITE RUN MISCELLANEOUS PIPING

Sketches or diagrams of the proposed routings of all piping, not already indicated and routed on the shop drawings which were reviewed by the Employer, shall be submitted to the Employer for review, Employer's acceptance of such site routings shall be obtained before the piping is erected. All these site run piping shall be installed in such a manner as to present an orderly and neat installation. They shall be located as to avoid obstruction of access and passages. Valves, instruments or any other special items shall be located convenient for operation by the operating personnel. Pipe runs shall be plumb or level except where pitch for drainage is required. Pipe runs that are not parallel to the building structure, walls or column rows shall be avoided so that deflection of pipes between hangers does not exceed 6 mm. No miscellaneous pipe shall be routed and installed above or adjacent to electrical equipment.

9.00.00 THERMAL EXPANSIONS

All piping installation shall be such that no excessive or destructive expansion forces exist either in the cold condition or under condition of maximum temperature. All bends, expansion joints and any other special fittings, necessary to provide proper expansion, shall be incorporated. During installation of expansion joints and anchors, care must be taken to make sure that full design movement is available at all times for maximum to minimum temperature and vice-versa.

10.00.00 PIPING SUPPORTS

10.01.00 Hangers, supports and anchors shall be installed as required to obtain a safe, reliable and complete pipe installation. All supports shall be properly levelled and anchored when installed. The anchors shall be so placed that thermal expansion will be absorbed by bends without subjecting the valves or equipment to excessive strains.

10.02.00 The hanger assemblies shall not be used for the attachment of rigging to hoist the pipe into place. Other means shall be used to securely hold the pipe in place till the pipe support is completely assembled and attached to the pipe and building structures and spring support is set to accommodate the pipe way. All temporary rigging shall be removed in such a way that the pipe support is not subjected to any sudden load. All piping, having variable spring type supports, shall be held securely in place by temporary means during the hydraulic test of pipe system. Constant support type spring hangers used during hydraulic test shall be pinned or blocked solid during the test. After complete installation and insulation of the piping and filling of the piping with its normal operating medium, the pipe support springs shall be adjusted to the cold positions. If necessary, the spring support shall be re-adjusted to the hot positions after the line has been placed for service at its normal maximum operating temperature conditions. Electric arc welding only shall be used to weld all pipe supports to structural steel members that form part of the building supporting structure. The structural beams shall not be heated more than necessary during welding of supports and such welds shall run parallel to the axis of the span. All lugs or any other attachments welded to the piping shall be of the same material as the pipe.

11.00.00 PRESSURE TESTING

11.01.00 On completion of erection of pressure parts, a hydraulic test in accordance with the requirements of the Indian Boiler Regulations shall be performed by the Contractor.

11.02.00 All the valves, high pressure pipes and inter-connected pipes connecting the pressure parts shall be tested along with pressure parts. All blank flanges or any removable plugs required for openings not closed by the valves, and piping provided, shall be furnished by the Contractor. The pressurization equipment including water piping from the supply, needed for the above test shall also be furnished by the Contractor. Any defects noticed during the testing are to be rectified and the unit re-tested. If any welding is done on the pressure parts after the Hydraulic test, the Hydraulic test for that portion of pressure parts shall be repeated.

11.03.00 Thy hydraulic test shall be considered successful only on certification to that effect

by the concerned inspecting Authority as per the provisions of the Indian Boiler Regulations and the Employer.

12.00.00 THERMOWELLS AND FLOW NOZZLES

12.01.00 All the thermowells and flow nozzles in the equipment furnished under the technical specifications shall be installed as a part of this work.

12.02.00 All thermowell connections incorporated in the steam service shall be plugged during the pressure testing and the blow out of steam piping systems. Upon completion of the blow out operation, all thermowells shall be installed and seam welded. Similarly, all flow nozzles in the steam lines shall also be installed only on completion of steam blowing operations unless otherwise agreed to by the Employer, depending upon the sequence of cleaning and purging operations to be adopted by the Contractor at the field.

13.00.00 INSULATION, LAGGING AND CLADDING

The provision of insulation, lagging and cladding of the various equipments and portion of the equipment covered under the Contract, shall be furnished by the Contractor as specified elsewhere or agree to separately in writing. Welds required for holding insulation on pressure parts shall be carried out by IBR qualified welder.

13.01.00 **Piping, Pipe Fittings & Valves**

All piping insulation and metal cladding furnished with the equipment to be erected shall be applied as specified herein.

13.01.01 **Piping**

The insulation on piping shall be applied using wire loops on 150mm centres. These wire loops shall be thoroughly embedded into the outer insulation surface and all cracks, voids and depressions shall be filled with insulating cement suitable for the piping temperature so as to form a smooth base for application of cladding. The wires used for piping insulation shall be of 16 SWG. The surface shall be smooth and uniform before applying the outer covering. All piping insulation ends shall be terminated at a sufficient distance from flanges to facilitate removal of bolts.

13.01.02 **Flanges**

Insulation on flanges shall be by means of blocks of insulating material securely bound to the flange by wire loops. Such blocks of insulation shall be long enough to

overlap the adjacent pipe insulation by an amount equal to the thickness of adjacent pipe insulation. Smooth finish shall be obtained by the application of insulating cement. Alternatively, sectional pipe insulation of proper diameter may be used. Insulation on flanges shall not be done until the pipe and equipment have been in service during the initial operation and till all the flange bolts have been retightened.

13.01.03 **Bends and Elbows**

Insulation on bends and elbows shall be cut into sections sufficiently short to form a reasonable smooth external surface. After the application of insulation material in place, it shall be smoothly coated with insulating cement. Elbows may be insulated as above or alternatively by means of specially moulded insulation enclosures.

13.01.04 **Cladding**

Cladding shall be of aluminium sheet of thickness as per details given in detail Technical Specification or will be provided during detail engineering shall be machine rolled and formed to accurately fit insulation curvatures. Cladding shall be secured using self-tapping screws. Screws shall be adequate number and so located as to produce tight joints. The spacing of screws shall be as far as possible uniform and on centres not exceeding 150 mm. For outside diameters less than 230 mm, spacing of screws shall be on centres not exceeding 100 mm. adequate number of screws shall be provided for fixing the cladding and be so placed in such locations, as to produce a smooth cladding finish without bellying'. Insulated elbows having insulated diameters less than 330 mm shall be provided with preformed smooth aluminium elbow jackets. Wherever possible, all joints should be lapped a minimum of 50 mm with joints facing downwards and so placed that they are obscured from normal points of vision. All the joints in the cladding shall be made with suitable provisions for expansions. All butt joints such as those at piping tees shall be made using rolled seams. In addition, to prevent galvanic corrosion, suitable action, as specified at clause no 13.02.00 of this chapter, shall be taken.

13.01.05 **Valves and Fittings**

All valves and fittings (above valve size of 2 inches) installed in the pipelines shall also be applied with insulation and furnished with suitably shaped boxes so as to facilitate easy dismantling of the fittings. The insulation thickness for valves, valve fittings etc., shall be same as that used on the line on which they are installed. All voids shall be properly filled up with insulating material and as per the directions of the Employer.

13.02.00 **Protection of Equipment during Insulation Applications**

All equipment and structures shall be suitably protected from damage while applying insulation after completion of insulation. All equipment and structures shall be thoroughly cleaned and remove insulating materials which might have fallen on them.

14.00.00 CODE REQUIREMENTS

The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Indian Electricity Rules & Codes, Indian Boiler Regulations, ASME codes and accepted good practices, the

Employer's Drawings and other applicable Indian recognised codes and laws and regulations of the Government of India.

15.00.00 ELECTRICAL SAFETY REGULATIONS

15.01.00 In no circumstances will the Contractor interfere with fuses and electrical equipment belonging to the other Contractor or Employer.

15.02.00 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Employer, he shall:

(a) Satisfy the Employer that the appliance is in good working condition.

(b) Inform the Employer of the maximum current rating,voltage and phase of the appliances.

(c) Obtain permission of the Employer detailing the socket to which the appliances may be connected.

The Employer will not grant permission to connect unitl he is satisfied that

(d) The appliance is in good condition and is fitted with suitable plug

(e) The appliance is fitted with a suitable cable having two earth conductors,one of which shall be an earthened metal sheath surrounding the cores.

15.03.00 No electric cable in use by the other Contractor/Employer will be disturbed without permission.No weight of any description willl be imposed on any such cable and ladder or similar equipment will rest against or to be attached with it.

15.04.00 No reapir work shall be carried out on any live equipment.The equipment must be declared safe by the Employer and a permit to work issued before any work is carried out.

15.05.00 The Contractor shall employ the necessary number of qualified,full time electricians to maintain his temporary electrical installation..

16.00.00 REMOVAL OF MATERIAL

No material brought to the Site shall be removed from the Site by the Contractor and/or his Sub-Contractors without the prior written approval of the Employer.

17.00.00 INSPECTION, TESTING AND INSPECTION CERTIFICATES

The provisions of the clause entitled Inspection, Testing and Inspection Certificates given in Part - C of the Technical Specification, shall also be applicable to the erection portion of the Works. The Employer shall have the right to re-inspect any equipment though previously inspected and approved by him at the Contractor's works, before and after the same are erected at Site. If by the above inspection, the Employer rejects any equipment, the Contractor shall make good for such rejections either by replacement or modification/ repairs as may be necessary to the satisfaction of the Employer. Such replacements will also include the replacements or re-execution of such of those works of other Contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.

18.00.00 ACCESS TO SITE AND WORKS ON SITE

18.01.00 Suitable access to site and permission to work at the Site shall be accorded to the Contractor by the Employer in reasonable time.

18.02.00 In the execution of the Works, no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work on the Site, except by the special permission, in writing by the Employer or his representative.

19.00.00 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

The Contractor shall establish a Office at the Site and keep posted an authorised representative for the purpose of the Contract. Any written order or instruction of the Employer or his duly authorised representative, shall be communicated to the said authorised resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.

20.00.00 CO-OPERATION WITH OTHER CONTRACTORS

20.01.00 Contractor, who may be performing other works on behalf of the Employer and the workmen who may be employed by the Employer and doing work in the vicinity of the works under the Contract. The Contractor shall also arrange to perform his work as to minimise, to the maximum extent possible, interference with the work of other Contracts and their workmen. Any injury or damage that may be sustained by the employees of the other Contractors and the Employer, due to the Contractor's work shall promptly be made good at his own expense. The Employer shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the workmen of the Employer in regard to their work. If the work of the Contractor is delayed because of the any acts of omission of another Contractor, the same shall be dealt in accordance with GCC.

Employer shall have full access to visit the contractor's site at any time for inspection and surveillance checks.

20.02.00 The Employer shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's Works. The Employer shall determine the corrective measures if any, required to rectify this situation after inspection of the works and such decisions by the Employer shall be binding on the Contractor.

21.00.00 DISCIPLINE OF WORKMEN

The Contractor shall adhere to the disciplinary procedure set by the Employer in respect of his employees and workmen at Site. The Employer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Employer such employee has mis-conducted himself or is incompetent, negligent or otherwise unde-sirable then the Contractor shall remove such a person objected to and provide in his place a competent replacement.

22.00.00 CONTRACTOR'S FIELD OPERATION

22.01.00 The Contractor shall keep the Employer informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the Employer shall not relieve the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the Employer

	or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.
22.02.00	The Contractor shall have the complete responsibility for the conditions of the Work-Site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the Contract and shall not be limited to normal working hours. The construction review by the Employer is not intended to include review of Contractor's safety measures in, on or near the Work-Site, and their adequacy or otherwise.
23.00.00	**PHOTOGRAPHS AND PROGRESS REPORT**
23.01.00	The Contractor shall furnish three (3) prints each to the Employer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Employer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.
23.02.00	The above photographs shall accompany the monthly progress report detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.
23.03.00	Project Management System to be implemented as defined in Annexure-A to sub section IIC (Project Management) of technical specifications Section VI, Part A.
24.00.00	**MAN-POWER REPORT**
24.01.00	The Contractor shall submit to the Employer, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.
24.02.00	The Contractor shall also submit to the Employer on the first day of every month, a man power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill- wise and the areas of employment of such labour.
25.00.00	**PROTECTION OF WORK**
	The Contractor shall have total responsibility for protecting his works till it is finally taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be resolved as per the provisions of the as specified at clause no 20.00.00- of this chapter entitled "Co-operation with other Contractors." The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The

Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

26.00.00 EMPLOYMENT OF LABOUR

26.01.00 In addition to all local laws and regulations pertaining to the employment of labour to be complied with by the Contractor pursuant to GCC, the Contractor will be expected to employ on the work its employees with relevant skills and experience of the particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be deployed. The deployment shall be in compliance of all the applicable labour laws.

26.02.00 All travelling expenses including provisions of all necessary transport to and from Site, lodging allow-ances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.

26.03.00 The hours of work on the Site shall be decided by the Principal Employer and the Contractor shall adhere to it. Working hours will normally be eight (8) hours per day - Monday through Saturday.

26.04.00 Contractor's employees shall wear identification badges while on work at Site.

26.05.00 In case the Principal Employer becomes liable to pay any wages or dues to the labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contact Labour Regulation Abolition Act or any other law due to act of omission of the Contractor, the Principal Employer may make such payments and shall recover the same from the Contractor's Bills.

27.00.00 FACILITIES TO BE PROVIDED BY THE EMPLOYER

27.01.00 Communication

The Employer will extend the telephone facilities, if available at Site, for purposes of Contract. The Contractor shall be charged at actuals for such facili-ties.

27.02.00 Railway Siding

Railway siding shall be provided by owner (up to plant entry point) for coal transportation to site. However the same may not be available to the bidder for material/supplies transport etc. Bidder has to plan its own arrangement for movement of ODC consignment to plant site.

Further, irrespective of readiness of railway siding, owner reserves the option of coal supply in stackyard before the synchronization of first unit for which bidder has to ensure readiness of coal supply system up to mill bunker.

28.00.00 FACILITIES TO BE PROVIDED BY THE CONTRACTOR

28.01.00 Contractor's site office Establishment

The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract, pursuant to GCC. The site office will include one conference meeting room (250-300 Sq Ft) for site meetings between the Contractor and the Employer. The contractor shall also provide four (4) furnished office rooms (150-250 SqFt) for use by the Employer to facilitate effective co-ordination during the tenancy of the contract.

28.02.00 Tools, tackles and scaffoldings

The Contractor shall provide all the construction equipments, tools, tackles and scaffoldings required for pre-assembly, installation, testing, commissioning and conducting Guarantee tests of the equipments covered under the Contract. He shall submit a list of all such materials to the Employer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the Employer. The Contractor shall arrange Dozer, Hydra, Cranes, Trailer, etc. for the purpose of fabrication, erection and commissioning.

28.03.00 **Testing Equipment and Facilities:**

The contractor shall provide the necessary testing, equipment and facilities.

28.04.00 **Site laboratory for civil works:**

Contractor shall provide and maintain a site laboratory for the testing of construction material under the direction and general supervision of employer.

28.05.00 **First-aid**

28.05.01 The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first-aid.

28.05.02 As per NTPC Safety rules, ambulance is to be provided by the contractor, however, in case of any emergency, employer may provide the services of an ambulance for transportation to the nearest hospital.

28.06.00 **Cleanliness**

28.06.01 The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the Employer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

28.06.02 Similarly the labour colony, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Employer. Proper sanitary arrangements shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.

28.07.00 **Not used**

28.08.00 **Electricity**

Refer to construction power, as envisaged at Clause 1.15.00 of Sub Section-II-B, Part A, Sec VI of Technical specification.

28.09.00 **Water**

Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony. However, drawal of construction/potable water from bore-well shall be permitted if

found suitable. Any statutory clearance required shall be obtained by the contractor. Assistance, if required shall be provided by the owner.

29.00.00 LINES AND GRADES

All the Works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and layout the Works. Basic horizontal and vertical control points will be established and marked by the Employer at Site at suitable points. These points shall be used as datum for the works under the Contract. The Contractor shall inform the Employer well in advance of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the Employer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the Employer at Contractor's expense.

30.00.00 FIRE PROTECTION

30.01.00 The work procedures that are to be used during the erection shall be those which minimise fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or flammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Untreated canvas, paper, plastic or other flammable flexible materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.

30.02.00 Similarly corrugated paper fabricated cartons etc. will not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be of water proof and flame resistant type. All the other materials such as working drawings, plans etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.

30.03.00 All the Contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.

30.04.00 The Contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment, shall be easy and kept open at all time.

31.00.00 SECURITY

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.

32.00.00 CONTRACTOR'S AREA LIMITS

The Employer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contactor's personnel to work out of the areas marked out for him the same shall be done only with the written permission of the Employer.

33.00.00 CONTRACTOR'S CO-OPERATION WITH THE EMPLOYER

In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the Employer, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Employer and the same shall be acceptable at all times to the Contractor. The Employer may impose such restrictions on the facilities provided to the Contractor such as electricity, etc. as he may think fit in the interest of the Employer and the Contractor shall strictly adhere to such restrictions and co-operate with the Employer. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and installed by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in documents and specifications.

34.00.00 PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES

34.01.00 **GENERAL**

34.01.01 The Contractor upon completion of installation of equipments and systems, shall conduct pre-commissioning and commissioning activities, to make the equipment/systems ready for safe, reliable and efficient operation on sustained basis. All pre-commissioning/commissioning activities considered essential for such readiness of the equipment/systems including those mutually agreed and included in the Contractor's quality assurance programme as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the contractor.

34.01.02 The pre-commissioning and commissioning activities including Guarantee/ demonstration/acceptability tests, checks and trial operations of the equipment/ systems furnished and installed by the contractor shall be the responsibility of the Contractor as detailed in relevant clauses in Technical Specification. The Contractor shall provide, in addition, test instruments, calibrating devices etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Contractor’s workmen required for the above test shall always be present at site during such operations.

34.01.03 The following activities shall be carried out by the contractor, 18 month prior to schedule date of commissioning of the equipment/systems installed by him.

(a.) The contractor shall furnish the organization chart of his operation and commissioning engineers for the acceptance of employer. Adequate number of operation and commissioning engineers shall be deployed by the

contractor to effectively meet the requirement of round the clock operation in shifts also, till the plant is taken over by the employer.

(b.) The contractor shall submit the bio-data containing the details of experience of his operation and commissioning engineers for the acceptance of employer.

(c.) The contractor shall furnish the deployment schedule of his operation and commissioning engineers for the acceptance of the employer.

(d.) Apart from above, contractor shall ensure deployment of sufficient skilled/semi-skilled/unskilled manpower during pre-commissioning and commissioning activities.

34.01.04 It shall be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and initial operation of the equipment/systems which are installed by him.

34.01.05 The Contractor shall also be responsible for flushing and initial filling of all oils and lubricants required for the equipment furnished and installed by him so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these specifications and documents.

34.02.00 **COMMISSIONING DOCUMENTATION**

34.02.01 The contractor shall submit the commissioning documentation, comprising of Standard checklists, pre-commissioning procedures, testing schedules, commissioning schedules and commissioning networks for various equipment/ systems covered under the contract, for the approval of employer.

34.02.02 Standard checklist, as the name suggests, shall be a fairly general documents, containing the list of all checks required to be carried out for similar and repetitive type of equipment to ensure consistent and thorough checking. An indicative list of such equipment is enclosed as Annexure I.

34.02.03 The testing schedule is a document, designed for safe and systematic commissioning of individual equipment/sub-system (for example Boiler Feed Pump, condensate pump, compressor etc) Commissioning schedule is a document envisaged for commissioning of a system (for example feed system, Condensate system, Compressed Air system, Fire water system, Unit commissioning etc). The testing/Commissioning schedule shall have a standard format in order to maintain consistency of presentation, content and reporting. A brief write up on the contents of the Testing Schedule/Commissioning Schedule is enclosed as Annexure-II.

34.02.04 The contractor shall submit the list of commissioning documentation to be submitted by him, alongwith their submission schedule for various equipment/systems covered under the contract, with in 6(six) month from the date of award of contract, for the acceptance of employer.

34.02.05 The Contractor shall submit the commissioning documentation, for various equipment/covered under the contract, for the approval of employer, at least 18 months before the scheduled date of commissioning of the equipment/systems.

34.03.00 **COMMISSIONING ACTIVITIES**

34.03.01 Upon completion of pre-commissioning activities/tests, the contractor shall initiate commissioning of facilities. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the facilities.

34.03.02	Contractor shall carry out the checks/tests at site to prove to the Employer that each equipment of the supply complies with requirements stipulated and is installed in accordance with requirements specified.
34.03.03	Before the plant is put into initial operation the Contractor shall be required to conduct test to demonstrate to the Employer that each item of the plant is capable of correctly performing the functions for which it was specified and its performance, parameters etc. are as per the specified/approved values. These tests may be conducted concurrently with those required under commissioning sequence.
34.03.04	The Contractor shall also demonstrate the performance of all C&I equipment, the tests on main equipment of prior to that as the case may be.
34.03.05	Other tests shall be conducted, if required by the Employer, to establish that the plant equipment are in accordance with requirements of the specifications.
34.03.06	The Contractor shall conduct all the commissioning tests and undertake commissioning activities pertaining to all other auxiliaries and equipments including all electrical and C&I equipment/systems not specifically brought out above but are within the scope of work and facilities being supplied and installed by the Contractor and follow the guidelines indicated above or elsewhere in these technical specifications.
34.05.00	**Initial Operation**
	Upon completion of system checking/Tests as above and as a part of commissioning of facilities, complete plant/facilities shall be put on initial operation as stipulated in General Technical Requirements.
35.00.00	**MATERIALS HANDLING AND STORAGE**
35.01.00	All the equipments furnished under the Contract and arriving at Site shall be promptly received, unloaded and transported and stored in the storage spaces by the Contractor.
35.02.00	Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and / or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.
35.03.00	The Contractor shall maintain an accurate and exhaus-tive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Employer.
35.04.00	All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Employer. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equip-ment at Site.
35.05.00	All electrical panels, controls gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings,

	commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.
35.06.00	All the electrical equipment such as motors, genera-tors, etc. shall be tested for insulation resistance as per OEM Practice. Storage of EHV/Generator transformers under Nitrogen /Dry air shall not exceed the time duration as defined by OEM practice.
35.07.00	The Contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before the equipment are installed.
35.08.00	The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or dete-rioration in quality by storage.
35.09.00	All the materials stored in the open or dusty location must be covered with suitable weatherproof and flame-proof covering material wherever applicable.
35.10.00	If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Employer will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.
35.11.00	The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipments such as motors, control gear, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space. The Employer, in addition, may direct the Contractor to move certain other materials, which in his opinion will require indoor storage, to indoor storage areas which the Contractor shall strictly comply with.
35.12.00	Sound Storage Management system need to be followed for storage of material. First in First Out method (FIFO) to be adopted to avoid longtime storage. Storage duration of any material at site shall not be more than 3 months. Accordingly supply of material in sequence of erection at site to be ensured. To achieve the same, following is to be adopted: a. Dispatch clearance is to be given in order of sequence of erection. To achieve the goal, proper tags shall be maintained in ascending order. The tag shall be self-explanatory. b. MDCC shall be issued by RIO based on clearance from Site FQA head, Main contractor, Erection head for dispatch and supply of material. Strict adherence to sequential supply of material as per supply schedule.
35.13.00	An automated storage and retrieval system consists of a variety of computer-controlled systems for automatically placing and retrieving of material may be adopted. Accordingly, each material shall be marked with unique identification code.
36.00.00	**CONSTRUCTION MANAGEMENT**
36.01.00	The field activities of the Contractors working at Site, will be coordinated by the Employer and the Employer decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors and tradesmen of the Employer regarding scheduling and co- ordination of work. Such decision by the

Employer shall not be a cause for extra compensation or extension of time for the Contractor.

36.02.00 The Employer shall hold weekly meetings of all the Contractors working at Site, at a time and place to be designated by the Employer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Employer and shall strictly adhere to those decisions in performing his Works. In addition to the above weekly meeting, the Employer may call for other meeting either with individual Contractors or with selected number of Contractors and in such a case the Contractor if called, will also attend such meetings.

36.03.00 Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Employer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.

36.04.00 The Employer shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.

36.05.00 **Site management during construction phase till handing over of plant**

Bidder shall ensure that the plant site within the plant boundary is managed in a coordinated and professional way all through the construction phase till handing over of plant, ensuring safe, easy & unhindered working conditions and a healthy & hygienic working environment at site. He shall ensure the following measures at site while executing the project.

a) Unhindered motorable road access to all work areas and facilities both during the construction/erection and as they get completed progressively. Required temporary access roads other than the permanent roads shall also be provided. Bidder shall prioritize the construction of approach roads, roads around the main plant block, roads to office & storage areas and the offsite areas from the start of project itself. He shall finalize and submit the complete road layout plan along with priority and completion schedule immediately after the award for review by the Employer .He shall ensure that the roads are promptly repaired and maintained against any damages due to movement of traffic/heavy trailers & cranes etc providing motorable access at all times. Adequate onsite stock of road materials shall be kept and maintained disturbed over the site for repairs especially before the monsoon period.

b) Proper drainage of rain water, ground water from excavations, water flows from batching plant / construction sites etc. He shall prioritize the construction of permanent drains from the start of the project itself. Till such time the permanent drainage network is done, he shall construct adequate temporary drains to ensure that there is no accumulation /stagnation of water in the plant site. Bidder may consider providing pre-cast RCC drains for temporary/ permanent drain construction for faster construction of drains. The drain construction shall be matched with progress of road construction for preventing damage to roads. Bidder shall provide and maintain adequate

number of drainage pumps (both electrical and diesel operated) of suitable capacity for pumping out accumulated water especially during the monsoon periods. All drain diversions required shall be undertaken at the start of the project itself.

c) The plant site is fully secured against unauthorized access.

d) Proper housekeeping by systematic and proper disposal of earth from excavations(separately for usable & surplus earth), muck (from pile bores or otherwise), wastes (from dismantling of pile tops, concrete works etc), packing & insulation wastes, steel scrap, cable wastes etc generated during construction / erection works. Suitable disposal sites for each of above shall be identified in the layout and at site in the beginning of the project itself. It shall be ensured that all agencies engaged by the bidder follow the discipline to dispose off of earth spoils and wastes at the designated places. Preferably once in a week suitable time slot will be identified for housekeeping by all agencies and suitable instructions shall be issued in this regard. Bidder may engage a separate agency or identify a gang for collection of wastes and disposal to designated places. Suitable arrangement / tie-up will also be made for periodic disposal of wastes/ scrap from the designated places.

e) All fabrication areas shall be suitably hard crusted to provide a water free and proper working platforms. Suitable sheds preferably pre-engineered structures to be provided for paint shops, fabrication workshops etc for ensuring all weather work conditions for onsite structural works. For the main plant and auxiliary buildings, bidder should preferably plan the works in such a way that structural fabrication is done in suppliers' offsite works / workshops and onsite fabrication works are avoided / kept minimum.

f) Suitable onsite maintenance workshop for day to day breakdown maintenance heavy plant and equipment like batching plants, cranes, earth moving equipment, welding equipment etc. The workshop shall have stock of frequently needed spares and suitable repair facilities with experienced technicians/mechanics. A central test laboratory equipped with test equipment for routine tests like tests on soil, concrete, bricks, aggregates, welds etc with experienced staff shall be established at the start of the project itself.

g) All office and covered store buildings of the bidder and its agencies shall be of prefab/ pre-engineered / porta cabin construction. Shabby semi-finished constructions in brickwork/ GI / asbestos roof etc shall not be permitted.

h) First aid facilities and amenities like rest rooms, suitable pre-engineered toilets (separate for men and women), drinking water fountains/tanks, canteen, crèche for women workers shall be planned and established at the beginning of the project itself. These facilities shall be distributed over the plant area to enable easy access by the construction workers and staff and shall be marked on the plant layout. Suitable treatment for toilet discharge, like bio digesters etc shall be planned and conventional septic tanks / soak pits etc shall be avoided.

i) Proper lighting of all construction / erection areas. Bidder shall erect adequate number of high lighting masts in main plant, offsite, office and store areas for lighting during night. DG sets of adequate capacity shall be provided for emergency backup. The street lighting along the roads shall also

be prioritized along with road construction. The construction power ring main shall be planned and erected immediately after the award.

j) Well planned and coordinated storage and movement of plant, equipment and construction materials. System wise / agency wise storage / laydown areas shall be planned and marked on the plant layout at the beginning itself. Bidder shall ensure that all its agencies comply to the areas allocated to them and follow the designated storage and movement plans. Adequate covered storage shall be constructed for storage of critical equipments like switchgears, MCCs, insulation etc.

k) Proper access control for construction workers, staff and visitors. Bidder shall ensure that suitable electronic based gate pass system is in place from start of project itself to keep record and track of all workers, staff and visitors entering/exiting the plant premises shift wise on daily basis.

l) Compliance to all safety requirements as specified in this document. Bidders shall establish a safety centre at the start of the project itself. It shall have a 24X7 manned safety control room in addition to a permanent safety equipment display room, separate training / lecture hall with AV facilities for safety training, store room with adequate stock of specified safety equipment, a first aid room and other amenities. Bidder shall install 25 Nos. CCTV cameras at all strategic locations in the plant area which shall be linked to the safety control room."

m) Compliance to all environment and other conditions stipulated by the concerned statutory authorities while according clearance / NOC (No objection certificate) to the project. Bidder shall ensure adequate sprinkling of water by deploying water tankers to prevent the fugitive dust nuisance during construction.

n) Development of suitable landscape & green belt areas and rainwater harvesting within the plant premises. Bidder shall plan to develop the landscape & green belt areas and rainwater harvesting from the start of the project itself. The landscape and rain water harvesting plan shall be finalized immediately after award of work and suitable work plan with priority and schedule shall also be finalized thereafter. Top soil before excavation shall be suitably preserved and stacked for landscape and green belt development.

o) Provision of adequate shelters, water supply, sanitation and lighting in construction workers and staff camps. No camps for workers and staff shall be permitted within the plant premises and Bidder shall make separate arrangement outside the plant premises for locating and development of camps for construction workers and staff. The designated areas shall be suitably developed with infrastructure like roads, drains, water supply and sewerage and shall be free from water logging. Suitable low cost shelters will be provided for the workers. Complete area shall be secured by fencing and shall be provided adequate area lighting. Suitable waste disposal, shopping and recreation facilities will be developed in these camps.

Bidder shall ensure that due importance is given to site management as discussed above and a detailed work plan considering the above aspects is finalized immediately after the award. A senior level executive shall be identified who shall be responsible for implementation of the work plan. Suitable format for progress reporting on site management plan shall be

developed and made part of the project progress report. The progress on implementation of above work plan shall be reviewed along with project progress in the monthly project review meetings with Employer. In case the progress on site management plan is unsatisfactory, and in the opinion of Employer, bidder's actions on site management aspects is not adequate, Employer may get the relevant work executed through a separate agency and deduct the expenses incurred from Bidder's bill along with overheads in line with GCC.

p) If Employer decides to retain or withhold any amount from the Contractor, the Employer shall clearly articulate and share with contractor, the reasons and justifications for the retention or withholding of funds. Additionally, specific conditions for releasing the withheld amount shall also be established and communicated at the time of withholding. Upon rectification of the identified issues or deficiencies by the Contractor to the satisfaction of the Employer, the Employer shall promptly release the withheld amount. The release shall be made in accordance with the terms and conditions specified in the contract agreement.

36.06.00 **QUALITY CONTROL ROOM**

Bidder to refer clause no 1.01.00 -G of section IV -Part-A.

36.07.00 Welder Training Center -Contractor shall setup a small welding training center 3 -4 welding booths equiped with GTAW & SMAW setup in a pota cabin/suitable enclosed space to train & hone skill of high pressure welders who are giving high rate of welding defect.

36.08.00 **SMART STORAGE AREA/YARD MONITORING**

Bidder to refer clause no 1.01.00 -F of section IV -Part-A.

37.00.00 FIELD OFFICE RECORDS

The Contractor shall maintain at his Site Office up-to- date copies of all drawings, specifications and other Contract Documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract shall incorporate all such changes on the drawings and other Engineering data to indicate as installed conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering data shall be submitted to the Employer in required number of copies.

38.00.00 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE

38.01.00 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the Works under intimation to the Employer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Employer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

38.02.00	The Employer shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose of any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.
38.03.00	After the completion of the Works, the Contractor shall remove from the Site under the direction of the Employer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Employer. If the Contractor fails to remove such materials, within fifteen (15) days of issue of a notice by the Employer to do so then the Employer shall have the liberty to dispose off such materials as detailed under as specified at clause no 38.02.00- of this chapter and credit the proceeds thereto to the account of the Contractor.
39.00.00	**PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY**
39.01.00	The Contractor shall be responsible for any damage resulting from his operations. He shall also be re-sponsible for protection of all persons including members of public and employees of the Employer and the employees of other Contractors and Sub- Contractors and all public and private property including structures, building, other plants and equipments and utilities either above or below the ground.
39.02.00	The Contractor will ensure provision of necessary safety equipment such as barriers, sign - boards, warning lights and alarms, etc. to provide adequate protection to persons and property. The Contractor shall be responsible to give reasonable notice to the Employer and the Employers of public or private property and utili-ties when such property and utilities are likely to get damaged or injured during the performance of his Works and shall make all necessary arrangements with such Employers, related to removal and/or replacement or protection of such property and utilities.
40.00.00	**PAINTING**
	For painting refer Part-A, sub section-III, Section VI of Technical specification.
	Painting for structures shall conform to the painting specification specified in Part-B under Civil.
	Painting for piping shall conform to the painting specification given in Part-B of the respective chapter.
	Painting for Electrical equipments/systems shall conform to the painting specification given in Electrical portion of Part-A and Part-B of technical specifications.
41.00.00	**INSURANCE**
41.01.00	In addition to the conditions covered under the Clause entitled "Insurance" in Section General Conditions of Contract (GCC), the following provisions will also apply to the portion of works to be done beyond the Contractor's own or his Sub-Contractor's manufacturing Works.
41.02.00	**Workmen's Compensation Insurance**
	This insurance shall protect the Contractor against all claims applicable under the Workmen's Compensation Act, 1948 (Government of India). This policy shall also cover the Contractor against claims for injury, disability disease or death of his or his

Sub-Contractor's employees, which for any reason are not covered under the Workmen's Compensation Act, 1948. The liabilities shall not be less than the following:

Workmen's Compensation	-	As per Statutory Provisions
Employee's Liability	-	As per Statutory Provisions

41.03.00 **Comprehensive Automobile Insurance**

This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the Employer's men and damage to the property of other arising from the use of motor vehicles during on or off the Site operations, irrespective of the Ownership of such vehicles. The liability covered shall be as herein indicated:

Fatal Injury	:	Rs.100, 000 each person
	:	Rs.200, 000 each occurrence
Property Damage	:	Rs.100, 000 each occurrence

41.04.00 **Comprehensive General Liability Insurance**

41.04.01 The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Loss of or Damage to Property; Accident or Injury to workers; Indemnification" in Section General Conditions of Contract (GCC).

41.04.02 The hazards to be covered will pertain to all the Works and areas where the Contractor, his Sub-Contractors, his agents and his employees have to perform work pursuant to the Contract.

41.05.00 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractor to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.

42.00.00 UNFAVOURABLE WORKING CONDITIONS

The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms, etc. and during other unfavorable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Employer. Such unfavorable construction conditions will in no way relieve the Contractor of his responsibility to perform the Works as per the schedule.

43.00.00 PROTECTION OF MONUMENTS AND REFERENCE POINTS

The Contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he may come across during the course of performance of his Works either during excavation or elsewhere, are properly protected and handed over to the

Employer. Similarly the Contractor shall ensure that the bench marks, reference points, etc., which are marked either with the help of Employer or by the Employer shall not be disturbed in any way during the performance of his Works. If, any work is to be performed which disturb such reference, the same shall be done only after these are transferred to other suitable locations under the direction of the Employer. The Contractor shall provide all necessary materials and assistance for such relocation of reference points etc.

44.00.00 WORK & SAFETY REGULATIONS

44.01.00 General

i) The contractor shall comply with all the requirements of "The Building and Other Construction Workers (Regulation of Employment & Conditions of Service) Act," 1996 and its Central Rule 1998 / State Rules and any other statutory requirements as applicable.

ii) The Contractor shall follow NTPC Safety Rules as specified in GCC with respect to safety in construction & erection.

iii) The contractor shall have the approved Safety, Health and Environment (SHE) Policy in respect of Safety and health of Building Workers and it shall be circulated widely and displayed at conspicuous place in Hindi and local language understood by the majority of the workers. A copy of the safety policy should be submitted to Engineer in charge.

iv) Thecontractor shall submit the safety plan comprising of methods to implement the Safety Policy/ Rules, Risk assessment and ensuring Safety at work areas, Safety audits, inspections and its compliance, Supervision and responsibility to ensure Safety at various levels, Safety training to employees and workers, review of Safety and accident analysis, ensure Health and Safety Procedures to prevent accidents for approval as per the format of Safety plan as annexed at Annexure - III.

Bidder shall furnish the Safety Plan, duly filled in as per EMPLOYER's Format.

The above proposed "Safety Plan" shall be further discussed/ finalized at Site, in line with the NTPC safety rules, and shall be approved by Project Manager/ Head of Project before start of work at Site.

v) The Contractors shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the Employer or to others, working at the Site.

vi) All equipments used in construction and erection by the contractor shall meet BIS / International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual. The contractor should also follow Guidelines / Rules of the Employer in this regard.

vii) The Contractors shall provide suitable latest Personal Protective Equipments of prescribed standard to all their employees and workmen according to the need. The Engineer I/c shall have the right to examine these safety equipments to determine their suitability, reliability, acceptability and

adaptability. The contractor should also ensure these before their use at worksite.

viii) The Contractor shall provide safe working conditions to all workmen and employees at his workplace including safe means of access, railings, stairs, and ladders, scaffolding, work platforms, toe boards etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection of scaffolds, access, work platforms etc. shall be good and the contractor shall use standard quality of material.

ix) The Contractor shall follow and comply with all the Safety Rules, standards, code of practices of NTPC and relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any protest or contest or reservation. In case of any unconformity between statutory requirement and the Safety Rules of the Employer referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent. As and when required he can refer / obtain copy of NTPC safety documents as stated above.

x) The contractor shall have his own arrangements with nearby hospitals for shifting and treatment of sick and injured.

The medical examination of the workers employed in hazardous areas shall be conducted as per Rule 223 0f The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 Their health records shall be maintained accordingly and to be submitted to Engineer I/c when asked for. If any worker found suffering from occupational health hazard, the worker should be shifted to suitable place of working and properly treated under intimation to Engineer I/c. The medical fitness certificate to be submitted to Engineer (I/c).

xi) First Aid boxes equipped with requisite articles as specified in the Rule 231 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 shall be provided at construction sites for the use of workers. Training has to be provided on first aid to workmen & office bearers working at site.

44.01.01 **Emergency Action Plan**

The contractor shall prepare an emergency action plan approved by his competent authority to handle any emergency occurred during construction work. Regular mock drills shall be organized to practice this emergency plan. The Emergency Action Plan should be widely circulated to all the employees and suitable infrastructure shall be provided to handle the emergencies.

44.01.02 **Scaffolding**

The contractor shall take all precautions to prevent any accidental collapse of scaffolding or fall of persons from scaffolding. The contractor should ensure that scaffolding are designed by a competent person and it erection and repairs should be done under the expert supervision. The scaffolding shall meet the required strength and other requirements for the purpose for which the scaffold is erected. The material used for scaffold should conform to the BIS / International standards.

44.01.03 **Opening**

The contractor shall ensure that there is no opening in any working platform/any floor of the building, which may cause fall of workers or material. Whenever an opening on a platform/any floor of the building is unavoidable, the opening should be suitably fenced and necessary measures for protection against falling objects or building workers from such platform are taken by providing suitable safety nets, safety belts or other similar means.

44.01.04 **Explosives**

The contractor shall take all precautions while handling, using, storing or transporting of all explosives. Before usage of any explosive necessary warning / danger signals be erected at conspicuous places to warn the workers and general public. The contractor should strictly ensure that all measures and precautions required to be complied for use, handling, storing or transportation of explosives under the rules framed under the Explosives Act, 1884.

44.02.00 **Fencing of Machinery**

The contractor shall provide suitable fencing or guard to all dangerous and moving parts of machinery.

The contractor shall not allow any of the employees to clean, lubricate, repair, adjust or examine during machinery in motion, which may cause injury to the person.

44.03.00 **Carrying of Excessive Weight by a Worker**

The worker shall not be allowed to lift by hand or carry over his head, back or shoulder more than the maximum limit set by the prescribed rules for the construction Workers.

44.04.00 **Dangerous and Harmful Gases / Equipment**

The contractor shall ensure that the workers are not exposed to any harmful gases during any construction activity including excavation, tunneling, confined spaces etc.

The contractor should not allow any worker to go into the confined space unless it is certified by Engineer (I/c) to be safe and fit for the entry to such work place. Proper record and work permits should be followed to carry out such works.

44.05.00 **Overhead Protection**

The contractor shall ensure that any area exposed to risk of falling materials, articles or objects is roped off or cordoned off or otherwise suitably guarded from inadvertent entry of any person.

Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.

44.06.00 **Working at Heights**

All working platforms, ways and other places of construction work shall be free from accumulations of debris or any other material causing obstructions and tripping.

Wherever workers are exposed to the hazard of falling into water, the contractor shall provide adequate equipment for saving the employees from drowning and rescuing from such hazards. The contractor shall provide boat or launch equipped with sufficient number of life buoys, life jackets etc. manned with trained personnel at the site of such work.

Every opening at elevation from ground level through which a building worker, vehicle, material equipment etc. may fall at a construction work shall be covered and/or guarded suitably by the contractor to prevent such falls.

Wherever the workers are exposed to the hazards of falling from height, the contractor shall provide full harness safety belts fitted with fall arresting systems to all the employees working at higher elevations and life line of 8 mm diameter wire rope with turn buckles for anchoring the safety belts while working or moving at higher elevations. Safety nets shall also be provided for saving them from fall from heights and such equipment should be in accordance with BIS standards. Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.

The contractor shall provide standard prefabricated ladders on the columns where the workers are required to use them as an access for higher elevations till permanent staircase is provided. The workers shall be provided with safety belts fitted with suitable fall arresting system (fall arrestors) for climbing/getting down through ladders to prevent fall from height.

44.07.00 **Handling of Hazardous Chemicals**

The Contractor will notify well in advance to the Engineer I/c of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. NTPC shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contract shall strictly adhere to and comply with such instructions. The Engineer I/c shall have the right at his sole discretion to inspect any such container or such construction plant / equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by NTPC and NTPC shall not entertain any claim of the Contractor towards additional safety provisions / conditions to be provided for / constructed.

Further, any such decision of the Engineer I/c shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by NTPC, the Contractor shall use alternative methods with the approval of the NTPC without any cost implication to the NTPC or extension of work schedule.

Where it is necessary to provide and / or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and / or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer I/c. In case any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.

The Contractor shall be fully responsible for the safe storage of his and his Sub-contractor's radio-active sources in accordance with BARC/DAE (Bhabha Atomic Research Centre/ Department of Atomic Energy, Govt. of India) Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, the contractor would take storage and handling of such material.

The contractor shall provide suitable personal protective equipments to the workers who are handling the hazardous and corrosive substances including alkalis and acids.

As a precautionary measure the contractor should keep the bottles filled with distilled water in cupboard / Boxes near work place for emergency eye wash by worker exposed to such hazardous chemicals.

44.08.00 **Eye Protection**

The contractor shall provide suitable personal protective equipment to his workmen depending upon the nature of hazards and ensure their usage by the workers engaged in operations like welding, cutting, chipping, grinding or similar operations which may cause injuries to his eyes.

44.09.00 **Excavation**

The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding material or article from any bank or side of such excavation which is more than one and a half meter above his footing by providing adequate piling, shoring, bracing etc. against such bank or sides.

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.

44.10.00 **Electrical Hazards**

The contractor should ensure that all electrical installations at the construction work comply with the requirements of latest electricity acts / rules.

The contractor shall take all adequate measures to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuits which may cause electrical hazards during the construction work. The contractor shall provide the sufficient ELCBs / RCCBs for all the portable equipments, electrical switchboards, distribution panels etc. to prevent electrical shocks.

The contractor should ensure use of single / double insulated hand tools or low voltage i.e., 110 volts hand tools.

The contractor should also ensure that all temporary electrical installations at the

construction works are provided with earth leakage circuit breakers.

44.11.00 **Vehicular Traffic**

The contractor should employ vehicle drivers who hold a valid driving license under the Motor Vehicles Act, 1988.

44.12.00 **Lifting Appliances, Tools & Tackles, Lifting Gear And Pressure Plant & Equipment etc.**

The contractor shall ensure all the lifting appliances, tools & tackles including cranes etc., lifting gear including fixed or movable and any plant or gear, hoists, Pressure Plant and equipment etc. are in good condition and shall be examined by competent person and only certified shall be used at sites. Periodical Examination and the tests for all lifting / hoisting equipment & tackles shall be carried out. A register of such examinations and tests shall be properly maintained by the Contractor and will

be promptly produced as and when desired by the Engineer I/c or by the person authorized by him.

44.13.00 **Excessive Noise, Vibration**

The contractor shall take adequate measures to protect the workers against the harmful effect of excessive noise or vibration. The ambient noise should not exceed the limits prescribed under the concerned rules, Noise Pollution (Regulation and Control) Rules, 2000. Generally for brownfield projects background noise is in the range of 58-60 DB, however it shall be responsibility of contractor to collect and measure the latest noise data at site.

44.14.00 **Electrical Installations**

44.14.01 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Engineer I/c to handle such fuses, wiring or electrical equipment.

Before the Contractor connects any electrical appliances to any plug or socket belonging to the other contractor or the NTPC, he shall

i) Satisfy the Engineer I/C that the appliance is in good working condition;

ii) Inform the Engineer I/C of the maximum current rating, voltage and phases of the appliances;

iii) Obtain permission of the Engineer I/C detailing the sockets to which the appliances may be connected.

The Engineer I/C will not grant permission to connect until he is satisfied that:

The appliance is in good condition and is fitted with suitable plug; having earth connection with the body.

Wherever armored / metallic sheathed multi core cable is used, the same armored / sheathed should be connected to earth.

iv) No repair work shall be carried out on any live equipment. The Engineer I/c must declare the equipment safe and a permit to work shall be issued by the NTPC / contractor as the case may be to carry out any repair / maintenance work. While working on electric lines / equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the contractor to electricians / workmen / Officers.

v) The contractor shall employ necessary number of qualified, full time Electricians / Electrical Supervisors to maintain his temporary electrical installation. The installations are provided with suitable ELCBs and RCCBs wherever required.

44.15.00 **Safety Organisation**

44.15.01 The contractor shall employ full time safety officer(s) as per requirement stipulated in NTPC Safety Rules, exclusively to supervise safety aspects of the equipments and workmen, who will coordinate with the NTPC Safety Officer. Further requirement of safety officers, if any, shall be guided by Rule 209 of The Building and Other Construction Worker (Regulation of Employment and Conditions of Service) Central Rule 1998. In case the work is being carried out through subcontractor, the employees / workmen of the sub-contractor shall also be considered as the contractor's employees/workmen for the above purpose.

44.15.02 The name and address of such Safety Officer of the Contractor will be promptly informed in writing to the EIC with a copy to the Project Safety Officer before he starts work or immediately after any change of the incumbent is made during currency of the Contract.

44.16.00 **Reporting of Accident and Investigation**

In case any accident occurs during the construction / erection or other associated activities undertaken by the Contractor thereby causing any near miss, minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer I/C, NTPC Safety Officer with a copy to NTPC Head of Project in the prescribed form and also to all the authorities envisaged under the applicable laws.

44.17.00 **Right to stop Work**

44.17.01 The Engineer I/C shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.

44.17.02 The Contractor shall not be entitled for any damages / compensation for stoppage of work, {Sub-Clause XVIII (I)} due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.

44.18.00 **Fire Protection**

The contractor shall provide sufficient fire extinguishers at place /s of work. The fire

extinguishers shall be properly maintained as per relevant BIS Standards. The employees shall be trained to operate the fire extinguishers / equipment.

44.19.00 **Penalties**

I 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 I/c shall have the right to regulate the payment in accordance with provisions of GCC. Further such defaulting worker shall be sent out of the workplace immediately and shall not be allowed to work on that day. Engineer I/c / Safety Officer of NTPC will also issue a notice in this regard to the contractor.

II If two or more fatal accidents occur at same NTPC site under the control of contractor during the period of contract and he has

(1) not complied with keeping adequate PPEs in stock or

(2) defaulted in providing PPEs to his workmen

(3) not followed statutory requirements / NTPC safety rules

(4) been issued warning notice/s by NTPC head of the project on nonobservance of safety norms

(5) not provided safety training to all his workmen, the contractor can be debarred from getting tender documents in NTPC for two years from the date of last accident.

The contractor shall submit the accident data including fatal / non-fatal accidents for the last 3 years where he has undertaken the construction activities Projects-wise along with the tender documents. If the information given by the contractor found incorrect, his contract will be liable to be terminated.

44.20.00 The Contractor will make available minimum quantity of all safety equipments and safety PPEs of required specifications as per suggestive list included bidding documents as a part of "List of minimum T & P". Further Contractor will ensure availabilitty of additional requirement for individual worker and safety equipment as per site requirement during execution of the contract till its completion.

44.21.00 The Contractor shall abide by the following during Construction and Erection activities:

I. Chain pulley block shall not be used for loads more than 2 (Two) tonne.

II. Hydra shall not be used for material transport.

III. Cage shall necessarily be provided to Monkey ladders of height more than 4 m.

IV. Fencing shall be provided to all Electrical Distribution boards and transformers etc.

44.22.00 Contractor shall ensure following regarding implementation of Safety:

a) Two Tier Safety Monitoring System:
Separate Safety Consultancy contract shall be awarded by NTPC for assisting and guiding overall Plant Safety during Construction. The safety consultant shall induct and engage manpower required as per specific requirements of project.
For Construction safety, Contractor shall engage certified safety team in consultation with NTPC Safety team /safety Consultant for each package/area.

b) Risk level of different area of plant shall be evaluated by NTPC Safety & Safety consultant. Based on the severity of risk level, total project area shall be categorized into different safety zones and each zone will be identified with different color coding.

c) Dedicated Project Safety Manager of Safety Consultant will be deployed. Contractor to deploy area/ system wise safety representative for each system/ area of project e.g. SG area, TG Main Power House area and similarly in other BOP Systems.

d) The Safety Officer can stop work of any contractor if safety rules are violated.

e) There should also be safety clearance in Quarterly RA bills in addition to the clearances being presently taken from HR and Quality dept.

f)	PPEs, scaffoldings, safety nets, testing tools etc. should be monitored by NTPC Safety Manager to control and maintain the uniformity of Quality for Safety equipment/ PPEs.
g)	There should be 24/7 Safety Control room equipped with IP Camera, AI Input alarms and proper communication system for monitoring safety. All CCTV footage shall be available to control room. Drone based safety monitoring shall be done during day. The safety control room shall be operated & managed by NTPC through safety consultant.
h)	Safety management plan for the Project must be submitted for approval before start of work.
i)	In line with the Project Planning, Safety planning will be done jointly by Project Team and Consultants.
j)	Availability of Fire Tender shall be ensured by contractor before start of construction work.
k)	**Number of Safety Stewards**: Each area (e.g. SG, TG, etc.) should have minimum 5 safety Stewards from Main Agency and 5 from the sub agency.
l)	Contractor should provide scaffolding material, pipes, clamps, boards and scaffolding of standard quality.
m)	Uses of Safety net, Fire blankets and fall arrester shall be adequate.
n)	Construction Elevators shall be used during erection phase.
o)	Material transport through Hydra shall be avoided.
p)	Good Quality and new PPEs and tools and machinery shall be used.
q)	All Agency /Sub Agency will deploy Safety manpower after getting approval from Head of safety Consultant.
r)	Contractor Safety officer shall take approval of JSA /HIRA of each area from Safety consultant. Before Start of work in a particular area, concerned Safety consultant clearance is must.
s)	Inspect the site to ensure it is a hazard-free environment & promotes safe practices at the job site.
t)	Verifies that injury logs and reports are completed and submitted to NTPC.
u)	Receives reports from and responds to orders issued by NTPC and Labor inspectors.
v)	Serve as primary contact for project site incident and injury notification, investigation, and follow-up.
w)	Organize and maintain necessary project safety documentation.
x)	Training Setup to be created for giving basic education of Safety to workers.
y)	Safety Park and work simulation facility to be created at site.
z)	Health Check Up facility of workers.
aa)	Vendor Safety circle (with max 25 nos person) and monthly safety award to be created.

bb)	24/7 first aid center (common for all agency) and expenditure on contribution basis which is decided by NTPC safety department.
45.00.00	**FOREIGN PERSONNEL**
45.01.00	The Contractor shall submit to the Employer data on all personnel he proposes to bring into India from abroad for the performance of the Works under the Contract, at least sixty (60) days prior to their departure to India. Such data will include for each person the name, his present address, his assignment and responsibility in connection with the works, and a short resume of his qualification, experience etc. in relation to the work to be performed by him.
45.02.00	Any person unsuitable and unacceptable to the Employer shall not be brought to India. Any person brought to India, if found unsuitable or unacceptable by the Employer, the Contractor shall within a reasonable time make alternate arrangements for providing a suitable replacement and repatriation of such unsuitable personnel.
45.03.00	No person brought to India for the purposes of the works shall be repatriated without the consent of the Employer in writing, based on a written request from the Contractor for such repatriation giving reasons for such an action to the Employer. The Employer may give permission for such repatriation provided he is satisfied that the progress of work will not suffer due to such repatriation.
45.04.00	The cost of passports, visas and all other travel expenses to and from India, incurred by the Contractor shall be to his account. The Employer will not provide any residential accommodation and/or furniture for any of the Contractor's personnel including foreign personnel and Contractor shall make his own arrangements for such facilities in the area allotted at Site, to him by the Employer for that purpose.
45.05.00	The Contractor and his expatriate personnel shall respect all Indian Acts, Laws, rules and regulations and shall not in any way interfere with Indian political and religious affairs and shall conform to any other rules and regulations which the Government of India and the Employer may establish from time to time, on them. The Contractor's expatriate personnel shall work and live in close co-operation and coordination with their co-workers and the community and shall not engage themselves in any other employment neither part-time nor full-time nor shall they take part in any local politics.
45.06.00	The Employer shall assist the Contractor, to the extent possible, in obtaining necessary permits to travel to India and back, by issue of necessary certificates and other information needed by the Government agencies.
46.00.00	**FOUNDATION DRESSING & GROUTING FOR EQUIPMENT/ EQUIPMENT BASES**
46.01.00	The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations.
46.02.00	All the equipment/ equipment bases, shall be grouted and finished by bidder as per these specifications unless otherwise recommended by the equipment manufacturer.
46.03.00	The concrete foundation surfaces shall be properly prepared by bidder by chipping, grinding as required to bring the top of such foundation to the required level, to

provide the necessary roughness for bondage and to assure enough bearing strength.

46.04.00 **Grout**

The grout for equipment foundation shall be high strength grout having a minimum characteristic compressive strength of 60 N/mm2 at 28 days. The grout shall be ready mix non-shrink, chloride - free, cement based, free flowing, non-metallic grout as recommended by equipment manufacturer. The ready mix grout shall be of reputed make as approved by the Employer.

The Grout shall have good flowability even at very low water/ grout powder ratio.

The Grout shall have characteristics of controlled expansion to be able to occupy its original volume to fill the voids and to compensate for shrinkage. Grout shall be of pre-mix variety so that only water needs to be added before use.

The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout.

46.05.00 **Placing of Grout**

46.05.01 After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipu-lation of the grout. The height of such dam shall be at least 25mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back & forth to push the grout into every part of the space under the base.

46.05.02 The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases.

46.05.03 In addition to the above, recommendations of Grout manufacturer shall also be followed.

46.06.00 **Finishing of the Edges of the Grout**

The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothened with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.

46.07.00 **Checking of Equipment After Grouting**

After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place

during grouting. The values recorded prior to grouting shall be used during such post grouting check- up and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the Employer.

47.00.00 SHAFT ALIGNMENTS

All the shafts of rotating equipment shall be properly aligned to those of the matching equipments to as perfect an accuracy as practicable. The equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment. The vibration level of rotating equipments measured at bearing housing shall conform to Zone A of ISO 10816. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

48.00.00 DOWELLING

All the motors and other equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the Employer.

49.00.00 CHECK OUT OF CONTROL SYSTEMS

After completion of wiring, cabling furnished under separate specification and laid and terminated by the Employer, the Contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents.

50.00.00 COMMISSIONING SPARES

50.01.00 It will be the responsibility of the Contractor to provide all commissioning spares including consumable spares required for initial operation till the Completion of Facilities. The Contractor shall furnish a list of all commissioning spares within 60 days from the date of Notification of Award and such list shall be reviewed by the Employer and mutually agreed to. However. such review and agreement will not absolve the Contractor of his responsibilities to supply all commissioning spares so that initial operation do not suffer for want of commissioning spares. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.

50.02.00 These spare will be received and stored by the Contractor atleast 3 months prior to the schedule date of commencement of initial operation of the respective equipment and utilised as and when required. The unutilised spares and replaced parts, if any, at the end of successful completion of guarantee tests shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer.

51.00.00 CABLING

51.01.00 All cables shall be supported by conduits or cable tray run in air or in cable channels. These shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turn made of symmetrical bends or fittings. When cables are run on cable trays, they shall be clamped at a minimum intervals of 2000mm or otherwise as directed by the Employer.

51.02.00 Each cable, whether power or control, shall be provided with a metallic or plastic tag of an approved type, bearing a cable reference number indicated in the cable and conduit list (prepared by the Contractor), at every 5 meter run or part thereof and at both ends of the cable adjacent to the terminations. Cable routing is to be done in

such a way that cables are accessible for any maintenance and for easy identification.

51.03.00 Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulted cables 1100 V grade shall be 15 D where D is the overall diameter of the cable. Installation of other cables like high voltage, coaxial, screened, compensating, mineral insulated shall be in accordance with the cable manufacturer's recommendations. Wherever cables cross roads and water, oil, sewage or gaslines, special care should be taken for the protection of the cables in designing the cable channels.

51.04.00 In each cable run some extra length shall be kept at a suitable point to enable one or two straight through joints to be made, should the cable develop fault at a later date.

51.05.00 Control cable terminations shall be made in accordance with wiring diagrams, using identifying codes subject to the Employer's approval. Multicore control cable jackets shall be removed as required to train and terminate the conductors. The cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. The insulated conductors from which the jacket is removed shall be neatly twined in bundles and terminated. The bundles shall be firmly but not tightly tied utilising plastic or nylon ties or specifically treated fungus protected cord made for this purpose. Control cable conductor insulation shall be securely and evenly cut.

51.06.00 The connectors for control cables shall be covered with a transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals and shall preferably terminate in Elmex terminals and washers. The insulating sleeve shall be fire resistant and shall be long enough to over pass the conductor insulation. All control cables shall be fanned out and connection made to terminal blocks and test equipment for proper operation before cables are corded together.

52.00.00 EQUIPMENT DELIVERY AND ERECTION

52.01.00 General Requirements

(a.) This part covers Contractor's responsibilities for packing, shipping, ware-housing and the installation of all equipment and materials furnished and installed under this specification.

(b.) The Contractor shall submit for Employer's approval draft manual for Equipment Delivery and Erection (EDE Manual) covering detailed instructions, write up, technical data, drawings, check-lists, documentation formats for all activities after equipment manufacture upto installation of equipment. This manual shall cover general instructions for all equipment and specific instructions for individual equipment wherever required and shall include at least the following:

(1.) Instructions for packing, shipping, receiving handling, ware-housing and storage.

(2.) Instructions for location and installation of equipment furnished by this specification.

(3.) Installation drawings for field mounted equipment, panels, cubicles and other equipment covered under this specification.

(4.) Instruction relating installation of piping/ tubing, support and routing drawings of impulse pipes/signal tubes and tube/cable trays.

(5.) Check lists and quality assurance hold points.

(6.) Format for all related documentation.

(c.) The EDE Manual shall conform to the requirements of this specification, all applicable codes and standards, recommendations of equipment manufacturers and accepted good engineering practices and shall be subject to Employer approval during detailed engineering.

(d.) The Contractor shall ensure that all work under this part shall be performed as per the requirements of this specification, Employer approved EDE Manual and drawing/documents approved by the Employer during detailed engg.

52.02.00 **Crating**

(a.) All equipment and materials shall be suitably coated, wrapped, or covered and boxed or crated for moist humid tropical shipment and to prevent damage or deterioration during handling and storage at the site.

(b.) Equipment shall be packed with suitable desiccants, sealed in water proof vapour-proof wrapping and packed in lumber of plywood enclosures, suitably braced, tied and skidded. Lumber enclosures shall be solid, not slatted.

(c.) Desiccants shall be either silica gel or calcium sulphate, sufficiently ground to provide the required surface area and activated prior to placing in the packaging. Calcium sulphate desiccants shall be of a chemical nature to absorb moisture. In any case, the desiccant shall not be of a type that will absorb enough moisture to go into solution. Desiccants shall be packed in porous containers, strong enough to withstand handling encountered during normal shipment. Enough desiccant shall be used for the volumes enclosed in wrapping.

(d.) Review by the Employer of the Contractor's proposed packaging methods shall not relieve the Contractor of responsibility for damage or deterioration to the equipment and materials specified.

(e.) All accessory items shall be shipped with the equipment. ; Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of each box and crates shall be indicated by markings on the exterior.

(f.) All boxes, crates, cases bundles, loose pieces, etc. shall be marked consecutively from No.1 upward throughout all shipments from a given port to completion of the order without repeating the same number.

(g.) An itemized list of contents shall be enclosed inside each case and one other copy securely fastened to the outside of the case in a tin or light weight sheet metal envelope or pocket. The lists shall be plainly marked and placed in accessible locations to facilitate receipt and inspection. The packing list shall indicate whether shipment is partial or complete and shall incorporate the following information on each container, etc., according to its individual shipping number:

a) Export case markings
b) Case number
c) Gross weight and net weight in Kilograms
d) Dimensions in centimeters
e) Complete description of material

(h.) Packaging or shipping units shall be designed within the limitations of unloading facilities and the equipment which will be used for transport. Complications involved with ocean shipment and the limitations of ports, railways and roads shall be considered. It shall be the Contractor's responsibility to investigate these limitations and to provide suitable packaging to permit safe handling during transit and at the job site.

(i.) Electrical equipment, control and instrumentation shall be protected against moisture and water damage. All external gasket surfaces and flange faces, couplings, motor pump shafts, bearing and like items shall be thoroughly cleaned and coated with rust preventive compound as specified above and protected with suitable wood, metal or other substantial type covering to ensure their full protection.

(j.) Equipment having antifriction or sleeve bearings shall be protected by weather tight enclosures.

(k.) Coated surfaces shall be protected against impact, abrasion, discolouration and other damage. Surfaces which are damaged shall be repaired.

(l.) All exposed threaded parts shall be greased and protected with metallic or other substantial type protectors. All female threaded openings shall be closed with forged steel plugs. All pipings, tubing, and conduit equipment and other equipment openings shall be sealed with metallic or other rough usage covers and tapped to seal the interior of the equipment piping, tubing, or conduit.

(m.) Provisions shall be made to ensure that water does not enter any equipment during shipment or in storage at the plant site.

(n.) Returnable containers and special shipping devices shall be returned by the manufacturer's field representative at the Contractor's expense.

(o.) While packaging the material, care shall be taken for the limitation from the point of view of availability of railway wagon sizes in India.

52.03.00 **Factory Assembly**

(a.) Instrument enclosures shall be supplied and erected completely in the factory with instrument, air supply and blow down piping with necessary valves, fittings, etc. and also all electrical wiring between the instruments and the enclosure terminal blocks. Control panel and cubicles shall also be fully wired in the factory. Control panel mounted equipments are to be dismounted from the panels before shipment and individually packed for shipment. Electronic control modules of the plug-in type are to be removed from equipment racks after factory checkout are individually packed for shipment. Other equipment shall be fully assembled at the factory, except for necessary shipping splits in panels.

(b.) All separately packaged accessories items and parts shall be shipped with the equipment. Containers for separately packaged items shall be marked so that they are identified with the main equipment. An itemized packing slip, indicating what is in that carton only, shall be attached to the outside and inside of each container used for packing.

A master packing slip covering all accessories items for a given piece of equipment which are shipped in separate containers, shall be attached to one container.

52.04.00

Equipment Installation

(a.) General Requirements

(1.) The Contractor shall furnish all construction materials, tools and equipment and shall perform all work required for complete installation of all equipments furnished under this specification.

(2.) Contractor shall prepare detailed installation drawings for each equipment furnished under this specification for Employer's approval. Installation of all equipment/systems furnished by this specification shall be as per Employer's approval.

(3.) Erection procedures not specified herein shall be in accordance with the recommendations of the equipment manufacturers. The procedures shall be acceptable to the Employer.

(4.) The Contractor shall coordinate his work with other suppliers where their instruments and devices are to be installed under specifications.

(b.) Installation Materials

All materials required for installation, testing and commissioning of the equipment shall be furnished by the Contractor.

(c.) Regulatory Requirements

All installation procedures shall confirm with the accepted good engineering practice and with all applicable governmental laws, regulations and codes.

(d.) Cleaning

All equipment shall be cleaned of all sand, dirt and other foreign materials immediately after removal from storage and before the equipment is brought inside the power plant building or to other installation sites. All piping and tubes shall be air blown.

(e.) Equipment Assembly

Equipment installed under these specifications shall be assembled if shipped unassembled. The equipment shall be dismantled and reassembled as required to perform the installation and commissioning work described in these specifications.

(f.) Equipment Setting

Field mounted instruments and accessories shall be bracket or sub panel mounted on the nearest suitable firm steel work or masonry. The brackets, stands, supports and other miscellaneous hardware required for mounting instruments and accessories such as receiver gauge, air set, valve manifold, purge-meter etc. shall be furnished and installed. No field mounted instruments shall be installed such that it depends for support or rigidity on the impulse piping or on electrical connection to it.

Indicating type field mounted instruments shall be installed in such a way that centre of indicating dial shall be about 1600-1800mm from operating floor level. Non-indicating type field instruments shall be installed such that

operating handle of manifold block / isolating cock comes within 1600 mm from operating floor level.

(g.) **Free-Standing Equipment**

Free-standing Cabinets shall be attached to the floor, concrete equipment bases or supporting steel as indicated on the manufacturer's drawings and the Employer's Plant Arrangement Drawings. The cabinets shall be shimmed for proper alignment before bolting them to the floor. Adjacent enclosures shall be shimmed to maintain mutually level appearance before they are attached to floor. Vibration dampening mounts shall be installed between supporting structures and panels when specified.

(h.) **Non-free Standing Equipment**

(1.) Non-free standing local enclosures and cabinets shall be mounted in

accessible locations on columns, walls, or stands in locations as indicated on the Employer's Plant Arrangement Drawings. Bracket and stands shall be fabricated as required to install the local enclosures and cabinets in a workman like manner.

(2.) Rough edges and welds on all fabricated supports shall be ground smooth. The supports shall be finished with two coats of primer and two coats of paint as specified in this part.

(i.) **Equipment Location**

(1.) All individual items of equipment not located in cabinets or on panels and racks are located approximately according to the floor elevation and the nearest building column designated by the Employer.

(2.) Solenoid valves not located in enclosures or mounted on valves shall

be mounted in easily accessible protected locations near the components with which they are associated.

(3.) All brackets, stands, supports and other miscellaneous hardware required for mounting devices shall be furnished and installed.

(4.) Thermometers shall be installed in the process lines and ducts as required and adjusted for ease in reading.

(5.) Permanent temperature wells on the main steam, hot reheat and cold reheat piping shall not be installed until steam blowing has been completed. Temporary temperature wells shall be installed in the main and reheat steam piping during steam blow and discarded after completion.

(6.) Any required adapting hardware such as pipe bushings, nipples, drilled caps and the like shall be provided for complete installation of control devices into process connections.

For location of C&I related equipment/devices, the requirement specified elsewhere in the technical specification may be referred.

(j.) **Installation of Field Mounted Instruments and Devices**

The Contractor shall submit installation drawings for all field mounted equipment furnished under this specification for Employer's approval. These

drawings shall meet the requirements of this specification, installation drawings, applicable codes and standards and recommendations of manufacturers of instruments/devices. All installation work under this specification shall be strictly as per installation drawings approved by the Employer during detailed engineering stage.

In addition to above relevant Portion as specified elsewhere in technical specification may be referred.

(k.) **Piping Connections**

(1.) All equipment having piping connections shall be levelled, aligned and wedged in place but shall not be grouted or bolted prior to the initial fitting and alignment of connecting piping. All equipment shall, however, be grouted or bolted to its foundation prior to final bolting or welding of the connection piping.

(2.) All flanged joints shall be checked and retightened after approximately 10 days of operation at normal operating temperature.

(l.) **Equipment Checkout**

(1.) All equipment shall be cleaned after installation. Equipment subject to pressure differentials shall be checked for leakage.

(2.) After erection, all equipment having moving parts, having electrical apparatus, or subject to pressure differentials shall be trial-operated.

(m.) **Defects**

(1.) All defects in erection shall be corrected to the satisfaction of the Employer and the Project Manager. The dismantling and reassembly of Contractor furnished equipment to remove defective parts, replace parts, or make adjustments shall be included as a part of the work

under these specifications.

(2.) The removal of control and instrument equipment in order to allow bench calibration, if required, and the re-installation of the said equipment after calibration shall also be included as a part of the work under these specifications.

(n.) **Equipment Protection**

(1.) All equipment to be erected under these specifications shall be protected from damage of any kind from the time of contract award until commissioning of each unit.

(2.) The equipment shall be protected during storage as described herein.

(3.) Equipment shall be protected from weld spatter during construction.

(4.) Suitable guards shall be provided for protection of personnel on all exposed rotating or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy removal and maintenance.

(5.) Equipment having glass components such as gauges, or equipment having other easily breakable components, shall be protected during the construction period with plywood enclosures or other suitable

means. Broken, stolen, or lost components shall be replaced by the Contractor.

(6.) Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and constructional periods by a coating of a suitable non- drying, oily type, rust preventive compound.

53.00.00 WELDING - SPECIAL REQUIREMENTS

If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed under separate specifications, the requirements shall be submitted to the Project Manager in advance of commencement of erection work.

54.00.00 DEVIATIONS DISPOSITIONING:

Any deviation to the contract and employer approved documents shall be properly recorded in the format prescribed by NTPC. All the deviations shall be brought to the knowledge of employer's representative for suitable dispositioning.

55.00.00 NON-DESTRUCTIVE TESTING (NDT):

The contractor shall record results of NDTs carried out at site in the format acceptable to employer. All the radiographs & its report duly signed & correlated to the job shall be handed over to the employer. Sensitivity of all the test equipment shall be compatible to the job & acceptance norms agreed.

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

55.01.00 Sub contracting of NDT & PWHT / SR Agencies- NDT & PWHT / SR contract shall be directly awarded by the main contractor to their approved NDT & PWHT / SR agencies .

56.00.00 TESTING EQUIPMENT & FACILITIES:

Contractor shall provide the testing equipment and facilities necessary to carry out tests & inspections.

ANNEXURE-I

STANDARD CHECKLIST

COMMISSIONING/TESTING ESSENTIAL PRE-REQUISITE

1. MECHANICAL

(A.) **VALVES**

(1.) MANUALLY OPERATED VALVE

(2.) ELECTRICALLY OPERATED VALVE

(3.) PNEUMATICALLY ACTUATED VALVE

(4.) HYDRAULICALLY ACTUATED VALVE

(5.) SAFETY VALVE

(6.) ELECTROMATIC RELIEF VALVE

(7.) STEAM TRAP

(8.) BUTTERFLY VALVE (ELECTRICALLY OPERATED)

(9.) BUTTERFLY VALVE (MANUALLY OPERATED)

(10.) BUTTERFLY VALVE (FOUR WAY-ELECTRICAL)

(11.) NON-RETURN VALVE (INCLUDING HYDRAULIC/PNEUMATIC FCNRVS)

(12.) THREE WAY CONTROL VALVE

(13.) RELIEF VALVE

(14.) DIFFERENTIAL PRESSURE REGULATING VALVE

(15.) FLOAT OPERATED VALVES

(B.) TANKS AND PRESSURRE VESSELS

(1.) TANKS (METAL) UPTO 20 M2

(2.) TANKS (LARGE STORAGE)

(3.) PRESSURE VESSEL (BELOW 17 BARS)

(4.) AIR RECEIVER

(5.) PRESSURE VESSEL-ACCESS DOOR

(6.) TURBINE MAIN OIL TANK

(C.) PUMPS

(1.) PUMP LOW PRESSURE CENTRIFUGAL (MOTOR DRIVEN)

(2.) PUMP UP TO 350 HP (260 KW)

(3.) PUMP SUMP INSTALLATION

(4.) GEAR PUMP/SCREW PUMP

(D.) PIPE WORK SYSTEM

(1.) STEAM SERVICES

(2.) WATER SERVICES
(3.) OIL/FIRE RESISTANT FLUID SYSTEM
(4.) AIR SERVICES (COMPRESSOR)
(5.) HIGH PRESSURE SERVICES
(6.) CONSTANT LOAD SUPPORT
(7.) SPRING SUPPORTS
(8.) HANGERS AND OTHER SUPPORTS

(E.) STRAINER AND FILTER
(1.) STRAINER/FILTER BASKET TYPE
(2.) STRAINER ROTARY (LOW PRESSURE)
(3.) FILTER & STRAINERS CENTRIFUGAL SEPARATORS
(4.) FILTER & STRAINER Y-TYPE
(5.) FILTER & STRAINER (PLATE TYPE)
(6.) PURIFIER
(7.) FILTER-COMPRESSED AIR LINE

(F.) HEAT EXCHANGER
(1.) HEAT EXCHANGER (GENERAL)
(2.) HEAT EXCHANGER-OIL/WATER
(3.) ROTARY AIR HEATER

(G.) FANS AND COMPRESSORS
(1.) FANS-NON-PRESSURE LUBRICATED
(2.) FANS-AXIAL FLOW PRESSURE LUBRICATED
(3.) COMPRESSORS-GENERAL
(4,) DAMPERS & GATES

(H.) CRANES AND ELEVATORS
(1.) AUXILIARY OVERHEAD/GANTRY CRANE
(2.) TRAVEL SUPPORT STRUCTURE FOR CRANE
(3.) LONG TRAVEL & CROSS TRAVERSE MOTION OF CRANE
(4.) MAIN AUX. HOIST MOTION (CRANE)
(5.) ELECTRIC HOIST

(I.) POWER TRANMISSION
(1.) POWER TRANSMISSION GEAR BOX
(2.) BEARING
(3.) FLUID COUPLINGS

2. ELECTRICAL

(1.) SWITCHYARD

(2.) POWER TRANSFORMERS, LT INDOOR TRANSFORMERS, OUTDOOR TRANSFORMERS.

(3.) BATTERY CHARGERS, DC BATTERIES, DG SETS, STATION LIGHTING, OVERHEAD LINES.

(4.) MV BUS DUCTS

(5.) D.C. MOTOR

(6.) HV SQUIRREL CAGE INDUCTION MOTOR

(7.) 415 V SQUIRREL CAGE INDUCTION MOTOR

(8.) MOTOR OPERATED ACTUATORS

(9.) LT SWITCHGEARS/MCC

- (I.) STANDARD CHECLISTS FOR ALL TYPES OF RELAYS USED IN SWITCHGEARS PROTECTION SYSTEM
- (II.) PT CARRIAGE AND CUBICLES
- (III.) CABLE/BUS DUCT/BUS BARS
- (IV.) CONTRACTOR MODULE
- (V.) SWITCH FUSE MODULE
- (VI.) MASTER PANEL OF LUBE OIL PANEL
- (VII.) FEEDER PANEL OF LUBE OIL PANEL
- (VIII.) SPACE HEATER AND CABLE MODULE
- (IX.) CONTROL TRANSFORMER MODULE
- (X.) HT CIRCUIT BREAKER
- (XI.) 415 V CIRCUIT BREAKER

(10.) POWER CABLE

(11.) CONTROL CABLE

(12.) AUXILIARY CABLE

(13.) D.C. CABLE

(14.) EXPLOSION PROOF ELECTRICAL EQUIPMENT

(15.) JUNCTION BOX

(16.) CONTROL TRANSFORMER MODULE

(17.) BRUSH GEAR ASSEMBLY

(18.) AUX. CONTROL AND RELAY PANEL DESK

(19.) INDICATING INSTRUMENT

(20.) RECORDING INSTRUMENT

(21.) INTEGRATING INSTRUMENT

3. CONTROL & INSTRUMENTATION

(A.) CONDUCTIVITY ANALYSING EQUIPMENT INCLUDING TEST PROCEDURES

(B.) PH ANALYSER INCLUDING TEST PROCEDURE

(C.) SILICA ANALYSER

(D.) LEVEL SWITCH (FLOAT ACTUATED)

(E.) LEVEL SWITCH (ELECTRODE TYPE)

(F.) LEVEL SWITCH (DISPLACER ACTUATED)

(G.) TRANSMITTER (FLOAT OPERATED PNEUMATIC OUTPUT) INCLUDING TESTING PROCEDURE

(H.) LEVEL INDICATOR (FLOAT/PULLEY TYPE)

(I.) LOCAL TEMPERATURE INDICATORS INCLUDING TEST PROCEDURE

(J.) RESISTANCE THERMOMETER ELEMENT INCLUDING TEST PROCEDURE

(K.) THERMOCOUPLE ELEMENT AND CONNECTING CABLE

(L.) THERMOCOUPLE AND RESISTANCE THERMOMETER CONVERTOR/TRANSMITTER INCLUDING TEST PROCEDURES.

(M.) TEMPERATURE SWITCH/THERMOSTAT INCLUDING TEST PROCEDURES

(N.) COLD JUNCTION BOXES

(O.) ZENER BARRIER

(P.) O2 ANALYSER

(Q.) O2 IN HYDROGEN INCLUDING TEST PROCEDURES

(R.) PRESSURE AND VACUUM GAUGE

(S.) PRESSURE AND VACUUM SWITCH INCLUDING TEST PROCEDURE

(T.) DIFFERENTIAL PRESSURE TRANSMITTER INCLUDING TEST PROCEDURE

(U.) DIFFERENTIAL PRESSURE SWITCH INCLUDING TEST PROCEDURE.

(V.) FLOW INDICATOR (VARIABLE AREA)

(W.) ORIFICE PLATE

(X.) TURBINE FLOW TRANSMITTER

(I.) FLOW SWITCH

(II.) WEIR

(III.) NOZZLE

(IV.) FLOW INDICATOR (PNEUMATIC INPUT) INCLUDING TEST PROCEDURE

(V.) FLOW INTEGRATOR (PNEUMATIC INPUT) INCLUDING TESTPROCEDURE

(VI.) FLOW INDICATOR (FLOAT OPERATED) INCLUDING TEST PROCEDURE

(VII.) VENTURI (FLUID)

(VIII.) FLOW SWITCH (MAGNETIC TYPE)

(IX.) AVERAGING INLET

(X.) LIMIT SWITCHES

(Y.) TURBINE SUPERVISORY MEASURING SYSTEM

(Z.) POSITION MEASUREMENT AND INDICATION INCLUDING TEST PROCEDURES

(AA.) TACHOMETER

(BB.) VIBRATION MEASUREMENT

(CC.) DIGITAL INDICATOR

(DD.) MOVING COIL INDICATOR INCLUDING TEST PROCEDURE

(EE.) RECORDER INCLUDING TEST PROCEDURE

(FF.) FLAME SCANNER

(GG.) ELECTRICAL AUTO MANUAL CONTROL STATION

(HH.) PUSH BUTTON MODULE

(II.) ALARM ANNUNCIATOR EQUIPMENT INCLUDING TEST PRO

(JJ.) TEST PROCEDURE FOR ELECTRONIC MODULES OF DDCMIS

KK.) THERMO CONTROL VALVE

(LL.) TEST PROCEDURE FOR ADJUSTMENT OF MODULATING CONTROLLER - PID TERMS

(MM.) TEST PROCEDURE INDICATING CONTROLLER-ELECTRICAL INPUT AND PNEUMATIC OUTPUT

Note: The items which are not part of this specification may be considered as not applicable.

ANNEXURE-II

BRIEF WRITE UP ON THE CONTENTS OF TESTING SCHEDULE / COMMISSIONING SCHEDULE

Testing Schedules should be designed to ensure that the plant area, equipment or apparatus are tested and commissioned and will operate as per the employer's specifications and good engineering practices.

Testing Schedule/Commissioning Schedule is required to be of a standard format in order to maintain consistency of presentation, content and reporting.

Testing Schedule/Commissioning Schedule should contain the following sections to make the document a self-contained one:

1. Plant Details/Design data
2. Testing Objective/Proposals
3. State of the Plant
   a) Erection Status with respect to Mech. Elect and C&I
   b) Availability of the services required
   c) Safety requirements as per Manufacturer's
4. Test method including completion/acceptance criteria
5. Results
6. Appendix
   a) Testing Programme
   b) Mech/Elect/C&I -Plant item completing list
   c) List of Drawing/documents required for carrying out the testing.

ANNEXURE - III

SAFETY PLAN

01. Safety Policy of the Contractor to be enclosed:
02. When was the Safety Policy last reviewed:
03. Details of implementation procedure / methods to implement Safety Policy / Safety Rules:
04. Name, Qualification, experience of Safety Officer
05. Review of Accidents Analysis Method, Methods to ensure Safety and Health:
06. Unit executive responsible to ensure Safety at various levels in work area:
07. List of employees trained in safety employed before execution of the job. Give the details of training:
08. Safety Training Targets, Schedules, methods adopting to providing safety training to all employees:
09. Details of checklist for different jobs / work and responsible person to ensure compliance (copy of checklist to be enclosed):
10. Regular Safety Inspection Methods and Periodicity and list of members to be enclosed:
11. Risk Assessment, Safety Audit by Professional Agencies, Periodicity:
12. Implementation of Recommendations of Audit / Inspections. Procedures for implementation and follow up:
13. Provision for treatment of injured persons at work site:
14. Review of overall safety by top Management and Periodicity:
15. System for Implementation of Statutory legislations:
16. Issue of PPEs to employees, Periodicity / stock on hand etc:

Signature

Head of the Organisation with date & stamp

ANNEXURE-IV

Health Safety and Environment (HSE) Policy and HSE Management Manual

1. INTRODUCTION

1.1 Background

NTPC safety policy and various safety requirement has already been indicated in the site regulation and safety section of GCC. This document shall be supplementary to above document and shall be read in conjunction with site regulation and safety section of GCC. In case of any contradiction, the stringent of the two requirements (in the opinion of the employer) shall prevail.

NTPC being India's largest power utility and a responsible corporate entity, the statement of policy on health and safety at work sets out the commitment of NTPC to manage health and safety effectively, and what shall be achieved by NTPC, the Contractor and any appointed sub- contractor.

NTPC, the Contractor and any appointed sub-contractor is committed to provide and maintain a safe and healthy workplace for all staff, and to provide the information, training and supervision needed to achieve this.

All involved parties are committed to protect the fundamental rights of all appointed workers and feel obliged to create a sound worker-management relationship as a key ingredient in a sustainable and successful project execution.

All involved parties will have to assume the responsibility for H&S procedures, and need to be made aware of their responsibilities and to comply with NTPC's H&S Policy.

The following requirements are mandatory for each worker in maintaining a safe and healthy workplace through:

- Being involved in the workplace H&S System;
- Sticking to correct procedures and equipment;
- Wearing protective clothing and equipment whenever required;
- Reporting any pain or discomfort as soon as possible;
- Ensuring that all accidents and incidents are reported;
- Helping new workers, trainees and visitors to the workplace understand the right safety procedures and why they exist;
- Telling the responsible managers immediately of any H&S concerns;
- Keeping the work place tidy to minimise the risk of any accidents.

The aim of all the stake holders is to achieve the following goals:

- Zero fatalities of workers, visitors or the public;
- Zero accidents and incidents of workers, visitors or the public;
- Zero harmful, hazardous or dangerous situations or occurrences;
- Zero environmental concerns or impacts;
- Continuous improvement of the health & safety performance at site under practical conditions.

1.2 **Definition of Occupational Health & Safety**

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995 and is defined as follows:

Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job.

"The main focus in occupational health is on three different objectives:

- the maintenance and promotion of workers' health and working capacity;
- the improvement of working environment and work to become conducive to safety and health and
- the development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

Workers safety has to be understood as the practice of an employer using preventative measures to prevent hazards to the employees' personal safety. This practice includes creating plans and procedures for employees and managers in the workplace. In addition, workplace safety involves creating policies and keeping emergency materials available for employee and manager use while at a work site.

1.3 **Purpose of the H&S Management Manual**

The present H&E Management Manual shall delineate the Health and safety Requirements, incl. policies and guidelines, and outline the roles and responsibilities of the different parties involved in the implementation and oversight of Health, Safety and Environment Measures to ensure community, worker and public health and safety during construction.

The H&S Management Manual considers the applicable national occupational health, safety and welfare legislation as well as guidelines and standards established by the relevant Ministries and Authorities.

The H&S Management Manual other than Site Regulation and Safety provisions provided in Bidding Documents takes the following applicable IFC Performance Standards (PS) into account:

- PS 2: Labour and Working Conditions, dated January 1, 2012
- PS 3: Resource Efficiency and Pollution Prevention, dated January 1, 2012
- PS 4: Community, Health, Safety and Security, dated January 1, 2012.

The H&S Management Manual includes the Occupational Health & Safety Requirements and arrangements that are mandatory for the Contractor for consideration and implementation.

In case the provisions in Site Regulation and Safety provisions provided in Bidding Documents are superior than the provisions indicated in this manual, the provisions provided in Site Regulation and Safety provisions provided in Bidding Documents shall prevail.

The defined H&S Standards are part of the contractual obligations, and no changes are possible without a prior written approval by NTPC.

1.4 Content of the H&S Management Manual

The H&S Management Manual contains an outline of the required H&S Organization at site and to be implemented by the Contractor.

It describes the overall H&S Management required for the organization of a safe and healthy working environment for the workers and to ensure that the public will not be affected by the construction activities. In addition to the organizational arrangements roles and responsibilities of the required H&S Staff of the Contractor are defined.

Attention is paid to the need for training to be implemented by the Contractor. It starts with the evaluation of training needs and defines the requirement of developing a training schedule as well as workers and visitorinduction.

Communication procedures are addressed and needed H&S Reporting is specified for the entire construction period.

As one of the most important subjects, the entire risk management process is comprehensively described, specifying the risk management process, the hierarchy of control and the safe system of work.

Reporting and monitoring procedures are developed for the fulfillment bythe Contractor and the standards for PPE are included.

The H&S Management Manual shall highlight the entire H&S Management System and also provide information on the H&S Standards to be followed by the Contractor.

2. HEALTH & SAFETY MANAGEMENT SYSTEM

An H&S Management System is implemented for the Project. The management system comprises of different components to be developed bythe Contractor.

That the Contractor must implement human resource policies and procedures that set out the approach to manage workers consistent with the requirements of IFC PS 2 as well as the applicable national laws and standards.

2.1 Health & Safety Management Manual

Contractor will implements this H&S Management Manual in order to delineate the Project's H&S Requirements, Policies and Guidelines as well as to outline the roles and responsibilities of the different parties involved in the implementation and oversight of measures to ensure community, worker and public health and safety during construction.

2.2 Contractor's H&S Plans

All Contractors shall establish an effective project specific H&S Plan. TheH&S Plan will be subject of NTPC's written approval. The H&S Plan shall be submitted by the Contractor not later than 4 weeks prior to any commencement of works at site.

Any work at site, incl. mobilization to the site will not be allowed to commence until NTPC deems the Contractor's H&S plan to be suitableand sufficient.

The H&S Plan shall describe how health and safety will be managed at site, incl. mobilization and transport to the site, and how the specified H&S Standards will be applied in practice. In

addition the Contractor shall ensure adequate communication of these requirements throughout the supply chain,its supervision, and the workers themselves.

The H&S Plan shall specify the management arrangements for carrying outthe work including but not limited to:

- Overview of the project;
- Clearly identified risks associated with the scope of works;
- Program and milestones;
- Site management and organization;
- Key contractors and sub-contractors;
- Communication, Cooperation and Co-ordination;
- Site security;
- Traffic management;
- Welfare facilities and provision;
- Arrangements for supervision of contractors on site;
- Arrangements for information, instruction and training includinginduction;
- Management of hazards on site;
- Arrangements for identification of hazards, assessment of risk and production of Method Statements;
- Arrangements for hazardous undertakings e.g. confined space, work at height, hot work, excavations, cofferdams etc.;
- Permit to work system;
- Site rules;
- Arrangements for managing plant and equipment;
- Management or lifting operations;
- Management of temporary works;
- Arrangements for monitoring and auditing etc.;
- Requirements as defined by relevant statutory planning authorities e.g. traffic, noise, working hours etc.;
- Incident & accident investigation.

The H&S Plan shall also consider the site rules outlining the H&S Requirements for all workers. The site rules shall include but should not belimited to:

- Site access;
- Access to and transport on the site;
- Entering and leaving the site;
- Use of mobile phones;
- Smoking;
- PPE requirements;
- General behaviour;
- Transport to the site;
- Vehicle traffic within the site area;
- Access to the site and Working Areas;
- Restricted areas.

The H&S Plan shall consider related plans and the corresponding direct and indirect H&S Requirements. This refers especially to the following related plans and assessments:

- Hazardous materials and waste management plan;

A checklist for the review and approval of project specific H&S Plans shall be developed prior to the construction contract. The checklist shall define the minimum requirements to be met by the Contractor.

2.3 Contractor's H&S Procedures

The Contractor is requested to develop workplace specific H&S Procedures. In this matter, it should be noted that procedures are similar to method statements probably better known by Contractors. The required content of H&S Procedures is described below.

H&S Procedures are part of the Project framework for effective H&S Management. The H&S Policy states the intention to provide a safe andhealthy workplace, and states the H&S goals of a workplace.

Specific health & safety workplace procedures shall address particular issues or hazards and the measures how to control those identified hazards. The procedures should be used together with other hazard control measuresto eliminate or reduce the risks of accidents and incidents and illness and/orinjuries at the working place.

H&S Procedures shall be developed for the following activities expected to apply during construction:

- Site access control and site security procedure;
- Health & safety protection at transmission line worksites;
- Isolation and lock-out;
- Use of hazardous chemicals;
- Simultaneous activities;
- Live line work;
- Shift work, shift rotation and fatigue;
- X-ray and NDT;
- Risk assessment;
- Job Safety Analysis;
- Working at height;
- Working in confined spaces;
- Use of personal protective equipment;
- Excavation works;
- Hot works;
- Welding;
- Emergency response procedure;
- Evacuation procedure (if applicable);
- First aid;
- Working in water (if applicable);
- Use of electrical equipment;
- Work on high voltage.

This checklist shall define the minimum requirements to be met by the Contractor.

2.4 Contractor's Safe Work Instructions

Safe work instructions shall be developed by the Contractor identifying the health and safety issues that may arise from use of the machinery and equipment. The safe work instruction must be based on the H&S Plan.

A safe work instruction should identify:

- the hazard associated with the use of a specific tool or equipment;
- the required control measures to be checked to ensure a safe use of a specific tool or piece of equipment;
- the specific training and/or qualification required;
- the personal protective equipment to be worn.

Safe work instructions do not replace the requirement for a risk assessment, preparation of a workplace procedure, the need of a permit to work or the need for training.

A risk assessment of the equipment must be performed before developing safe work instruction procedures to identify the hazards and risk controls.

A checklist for the review and approval of project specific Safety Work Instructions will be developed by the PIC prior to the first construction contract. The checklist will define the minimum requirements to be met by the Contractor.

2.5 Contractor's H&S Forms

The Contractor must develop forms like checklists for risk assessment etc. to support the support the use of workplace procedures, instructions, audits etc.

These forms must be attached to the respective documents, and must be read in closed conjunction with the corresponding document(s).

The checklists shall be subject of an update and revision in case improvements or needed changes were found suitable and required.

The checklists must be subject of project documentation, in the same way and considering the same procedure that is applicable for the project documentation in general.

H&S Forms have to comprise the following subjects as a minimum:

- Contractor Audit Questionnaire
- Basic Risk Assessment
- Permit to Work
- Workplace Inspection Checklist
- Accident/Incident Report/Investigation
- Fire Risk Assessment
- Hazardous Substance Risk Assessment
- Ladder Inspection Checklist.

The forms to be used by the Contractor must include all pertinent information. Additional forms like inspection checklists, workplace inspection checklists might be necessary and should be prepared by the Contractor and are subject of approval by NTPC.

2.6 Contractor's Grievance Management System

2.6.1 Workers Grievance Management System

The Contractor must implement a grievance management system to enable the workers to raise complaints and to inform about non-compliances with the implemented H&S Management System. The grievance management system should provide the possibility to issues complaints in case of discrimination and/or the non-consideration of equal opportunities.

The grievance management system shall consider the possibility to contact directly a member of the H&S Staff. The contacted staff members must take a note of the reported complaint or non-compliance and must report it to thesite manager and the H&S Manager.

The H&S Management is requested to solve a complaint or non-compliancewithin 3 working days. In case the problem could not be solved an action procedure specifying the needed activities together with a final deadline until the problem is expected to be solved must be prepared and submitted to NTPC.

The Contractor is requested to provide the possibility for the workers to notify a complaint or non-compliance in a confidential way.

2.6.2 Public Grievance Management System

The grievance management system shall also be open for public complaints.

A respective procedure must be developed by the Contractor for review and approval. The grievance management system for the public must consider areporting procedure to the local authority to demonstrate to the administrative body that the complaint was identified, noted, managed and solved.

The responsible authorities at the community level must be identified by the Contractor 4 weeks prior to the start of the construction activities or 4 weeksprior to the mobilization to the site.

The reporting procedure should be discussed and agreed upon together with the administrative body and specific attention should be paid to any specific requirements to be announced by the authority. The contact with the authority should be established by having a face-to-face meeting. This meeting should be attended by an H&S Representative of the Contractor.

2.7 H&S Committee

It shall be governed by site regulation and safety requirement as stipulated in GCC

3. ROLES, RESPONSIBILITIES AND ACCOUNTABILITY

It shall be governed by site regulation and safety requirement as stipulated in GCC

3.2.1 Child Labour

The contractor shall not deploy any person below the age of 18 years.

3.2.2 Pregnant Woman

Pregnant employees have the following four major prerogatives:

- paid time off for antenatal care
- maternity leave
- maternity pay
- protection against unfair treatment, discrimination or dismissal.

In addition, the contractor must not change a pregnant employee's contract terms and conditions without agreement. If this will be done by a contractor, it has to be handled as a breach of contract.

It's illegal for contractor to refuse to give pregnant employees time off for antenatal care or refuse to pay their normal rate for this time off.

The following rights shall be considered:

- Pregnancy-related illnesses
  If the employee is off work for a pregnancy-related illness in the 4 weeks before the expected date of birth of the child, maternity leave and statutory maternity pay by the employer has to start automatically.
- Compulsory maternity leave
  In case the employee does not take statutory maternity leave, they must take 4 weeks off after the child is born.
- Telling the contractor about the pregnancy
  Employees are obliged to inform their contractor about the pregnancy at least 15 weeks before the beginning of the week of the expected date of birth or, in case of unawareness of the pregnancy during this timeframe, the contractor must be told as soon as possible.

  Employees must also tell the contractor when they want to start their statutory maternity leave and pay.
- Health and safety for pregnant employees
  After the receipt of information about the pregnancy of an employee, the employer should assess the risks to the woman and her baby.

  Risks could be caused by:

  - heavy lifting or carrying
  - standing or sitting for long periods without adequate breaks
  - exposure to toxic substances
  - long working hours
  - vibration and mechanical shocks
  - extreme heat
  - noise
  - ionising radiation
  - non-ionising (electromagnetic) radiation
  - carbon monoxide
  - lead
  - polychlorinated Byphenyls
  - organic solvents
  - pesticides and herbicides
  - tobacco smoke.

The MSDS to be provided together with each chemical substance to be in use or to be delivered at the construction site, storage area etc. should highlight the category.

Where there are risks, the contractor should take reasonable steps to remove the risks or by offering the employee different work or work places or by changing the working hours by the adaption of sufficient breaks.

In case the contractor can't remove any risks, the contractor must suspend the employee on full pay and without any reduction.

Pregnant worker who think they're at risk but their employer disagrees should report to NTPC's H&S Manager during a site audit.

The contractor is obliged to inform every pregnant employee about theirrights in writing and this information must be recorded.

Apart from above, all the provisions of Maternity Benefit Act, 1961 as applicable from time to time, shall be complied with by the contractor.

4. TRAINING

It shall be governed by site regulation and safety requirement as stipulated in GCC

5. HEALTH & SAFETY REPORTING

5.1 Contractors Reporting Obligations

Independent from the general requirement and contractual obligations to implement a reporting scheme with respect to the progress, construction schedule and project reporting in general, the Contractor will be obliged to implement an H&S Reporting.

The H&S Reporting should provide an overview of the H&S Performancewithin a particular timeframe and with specific topics as mentioned below:

The H&S Reports should be submitted to NTPC Project Manager

5.1.1 Health & Safety Performance

5.1.1.1 Weekly Reports

The Contractor shall prepare weekly H&S reports. The weekly reports shall be submitted by close of business on the first working day after a completed working week, e.g. the reporting timeframe is from Monday to Saturday and the respective following working day is the upcoming Tuesday, if not a public holiday.

The weekly reports shall comprise of the following information with respect to the reporting timeframe:

- Originator
- Name of the project
- Activities performed
- Health occurrences
- Safety occurrences
- Resulting accidents, incidents or dangerous situations
- Undertaken measures.

5.1.1.2 Monthly Reports

The Contractor shall prepare monthly H&S reports. The monthly reports shall be submitted by close of business of the last working day of the first working week after the reporting timeframe, e.g. the reporting timeframe is from 1st of January until 31 of January and the due day of the submission ofthe report is the Friday of the first working week in February, if not a publicholiday.

The weekly reports shall comprise of the following information with respectto the reporting timeframe:

- Originator
- Name of the project
- Activities performed

- Health occurrences
- Safety occurrences
- Resulting accidents, incidents or dangerous situations
- Investigation results
- Undertaken measures
- Lessons learned
- Informed authorities and resulting obligations/conditions
- Results of workplace inspections.

5.1.2 **Hazards Reporting**

The H&S Staff of the contractor is requested to undertake workplace inspections. In case that hazards and risks are identified during workplace inspections, it is needed that the identified hazard or risk has to be solved immediately and without delay during the inspection.

In case that the problem could not be solved, a written report has to be prepared and issued to the H&S Manager or site manager highlighting:

- a description of the problem;
- the reason why it could not be solved during the inspection;
- the needed action;
- the responsible person;
- the associated hazards and risks;
- the deadline until the problem must be solved.

The occurrence must be reported in the monthly H&S Report.

Any other reporting requirements with respect to H&S, e.g. audit reports,weekly and monthly H&S Reports, remain unchanged.

6. **HEALTH & SAFETY RISK MANAGEMENT**

The risk management process with specifically requested forms requires a careful document administration and control. The Contractor should be aware that the documents resulting from the risk management process, in particular, the risk assessments, permits to work and job safety analysis, must be available during construction site audits and/or exemplary as part of a monthly report.

6.1 Risk Management Process

Risk management is the identification, assessment and prioritization of risks to avoid impacts on workers and the public.

The Contractor has to implement a suitable and appropriate risk management process to enable his site staff to prevent any non-compliances resulting in critical, harmful or dangerous situations followed by incidents, accidents or fatalities.

Alternatively suggested risk management processes shall be provided in theH&S Plan.

6.2 Hierarchy of Control

The first part of evaluating the risk stage, consideration must be given how likely each hazard could cause harm. When the potential for harm has been decided, the existing control measures should be identified. In this course, each step of the activity has to determine what control measures might already in place. When evaluating a risk it is imperative to check the applicable legislation and to ensure that everything required by law is in place or has to be done.

When considering current controls and further required control measures, the general principles of control should be applied:

Eliminate

- It has to be checked if the risk associated with the hazard could be eliminated.

Reduce

- It has to be assessed if the possible amount of the hazard or the exposure to the hazard could be reduced.

Isolate

- It must be evaluated if the hazard could be isolated. Isolating is the principle of preventing the contact with the hazard.

Control

- It must be assessed if a safe system of work, permit to work and/or procedures are in place to control the hazard to prevent that some bodybecomes injured.

Personal Protective Equipment

- As a final result of running through the hierarchy of control, the supply of personal protective equipment is the final result of controlling the hazard. The provision of PPE must not be the first and final stage of risk mitigation.

6.3 Safe System of Work

6.3.1 Risk Register

The Contractor is requested to develop and prepare a risk register. A risk register is a document that summarizes and defines the possible risks resulting from a particular activity, in the present case from particular construction or construction related activities. The concept of a risk register recognises that risk elements arising from proposed or actual activities fall into one of following three categories:

- Risks which are deemed to have a low risk and do not need to be managed;
- Risks that have a medium or high risk and will need to be managed;
- Risks which have an extreme risk and therefore the activity should probably not proceed.

The risk register records details all the risks identified for the construction phase and associates them in terms of likelihood of occurring and seriousness of impact.

The risk register to be prepared should identify:

- a description of each risk and its potential consequences;
- factors that may impact upon the likelihood and severity of the risk;
- an assessed risk ranking, such as
  - low,
  - medium
  - high or
  - very high;
- whether the risk ranking is acceptable or not;
- actions and controls that currently exist to mitigate risks

The definition of the risks from low to very high is explained in the following risk ranking table:

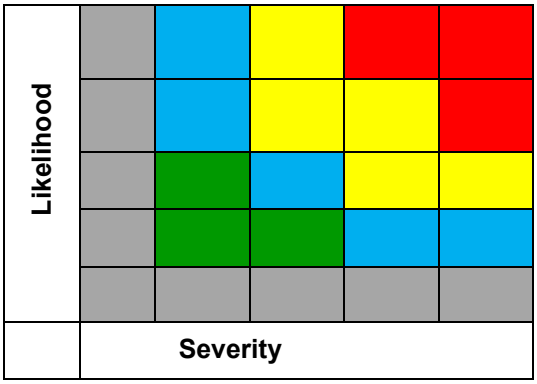


Table 6-1: Risk ranking table

It is recommended to develop the risk register at the beginning stage before start of a construction site by following the following steps:

- Identification of potential risks;
- Identification of the consequences;
- Identification of the likelihood and severity that the risk would result in adverse consequences;

Where risks have been ranked as medium, high or very high, mitigation measures must be addressed:

- **Medium (Risk ranking 3 to 4):** Mitigation actions to reduce the likelihood and severity should be identified and appropriate actions mustbe endorsed.

- **High (Risk ranking 6 to 9):** If uncontrolled, a risk event at this level may have a significant impact for the actions and tasks at a construction site as a whole. Mitigating actions need to be very reliable and should be approved and monitored by the Contractor. Even with mitigating actions in place, the construction site staff potentially exposed to that risk shouldbe advised of identified or potential risks which have been graded at this level.

- **Very High (Risk ranking 12 to 16):** Activities and projects with unmitigated risks at this level should be avoided or terminated. Mitigation actions of these types of risks may outweigh the benefits of the execution method. This is because risk events graded at this level have the potential to have significant adverse effects with the potential to cause serious accidents and incidents resulting in fatalities.

It needs to be identified if any risk mitigation procedures are in place.

If it is found that there are none, procedures must be developed consideringthe following:

- Planned actions:
  Reduction the likelihood a negative risk will occur and/or reduce theseriousness should it occur (What should you do now?)
- Contingency actions:
  Planned actions to reduce the immediate seriousness of a negative riskwhen it does occur. (What should you do when?)
- Recovery actions:
  Planned actions taken once a negative risk has occurred to allow you to move on. (What should you do after?)
- Risk Transfer:
  e.g. through assignment of contractual responsibilities or insurance.
- Actions:
  Necessary to ensure the realisation of opportunities (positive risks).

A risk register for every single construction site must be developed by the responsible Contractor considering as well the tasks and activities to be undertaken and execute by sub-contractors. The risk register has to be prepared by a competent and experienced group of engineers and workers approx. 4 weeks before mobilization to the site and start of any works at site even if they deemed to be of general nature and without having a risk potential. The risk register has to consider as well every transportation activity to the construction site.

The risk register will be subject of review and approval by NTPC.

6.3.2 **Risk Assessment**

The Contractor is requested to undertake a risk assessment for all activitiesassessed to be of a medium, high or very high risk.

The risk assessment has to be carried out with the participation of the staffexperienced with the tasks and activities and the equipment:

- the responsible H&S Manager or a H&S Supervisor
- the foreman for the execution of the activity
- the worker(s) asked to undertake the activity.

The risk assessment has to be performed prior to the execution of the activity and it must be done in written. The written risk assessment must bedocumented and stored in the project file.

The risk assessment has to be undertaken in a simple and comprehensive way, understandable by each participant.

6.3.3 **Permit to Work**

It shall be governed by site regulation and safety requirement as stipulated in GCC

Stage 1- Highlight Potential Hazards:

Worker(s) and the foreman guided by the H&S Advisor highlight potential hazards of a task and identify all necessary safety measures. The hazard identification must

consider all required electrical and mechanical equipment. Stage 1 has to be carried out in writing.

Work is not permitted to commence until Stage 4.

Stage 2-Application of Permit:

The Foreman applies for permission to start work on a prescribed form and submit the application to the H&S Advisor only when all requirements and conditions described in the permit to work have been fulfilled. The Foreman has to indicate in the written permit to work that risk assessment was conducted. The risk assessment must be attached to the permit to work.

Stage 3-Evaluation of Permit:

The H&S Advisor will evaluate and verify that all safety conditions specified in the permit to work have been fulfilled and are adequate described. He may also recommend additional measures in the permit to work when necessary. He will need to inspect the location of work wherethe permit to work has been applied for, with the Foreman during this process.

Only when all safety requirements and conditions stated in the permit to work are fulfilled, the H&S Advisor will then endorse the permit to workform and forward to the Health & Safety Manager.

Stage 4-Approval of Permit:

The H&S Manager may approve and issue the permit to work only when heis satisfied that:

- Proper evaluation of risk and hazards for the work concerned has beenconducted;
- No incompatible work will be carried out in the same time and locationof the permit to work, which may pose a risk to the persons at work;
- All reasonably practicable safety measures have been taken and all persons involved in the work have been informed of the work hazardsunder the PTW;
- All electrical and mechanical equipment is demonstrable checked and in safe conditions.

A work permit is valid for one working day and for the specified working time. In case the tasks could not be finalised within the validity of the permitto work, the permit to work must be renewed before commencement of work on the day the work may continue.

The permit to work form must include at least the following information:

- Originator
- Date
- Description of task activity
- Duration of the task
- Needed equipment
- Security certificates of equipment
- Risk Assessment
- Already implemented mitigation measures
- Further mitigation measures
- Needed training or induction
- Approved by

- Date and time of approval.

6.3.4 Job Safety Analysis (JSA)

The Contractor has to undertake a JSA which is a procedure to integrate safety and health principles and practices into a particular job operation. In a JSA, each basic step of the job related hazards has to be identified and recommendations have to be provided to choose the safest way to do the job.

For conducting a JSA four main steps have to be considered:

- selecting the job to be analyzed
- breaking the job down into a sequence of steps
- identifying potential hazards
- determining preventive measures to overcome these hazards.

The Contractor must provide a specific methodology for conducting a JSA .

7. EMERGENCY RESPONSE

7.1 Emergency Response Procedures

An emergency is a serious, unexpected, often dangerous situation that requires immediate action. The emergency procedure is the strategy of actions to be outlined in the emergency response plan to response to anemergency event.

This could include, but not limited to rescue:

- from working at height;
- in confined spaces, shafts and tunnels;
- from fire & smoke, etc.

7.2 Emergency Response Plan (ERP)

The Contractor has to develop an ERP for review and approval by NTPC.

The ERP has to consider at least the following information and instruction for an adequate management of emergency situations:

- Result of a risk assessment to determine the most probably emergencysituation;
- Identification of suitable emergency response procedures, such as:
  - Determination of safe evacuation areas;
  - Determination of safe evacuation routes;
  - Determination of accurate and suitable fire fighting equipment;
  - Determination of fire brigade;
  - Training and induction of emergency response procedure.

Note: Specific attention should be paid to the investigation of the nearest hospital or first aid station. The contact numbers of the hospital or first aid station together with at least one contact of a medically examined staff team member of the hospital or first aid station must be included in the ERP in case of injuries at night-time hours or during weekends or during bank holidays.

7.3 **First Aid at Site**

It shall be governed by site regulation and safety requirement as stipulated in GCC

7.4 **Fire Protection and Control**

The Contractor shall undertake a suitable and adequate fire risk assessment for whatever is applicable under the scope of work of the respective construction contract.

The Contractor shall ensure that the necessary fire prevention, protection and control measures are installed and maintained. This shall commence during mobilisation and updated accordingly.

The Contractor shall nominate certain of his employees who shall be trained in fire fighting duties. Nominated fire fighting personnel shall be available at all times during ongoing works on site.

7.4.1 **Fire Prevention, Protection & Control**

The following requirements apply with respect to fire prevention, protection& control and must be considered wherever applicable:

- Adequate and suitable means for extinguishing fire shall be provided and maintained.
- All stocks of inflammable substances shall be kept in a fire resisting store or in a safe place outside any occupied building.
- Provided that no such store shall be so situated as to endanger the means of escape from the workplace or from any part thereof in the event of a fire occurring in the store.
- Chemical fire-extinguishers shall be freshly charged at intervals not greater than those specified by the manufacturers, or otherwise once annually, and tested by the application of such hydraulic pressure thereto as shall be suited to the type of extinguisher tested, at intervals of not more than four years; and the dates of recharging the extinguisher and the last hydraulic test shall be clearly marked on the body of the extinguisher or on a tab securely attached thereto.
- Install a temporary or permanent water supply with sufficient flow volume and duration to supply the standpipes, hose stations, and sprinkler systems, before the construction of the facility to be protected. In permanent structures under contract in which standpipes are installed, connect the standpipe to the water supply, install the standpipe concurrently with construction of the structure, and maintain the standpipe in operable condition for fire protection use. Provide the standpipes with fire department connections on the outside of the structure, conspicuously marked, and located in an accessible location at street or road level.
- No fire, flame, open light or other agent likely to ignite volatile and inflammable substances shall be allowed or used in any part of a workplace in which volatile and inflammable substances are used.
- No person shall smoke in any part of a workplace where volatile and inflammable substances are used, and a notice prohibiting smoking shall be posted in a conspicuous place in every such part of the workplace.
- Inform workers of the fire hazards of the materials and processes to which they are exposed. Brief new workers on the parts of the plan that is essential for their protection and emergency evacuations.
- Provide additional training for personnel assigned tasks that require them to remain in a facility during a fire emergency.
- When working in potentially explosive atmospheres, safe non-electric tools and apparatus suitable for the use in such areas shall be employed.
- No plant, tank or vessel which contains or has contained any explosive or inflammable

substance shall be subjected to any welding, brazing or soldering operation, or to any cutting operation which involves the application of heat, until all practicable steps have been taken to remove the explosive or inflammable substance and any fumes arising there from, or to render them non-explosive or non-inflammable; and if any plant, tank or vessel has been subjected to any such operation as aforesaid, no explosive or inflammable substance shall be allowed to enter the plant, tank or vessel until the metal has cooled sufficiently to prevent any risk of igniting the substance.

7.4.2 Means of Fire Escape

Every workplace shall have adequate means of escape in case of fire.and must be properly maintained and kept free from obstruction.

7.4.3 Fire Alerts

The Contractor has to set up a system to alert workers on site and the public in the neighbourhood. This should be a permanent installed fire alarm (which must be tested on a weekly basis), a klaxon, an air horn or a whistle,depending on the size and complexity of the site.

Any warning needs to be distinctive, audible above other noise andrecognizable by everyone in case of fire.

8. HEALTH, SAFETY MANAGEMENT & MEASUREMENT

8.1 Noise Management

The Contractor is requested to develop a working noise monitoring plan to identify those areas at site where noise levels are occurring in a harmful range.

Generally, a reasonable mitigation measure, of more importance than wearing hearing protection devices, is the reduction of noise levels to a levelas low as reasonable possible. Avoidance has always the priority in comparison to passive reduction.

Noise levels must be kept below 80 dB (A) wherever possible. In case of exceeding this value, hearing protections must be provided to the workers and warning signs must be installed.

The noise monitoring must be repeated every week in case that the location of the construction site remains unchanged. In case of a change of the site, the noise monitoring has to be undertaken after implementation of site arrangements.

In case that a construction site could not be demarked in detail, the noisemonitoring has to be done for different activities.

The following table provides the standards, exposure times and need forpersonal protective equipment.

dB(A)	Exposure time[1)]		Need for PPE	Comment
	hours	minutes		

80	25	24	No	
85	8	0	No	
86	6	21	Yes	Suitable hearing protection must be provided. The hearing protection must be able to insulate the noise level to a value of 89 dB(A) or below.
87	5	2	Yes	
88	4	0	Yes	
89	3	10	Yes	
90	2	31	Yes	
95	0	47	Yes	
100	0	15	Yes	
105	0	4	Yes	
110	0	1	Yes	

Table 8-1: Noise standards, exposure times and need for PPE

1) Applicable to a 8h-working-shift

Source: US Department of Health and Human Services, Occupational Noise Exposure, page 18, dated June 1998.

Contractor shall ensure at a construction site that adequate measures are taken to protect workers against the harmful effects of excessive noise or vibration at such construction site and the noise level in no case exceeds the limits laid down in BOCW act 1996 and Chhattisgarh Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Rules, 2008. Additionally, compliance of The Noise Pollution (Regulation and Control) Rules, 2000) is to be ensured by the agency w.r.t ambient noise level.

8.2 Air Quality Management

The air quality at site could be affected by different emissions resulting from combustion engines or resulting from the generation of dust during dryweather conditions.

Emissions from combustion engines are difficult to reduce. Some efforts notto affect the air quality are the switch-off of machines whenever possible and to limit the number of machines and equipment to a level as low as reasonable possible. The Contractor is requested to consider these recommendations during the construction phase.

Considering this requirement, the Contractor must undertake all necessary actions to reduce the generation of dust to the lowest possible levels. Project specific measures shall be included in the H&S Plan.

Mitigation measures to prevent increased dust generation include using

dust-suppressing water spray in areas of active earthmoving and on unpaved roads, using aggregate-covered access roads to minimize dust emissions and minimizing the areas of exposed soil or cleared of vegetation. Truck beds should be covered with a tarp or similar material to minimize dust during the transport.

Mitigation measures during project activities to prevent increased air emissions would include using requiring emission control devices on equipment, maintaining properly tuned engines, avoiding unnecessary idling, using electric motors instead of internal combustion engines, usinglow-sulfur diesel fuel where available, preparing asphalt away from populated areas.

8.3 Pre-employment Health Assessment

Pre-employment health checks for construction site workers shall be mandatory. These checks shall ensure that in no case the state of health ofemployed workers can be impaired by possible pre-existing diseases. TheContractor shall deploy a suitable experienced medic and appropriate materials and premises for these checks.

Workers shall be checked, and all the results shall be analysed, before his first workday, in order to mitigate any risk.

Therefore, the Contractor shall provide the abovementioned medical staff and material during the entire year. Usage of hospital capacities is an often used option to fulfil these requirements, where those capacities are available. Only personnel with appropriate health condition with respect totheir particular job shall be employed.

All workers who are subject to an exposure to occupational health risksshall undergo periodic medical surveillance. This would be required forworkers:

- exposed to noise levels exceeding 85dB(A);
- exposed to hazardous materials, e.g. chemicals;
- carrying heavy loads.

In addition to the pre-employment health checks and periodic medical surveillance, the Contractor shall enable the site workers to pass an exit medical check after finishing their jobs on site. The exit medical check shallbe provided to all workers who worked more than 3 months constantly on the construction site.

All pre-employment, periodic or exit health checks must be documented foreach worker. The assessment records must be kept confidential and for the use by the project management only. The workers will have the right to askfor the results of the health checks.

The workers will have the right to decline any pre-employment, periodic or exit medical checks. In this case they will not have the possibility to apply for any compensation in case of health interferences resulting from their work activities in connection to existing diseases.

All pre-employment, periodic or exit health checks must be provided to the workers free of charge. The application for a health check must not result in a negative treatment of the respective worker.

The Contractor must ensure that any health checks requiring specific facilities, equipment or medical staff will be available at the constructionsite or in a reachable distance to travel.

8.4 **Covid-19 Prevention**

Contractor shall take all necessary measures related to Covid-19 prevention as per guidelines issued by Government authorities as well as NTPC guidelines (if any).

8.5 **Health Surveillance**

8.5.1 **Management of Alcohol and Drugs**

Smoking shall be prohibited at all times at the construction site, at worker's camp and at storage and fabrication areas. This includes the operating or use of all electrical or manual work equipment.

Smoking shall be restricted to clearly defined and highly visible areas, only.

The presence and consumption of non prescription drugs and alcohol is strictly prohibited at all areas.

Drug and, especially, alcohol testing shall be arranged after weekends and especially for workers appointed for works consisting of potentially high-risk activities. The drug and alcohol test shall be undertaken in case of indications of a respective consumption.

Until the result of the test is public, the worker(s) must refrain from anywork at site.

In case of a positive test result, the worker has to be expelled from the sitewithout any undue delay until the completion of the project.

9. PERSONAL PROTECTIVE EQUIPMENT

It shall be governed by site regulation and safety requirement as stipulated in GCC

10. INCIDENT & ACCIDENT MANAGEMENT

It shall be governed by site regulation and safety requirement as stipulated in GCC

11. HEALTH & SAFETY REVIEWS

11.1 MCA H&S Audits and Reviews

Prior to commencement of the main construction phase, NTPC will conduct a pre-construction phase H&S Review to ensure that all the necessary arrangements are in place and suitable for the work being undertaken at that time. This will include compliance with this H&S Standards document, the project H&S Plan and country specific legislation.

NTPC will conduct site specific H&S Reviews on a regular basis and formal H&S Audits of the Contractor and its supply chain. Formal H&S Audits will be conducted at least, every 6 months. The duration of this audit will be a minimum of 1 day and will require the full co-operation of the Contractors project management team.

In addition to H&S Reviews to be undertaken by NTPC, it is possible thatfurther H&S Audits and Reviews will be carried out by relevant stakeholders i.e. Ministry of Labour or Ministry of Health etc.

The Contractor is obliged to provide any necessary support to the stakeholders to enable them to undertake their tasks and duties and to allowthe access to the sites for undertaking the audits and reviews.

11.2 Contractors Health & Safety Review Programme

The Contractor shall implement an H&S Review Programme applicable for his construction site(s) that shall include a systematic evaluation of the implemented management system, compliance with this H&S Standards document, and the project H&S Plan and local legislative requirements.

11.2.1 Contractors H&S Audits

H&S Construction Site Audits must be undertaken on a monthly basis. The audits should be performed by the Site Manager, the H&S Manager and theH&S Advisor.

The audits should comprise the construction site itself, material andequipment storage areas, workshop areas and accommodation areas(Worker's camp area).

These audits shall be recorded and the results should be slipped into the monthly H&S Reports. A copy of the audit report must be attached to themonthly report.

11.2.2 Contractors H&S Inspections

H & S Inspections must be carried out on specific work areas and work places associated with the project on a weekly basis but independent thereofif they are assessed as medium or high risk areas or workplaces according to the risk register. The results of the inspections must be considered in the weekly H&S reports to be submitted to NTPC. A copy of the H&S Inspection report must be attached to the weekly report. The H&S

Inspections shall be executed by the H&S Manager together with the H&S Advisor.

11.2.3 Contractors Health & Safety Surveys

H & S Surveys shall be conducted by the Contractors' H&S Advisor on a daily basis. The date and time of the surveys must be documented but the results must not be recorded in a written report but significant findings mustbe communicated to the H&S Manager.

11.2.4 Contractors Management Surveys

Management surveys to be undertaken by the Contractors General Manager or his representatives shall be conducted at least every 3 months. The surveys must not be done by the responsible Site Manager, H&S Manager or H&S Advisor of the particular construction site. The results shall be recorded.

11.3 Reporting

The results of H&S Audits and H&S Inspections must be recorded and the reports must be submitted to NTPC within 3 working days after finalisation of the audit or inspection respectively. Forms to be used for the audits and audit reports respectively, inspections and surveys will be provided by NTPC.

The reports must include all relevant subjects according to the purpose of the H&S Reviews, but at least the results and the needed corrective actions.

An reporting schedule for each particular construction site must be developed by the Contractor and should be submitted to NTPC for reviewand approval.

11.4 Corrective Actions

The H&S Review reports must include the need for corrective actions. The list corrective actions must include the following information:

- Identified risks and non-compliances;
- Needed corrective actions;
- Needed personal and material resources;
- Responsible person;
- Date for latest finalisation.

The effectiveness of the corrective actions will be subject of NTPC'sH&S Audits.

11.5 Compliance Reviews

One week after the implementation of the corrective actions, the H&S Manager is requested to undertake a compliance review. After observation of the full compliance of the corrective actions, the H&S Manager has to report the finalisation to NTPC.

12. SITE H&S REQUIREMENTS

It shall be governed by site regulation and safety requirement as stipulated in GCC.

13. STAYING & FOOD ARRANGEMENT FOR WORKERS

The contractor may consider providing hygienic food, beverages and refreshments during period of Project construction which may enhance the productivity level of the workers.

The contractor shall also arrange quarters in workers habitat area for accommodation of workers during period of stay at SIPAT STPP. The proper cleaning and hygiene shall be maintained in quarters. The random checks for hygiene and cleanliness shall be done by Employer and any violation on cleanliness shall not be acceptable. Employer may take action for the same as deemed fit.

CLARIFICATION-05B FOR SIPAT-III (1X800 MW) EPC PACKAGE (UNDER BULK TENDER)

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's Response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
430	VI/A	IIB	9 of 20	1.16.02	765 kV Overhead Transmission Line	Laying of transmission line including cable which is outside plant boundary (approx. 2 Km), has been kept in purview of Bidder's scope. NTPC may kindly note that these are works which are not the core business of Main plant power contractor and is vendor dependent works. Further, being outside plant boundary, it will require lot of interactions with local authorities for which Main plant Contractor will likely to face issues in seeking approvals, clearances etc. apart from resolving law and order issues, in case so arise(s). Therefore, NTPC is requested to delete this outside transmission line scope from bidder's scope.	Bidder to note that the subject transmission line is for the connection of 765kV Generator Transformers to the bays in generation switchyard having approximate length of 1.7Kms only. Further, considering the small line length and based on the bidder's request, the provenness criteria for Transmission Line was also removed. Bidder to refer preliminary transmission line route survey which is attached as part of the technical specifications, wherein, all the transmission line towers are feasibly located inside the land boundary of Sipat STPP except for a small portion of Line stringing. The required RoW permission and clearances for this portion of the line which falls outside the plant boundary shall be taken by NTPC after detailed engineering based on final tower spotting data. Further, no cable associated with Sipat STPP Stage-III under the scope of EPC package is being considered outside the land boundary of Sipat STPP. Accordingly, Bidder to consider the same and comply with tender specification requirements.

CLARIFICATION-04B FOR SIPAT-III (1X800 MW) EPC PACKAGE (UNDER BULK TENDER)

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's Response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
426	VI/B	G-01	4 of 4	1.06.00	Further, Contractor will share the detailed design documents for establishing the changes done in the design for ensuring continuous operation at 40 % TMCR Load.	It is confirmed that the offered Steam Turbine shall be capable of continuous operation at 40 % TMCR Load as per CEA Gazette. However, the detailed design documents for establishing the changes done in the design are proprietor in nature and cannot be shared.	Noted.
427	VI/B	G-07			Data Sheet: Steam Turbine.	Many data / information asked are not required for operation and maintenance of the machine. These are proprietary design information of the designer and not required for the utilities. This creates trouble during execution and contract closing. Hence for maintaining the design confidentiality, such information cannot be divulged with.	Noted.
428	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.	OEM design guideline and the design of the modules cannot be altered. Same guideline has been followed in all 660 & 800 MW machines which are running without any trouble on this account. Hence our deviation stands.	Noted.
429	VI/A	IIA-06 (Errata to Section VI Technical Specification; Amdt-01, TG-01)	10 of 10	16.00.00	Steam Turbine Generator & Auxiliaries and associated systems shall be designed for 40% Technical Minimum Load (TML); for meeting this mandatory requirement and ensuring the design life of Turbine including its auxiliaries, necessary changes in design to be made. Design changes to be considered shall include but not limited to the following. 1. Changes required in LP Turbine last stage and second last stage blades (as applicable) to take care of increased flow separation at 40% TML. 2. Bidder shall consider state of art design with respect to blade metallurgy and effective moisture separation methodology to avoid blade erosion & failures at 40% load continuous operation of Turbine. Bidder shall submit thermal stress analysis report of Turbine components at 40% TML operation. 3. Increased thermal stress in Turbine stages: To enable continuous operation of turbine at 40% load, Bidder shall take care of the increased stresses (due to ventilation) in turbine design and ensure that design life of turbine and its components is not reduced. Further, turbine and auxiliaries shall also be designed for complying the requirements related to flexibilization as mentioned in CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023 in addition to the requirement specified elsewhere.	It is confirmed that the offered Steam Turbine shall be capable of continuous operation at 40 % TMCR Load as per CEA Gazette. However, the detailed design documents for establishing the changes done in the design are proprietor in nature and cannot be shared.	Noted.

CLARIFICATION-03B FOR SIPAT-III (1X800 MW) EPC PACKAGE (UNDER BULK TENDER)

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
220	VI D	ECC	14 of 64	35.12.00	.....Storage duration of any material at site shall not be more than 3 months. Accordingly supply of material in sequence of erection at site to be ensured. To achieve the same, following is to be adopted: a. Dispatch clearance is to be given in order of sequence of erection. To achieve the goal, proper tags shall be maintained in ascending order. The tag shall be self-explanatory. b. MDCC shall be issued by RIO based on clearance from Site FQA head, Main contractor, Erection head for dispatch and supply of material.	Based on experience in projects being executed at present by bidder on EPC basis, we propose to delink storage clearance with inspection and issue of MDCC by NTPC. Bidder should be given flexibility to either store the materials in it's manufacturing plant or project site based on the requirement of material for erection. This will help in making our Ordering / Manufacturing / Erection plan to meet the project timelines.	Provision of bidding documents shall prevail.
221	VI/B	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE	58 of 227	METHOD OF COMPUTATION OF AUXILIARY POWER CONSUMPTION FOR ESP: -	Electrostatic Precipitator with all TR sets, all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes working and rapping system in normal operation. During the test all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes will be kept in continuously ON condition at 100% duty condition and set point temperature shall be kept 5 degrees Celsius above the Design flue gas temperature/ operating flue gas temp whichever is higher.	It is understood that tender specification is intended to specify that the hopper heaters will be kept in "ON" condition and the thermostat will trip the heater once it reaches the set point temperature. Further, the design capacity of the heaters specified in tender is for 100% BMCR condition and the 100% duty condition means 100% TMCR normal operating condition. **Hence, Bidder suggests that the tender condition shall be modified as follows:** "During the test all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes will be kept in continuously ON condition at 100% TMCR guarantee point condition and set point temperature shall be kept at design flue gas temperature at guarantee point condition"	Bidder to refer to Amendment to technical specification Sl .no. SG-02B in this regard.
222	SECTION VI/ PART-C		16 of 119	8.03.04 a(iv)	The complete 3D data (editable model) which shall be utilised for all future detailed engineering related to maintenance, operation, R&M, efficiency improvement of the project etc. Complete 3D model along with as built GADs, layout, isometrics, reports extracted and 3D models for all disciplines , with any other document generated from 3D model and naming conventions with as-built updates along with complete reference databases, component catalogues for all the size range shall be handed over to owner. Apart from the 3D Model, all drawings like GADs, Isometrics etc. extracted from the model shall also be submitted by the Contractor in Electronic form. 3D model along with complete Project databases shall be submitted at each model review stage and as final as-built. The contractor shall also submit all the configuration files, customization files, templates and all referenced databases. 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. All software and hardware shall be supplied by bidder within 3 months of NOA. The 3D modelling software shall preferably be the same software bidder will be using for preparation of 3D model or it shall have all editable features to edit the model supplied by bidder on time to time basis. Database backup shall be taken every month and handed over to NTPC. 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 .	The OEM of the 3D modelling software (used by bidder) has expressed inability to provide perpetual licenses for ongoing NTPC tenders as his business model allows only subscription based licenses. (Further, as a special case, the OEM allowed perpetual licenses for NTPC TALCHER & LARA projects for which the supply of the licenses is under progress) In view of the above, NTPC is requested to review the requirement of perpetual licenses and allow the supply of subscription based licenses. As per prevailing industry practice, complete project database is provided after the completion of Engineering and 3D review models are shared for approvals. Accordingly 3D model will be provided at the end of Engineering and 3D review models will be shared time to time for approvals of layout drawings.	Bidder to follow specification requirement .
	EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES ON SECTION VI TECHNICAL SPECIFICATIONS Sl.No. #1				**NTPC REPLY:** Data to be submitted to NTPC during detailed engineering as per the provisions of Bidding documents, are not proprietary in nature. Hence Bidder's proposal of providing only the non editable 3D (review) model is not acceptable. Bidder to further note that there are suppliers available in market who are prepared to provide software with perpetual license. As such, Bidder to comply with Technical specification requirements in entirety.		
223	SECTION-VI PART-A	SUB-SECTION-VI CHAPTER-02	9 of 34	B/IX/8	Exciter/brush gear (if applicable) Air Cooler: 1 No each type	Bidder will suuply 1no. Exciter Air Cooler. Brush Gear Air Cooler is Not Applicable. NTPC to accept.	Specification is clear that 1no.each type of air cooler for exciter/brush gear (if applicable) shall be aupplied as mandatory spares . Same shall be decided during detailed engineering as per offered exciter by the successful bidder.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
224	VI/B (Mechanical)	G-01	4 of 4	1.06.00	Further, Contractor will share the detailed design documents for establishing the changes done in the design for ensuring continuous operation at 40 % TMCR Load. Bidder's query- Such Design document are proprietor in nature and cannot be shared. NTPC is requested to delete the clause. NTPC reply- 40% Technical minimum load operation to be ensured in line with latest CEA Gazette. Bidder may please note that this is mandatory requirement and is to be ensured by owner. Bidder to comply with the specification requirements.	It is confirmed that the offered Steam Turbine shall be capable of continuous operation at 40 % TMCR Load as per CEA Gazette. However the detailed design documents for establishing the changes done in the design are proprietor in nature and cannot be shared.	As per CEA Gazette Notification dated 25.01.2023, it is mandatory compliance for utilities to have their machines designed for flexibilisation which includes 40% technical minimum load, ramping requirements as specified in tender specifications and also two shift operation as per CEA notification dated 23.12.2022 on technical standards. Utilities may be asked to submit supporting document in this regard regarding design changes carried out in the OEM supplied machines towards compliance of these mandatory requirement. In view of the above, Bidder proposal is not acceptable and Bidder is requested to comply specification requirements.
225	VI/B (Mechanical)	G-07	3 of 8	2.05.00	Data Sheet: Steam Turbine. Bidder's query- Technical data of Steam Turbine required for operation, maintenance and information purpose shall only be furnished in O&M Manual. Data / information which are proprietary in nature, shall not be furnished. NTPC Reply- The data / information sought are not proprietary in nature and these information are provided in past also. Bidder to comply specification requirements.	Many data / information asked are not required for operation and maintenance of the machine. These are proprietary design information of the designer and not required for the utilities. This creates trouble during execution and contract closing. Still NTPC has not approved this documents in many old projects like North Karanpura, Patratu etc. Hence for maintaining the design confidentiality, such information cannot be divulge with.	The data / information sought are not proprietary in nature and these information are provided in past also. Bidder to comply specification requirements.
226	VI/B (Mechanical)	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. Bidder's query- Critical speed of composite rotor and blade assembly shall not be within ± 10% of rated speed. This is as per OEM's in house design guidelines NTPC Reply- Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.	OEM design guideline and the design of the modules cannot be altered. Same guideline has been followed in all 660 & 800 MW machines which are running without any trouble on this account. Hence our deviation stands.	Bidder's deviation is not acceptable. Bidder to comply with the requirements of Technical Specification.
227	VI/A Amendment 01,TG-1	IIA-06	New Clause added	16.00.00	16.00.00: Steam Turbine Generator & Auxiliaries and associated systems shall be designed for 40% Technical Minimum Load (TML); for meeting this mandatory requirement and ensuring the design life of Turbine including its auxiliaries, necessary changes in design to be made. Design changes to be considered shall include but not limited to the following. 1. Changes required in LP Turbine last stage and second last stage blades (as applicable) to take care of increased flow separation at 40% TML. 2. Bidder shall consider state of art design with respect to blade metallurgy and effective moisture separation methodology to avoid blade erosion & failures at 40% load continuous operation of Turbine. Bidder shall submit thermal stress analysis report of Turbine components at 40% TML operation. 3. Increased thermal stress in Turbine stages: To enable continuous operation of turbine at 40% load, Bidder shall take care of the increased stresses (due to ventilation) in turbine design and ensure that design life of turbine and its components is not reduced. Further, turbine and auxiliaries shall also be designed for complying the requirements related to flexibilization as mentioned in CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023 in addition to the requirement specified elsewhere.	Machine is capable of running at part load upto 40% TMCR subject to the condition that guidelines of O&M manual are strictly adhered. Further submission of any design analysis / report etc are not envisaged as they are proprietary in nature.	As per CEA Gazette Notification dated 25.01.2023, it is mandatory compliance for utilities to have their machines designed for flexibilisation which includes 40% technical minimum load, ramping requirements as specified in tender specifications and also two shift operation as per CEA notification dated 23.12.2022 on technical standards. Utilities may be asked to submit supporting document in this regard regarding design changes carried out in the OEM supplied machines towards compliance of these mandatory requirement. In view of the above, Bidder proposal is not acceptable and Bidder is requested to comply specification requirements.
228	VI/B	G-01	2 of 4	1.01.00 (n) & 1.03.00	Plant Life 25 years with Number of Starts : Hot : 6700, Warm : 1000, Cold : 150. The plant shall be capable of daily 2 load cycling from 100% to 50% & 1 load cycling bellow 50% TMCR which implies 13400 & 6700 cycles in design life.	The requirements of 7850 number of starts along with daily 3 load cycling and daily starts & stops are not practical. 7850 starts in 25 yrs means 314 starts in a year i.e. One startup in every 1.16 days. NTPC to reconsider the practicability and clarify the design requirement.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 1277 of Clarification 02.
229	VI/B	G-07	2 of 27		Tentative Master Drawing List	Master Drawing List will be agreed and finalised after order.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 181 of Clarification-02 of the same.
230	VI/B	A-02	3 of 67	1.05.00	*Type of Starts:* Hot start (after 8 hours of unit shut down) Warm start (after 36 hours of unit shut down) Cold start (after 72 hours of unit shut down)	For Start up curve preparation, we will consider the following condition as per standard practice. Hot start (after 8 hours of unit shut down) Warm start (after 48 hours of unit shut down) Cold start (after around 200 hours of unit shut down)	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 1278 of Clarification 02.
231	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 Shaft/bearing vibration c. Differential Expansion d. Low Main steam temperature e. Any other safety requirement as required	Only alarm on Differential Expansion & Low Main Steam Temp is available. Auto Protection is not envisaged as per OEM standard practice.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirements.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
232	VI/B	A-07	7 of 25	1.19.00	Furnish turbine clearance diagram indicating values for radial & axial clearances and leakage rate from glands.	Submission of leakage rate is not envisaged.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 183 of Clarification 02.
233	VI/B	A-07	7 of 25	1.20.00	Type Test of Metallic expansion Joints of Steam Turbine	Type Test of Metallic expansion Joints are not envisaged.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 182 of Clarification 02.
234	VI/B	A-08,A-09			LOW PRESSURE PIPING POWER CYCLE PIPING (HIGH PRESSURE PIPING)	What is the pressure range in bar categorizing low pressure piping? What is the pressure range in bar categorizing power cycle piping (high pressure piping)?	Please refer the corresponding PART-A of the specification for services / system considered in Low pressure and Power cycel pipng.Technical specifications are clear in this regard. Bidder to comply the specification requirements.
235	VI/A	I	5 of 8	3.00.00	The tender drawings are enclosed along with the specification as Part-E, Section-VI and shall supplement the requirements specified in these technical specifications. The scope and terminal points of the equipment to be furnished under this EPC package shall be as identified in these drawings read in conjunction with text of the specification.	We understand that tender drawings for Steam Turbine & auxiliaries are only indicative and for information only. These are not binding.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 184 of Clarification 02.
236	VI/A	IV	1 of 73	1.00.01 (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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 185 of Clarification-02 of the same.
237	VI/A	IV	2 of 73	1.00.01 (i-1)	For Cat-I Performance / Acceptance tests to be conducted along with the initial operation: After the conductance……. The contractor shall submit the detailed test evaluation report of Performance test results to Employer promptly but not later than 7 days from the date of conductance of Performance test.	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. Separate report shall be furnished to Customer as per agreement during MOM of TG-PG test.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1279 of Clarification-02 of the same.
238	VI/A	IV	10 of 73	1.01.03.01 (2)	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 for Approval and inclusion in TG-PG test procedure.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 186 of Clarification 02.
239	VI/A	IV	10 of 73	1.01.03.01 (2)	Variation in power factor, frequency, generator hydrogen pressure and voltage	Generator is not allowed to operate with variation in Hydrogen pressure & any variations in pressure shall be taken care during operation from safety aspects. Hence, no correction curve is envisaged for the same. It may be noted that same practice is also followed in all supercritical projects like Barh, Gadarwara, Mauda, North Karanpura, Khurja, Talcher etc. Hence Hydrogen Pressure Correction Curve is not applicable.	Bidder proposal is acceptable.
240	VI/A	IV	50 of 73	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. All the instruments including the flow nozzle shall be calibrated by the contractor before initial operation in a reputed international institute. All calibrations reports shall be made available prior to the start of initial operation and calibration certificates in original submitted to Employer. All instruments including flow nozzles as necessary for conductance of PG tests shall be installed prior to the start of initial operation.	PG test instruments are with special accuracy class and shall be calibrated before start of actual PG test and will be installed in running unit. Flow Nozzle shall be installed just before start of TG-PG test to ensure accuracy of flow measurement and its reading will be recorded in separate data logger.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 1280 of Clarification 02.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
241	VI/A	IV	51 of 73	2.03.00	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 to Customer within shortest possible as per agreement during MOM of TG-PG test.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 1281 of Clarification 02.
242	VI/B	G-04	9 of 227	3.3	The turbine generator performance test is carried out according to ASME PTC 6-2004 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 conductance 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.	Aging is a physical phenomenon and once steam enters into the cycle the aging of the components starts. Hence the aging period will be considered from the date of first synchronization to the conductance of PG test.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 188 of Clarification 02.
243	VI/B	G-04	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 during performance test. Average value of test data of the specified test period will be collected for evaluation purpose. Vendor to ensure calibration validity of all instruments used for PG Test. Calibration certificates of test instruments shall be submitted to Employer at least 15 days before the conductance of performance test. Instrument Calibration to be carried out in a NABL accredited Laboratory.	Flow Nozzle shall be installed just before start of TG-PG test to ensure accuracy of flow measurement and its reading will be recorded in separate data logger.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 1282 of Clarification 02.
244	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.	Duration of test shall be two hours, out of which most stable 1 hour period shall be selected for calculation and reporting.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 189 of Clarification 02.
245	VI/B	G-07	6 of 8	51	Gland leakage coefficients	Such data requested in data sheets is proprietary in nature, hence cannot be furnished.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 190 of Clarification 02.
246	VI/B	A-07	7 of 25	1.18.01 Note	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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 191 of Clarification 02.
247	Sec. VI, PART-B	A-07	8 of 25	2.02.00/(C)	…vibration levels shall be Zone A of ISO 10816.	Applicable standard for Vibration for Vacuum pump shall be ISO-10816-1. Vibration shall be as per ISO-10816-1 Zone A/B. ISO 10816-3 is not applicable for LRVP.	ISO-10816-3 is also applicable for Vacuum pumps. Bidder to comply with the requirements of Technical Specification.
248	Sec. VI, PART-B	G-05	8 of 37	2.02.01	Applicable Codes and Standard: ASTM ISO 10816-3 (VIBRATION)		
249	Sec. VI, PART-B	G-06	7 of 14	3.03.04 (ii)(b)	Oxygen content in condensate, at hotwell outlet, shall not exceed 0.015 CC per litre over the entire load range and	In supercritical power plant, oxygen is intentionally dosed in the feedwater cycle for efficient working of boiler. This oxygen level in feedwater is also maintained through deaerator. Since, dosing is deliberately done in the condensate. Therefore it is not possible to demonstrate such a low ppb of dissolved oxygen in the condensate after condenser. This deliberate dosing is not done in sub critical set where it is possible to maintain 0.015cc/ltr of dissolved oxygen in condensate after condenser.	The dissolved oxygen limiting level is achievable in super critical power plant also. Bidder's proposal is not acceptable. Bidder to comply with the requirements of Technical Specification.
250	Sec. VI, PART-B	II-B-02 (MOTORS)	1 of 4	3.01.00 b).	Continuous duty LT motors upto 50KW Output rating (at 50 Deg. C ambient temperature), shall be super Premium Efficiency class-IE4, 50-200 KW shall be of Premium efficiency class-IE3 conforming to IS 12615 or IEC 60034-30.	Clause to be updated as "Continuous duty LT motors upto 200KW Output rating (at 50 Deg. C ambient temperature), shall be of Premium efficiency class-IE3 conforming to IS 12615 or IEC 60034-30."	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 950 of Clarification-02 of the same.
251	Sec. VI PART-C	GENERAL TECHNICAL REQUIREMENTS	PAGE 34 OF 119	22.17.00	The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI).	The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). For the items not appearing in the sub vendor list (Section-VI, Part-B , Indicative sub-vendor list.) final acceptance by NTPC shall be on the basis of certificate of conformance (COC) by main contractor. Item/component mounted on the skid of the main item or supplied as a integral part of the main item, to be supplied as per proven practice of the manufacturer meeting the Customer technical specification. No vendor approval will be sought from NTPC for such cases.	Bidder understanding is not right. a] In case sub vendor is not mentioned in the list , That will be tied up during detailed enginnering in post award.
252	SEC VI PART-C	GENERAL TECHNICAL REQUIREMENTS	PAGE 34 OF 119	22.17.00	The contractor's proposal for any new sub vendor for any of the items identified in indicative sub-vendor list shall necessarily be furnished in the sub vendor questionnaire & main Contractor Evaluation report format attached as Annexure- VII with all relevant documents and main contractor's own physical assessment report assessed as per their quality management system for NTPC review and acceptance.	The contractor's proposal for any new sub vendor for any of the items identified in indicative sub-vendor list shall necessarily be furnished in the sub vendor questionnaire & main Contractor Evaluation report format attached as Annexure- VII with all relevant documents and main contractor's own physical assessment report /document review as applicable for domestic manufacturers and document review for foreign manufacturer) assessed as per their quality management system for NTPC review and acceptance. In case of physical assessment (for domestic vendor) is alreday done by main contractor then physical reassessment by main contractor is not required.	Bidder to comply technical specification requirement. Further, the same may be discussed during detailed engineering if required

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
253	SEC VI, PART-B	SUB-SECTION- E28 GENERATOR AND AUXILIARIES REV- 13	PAGE 4 OF 9	PROCESS CHECK FOR ROTOR AND ASSEMBLY (GENERATOR/EXCITOR)	**Rotor wedges, damper Wedges.-** Ultrasonic test/RT (at suppliers work and after preliminary machining)	Ultrasonic test/RT is applicable for Rotor Slot wedges only.	Bidder to follow NTPC technical specification requirements.
254	SEC VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIE	PAGE 1 OF 26, 2 of 26	1.01.01 (1) a,b,c,d 1.01.03 (2) a,b,c,d 1.01.04 (b) 1.01.06 (a)I,ii,iii	Creep requirements: a) Steels chosen for design metal temperatures less than 400°C are exempt from creep /stress rupture testing. b) Steels chosen for design metal temperatures between 400°C to 540°C AND having less than 3% chromium, shall require 5 years performance feed back experience in the absence of which, creep rupture test will be required to be carried out for minimum test duration of 1000 hrs/mutually agreed parameters for NTPC approval. c) Steels chosen for design metal temperatures above 540°C AND/OR having more than 3% chromium, shall require 10 years performance feed back experience OR adequate stress rupture data, in the absence of which, creep rupture test will be required to be carried out for minimum test duration of 1000 hrs/mutually agreed parameters for NTPC approval. d) Unspecified alloying elements shall be controlled as per the applicable standard.	Bidder's understanding that the creep requirement is applicable for steel chosen for design metal temperatures above 400°C and not for vendor qualification. If the mentioned creep requirement is applicable for vendor qualification then the NTPC approved vendor's are exempted from the creep requirements.	Biider understanding is not correct. Bidder to follow NTPC technical specification requirements.
255	SEC VI PART-C	GENERAL TECHNICAL REQUIREMENTS	PAGE 40 OF 119	25.03.00	The Contractor shall give the Project Manager/Inspector (15 days for domestic) / (45 days for foreign) written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within (15 days for domestic) / (45 days for foreign) of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.	The Contractor shall give the Project Manager/Inspector (~~15~~ 7 days for domestic) / (45 days for foreign) written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within (~~15~~ 7 days for domestic) / (45 days for foreign) of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.	Bidder consideration is not right : For doing the proper planning of Inspection activities , it is mentioned as 15 Days for Indian Origin Sub Vendors.
256	SEC VI PART-C	GENERAL TECHNICAL REQUIREMENTS	PAGE 40 OF 119	25.04.00	The Project Manager or Inspector shall within 15 days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract.	The Project Manager or Inspector shall within ~~15~~ 7 days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract.	Bidder consideration is not right : For doing the proper planning of Inspection activities , it is mentioned as 15 Days for Indian Origin Sub Vendors.
257	SEC VI PART-C	GENERAL TECHNICAL REQUIREMENTS	PAGE 40 OF 119	25.05.00	When the factory tests have been completed at the Contractor's or subcontractor's works, the Project Manager /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector	When the factory tests have been completed at the Contractor's or subcontractor's works, the Project Manager /Inspector shall issue a certificate to this with immediate effect ~~fifteen (15)~~ days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within ~~fifteen (15)~~ seven (7) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector	Bidder to follow NTPC technical specification requirements.
258	VI/B	D-1-8	10 of 20	8.06.00	All gratings shall be electroforged types. Minimum thickness of the grating shall be 40 mm.	As per Bidder's standard practice for Boiler and Auxiliaries Duct support structure area, Gratings thickness of 32 mm will be provided.	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
259	VI/B	D-1-9	1 OF 33	9.02.01 (a)	Minimum 1000 mm high (from floor/ roof level) hand railing shall be provided around all floor/roof openings, projections/balconies, walkways, platforms, steel stairs, etc., wherever the height of the building is more than 12m, railing height shall be 1.2m.	For all buildings, two hand rails with top rail at 1050 mm and bottom rail at 600 mm above platform level will be provided as per Bidder's regular practice being followed for all supercritical boiler design.	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
260	VI/B	D-1-9	1 OF 33	9.02.01 (b)	All stairs shall have a maximum riser height of 180 mm and a minimum tread width of 275 mm.	All steel stairs shall be provided with tread width of 250 mm as per our standard practice for all supercritical boiler design	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
261	VI/B	D-1-12(D)	2 OF 2	D1-12(D)	Basic wind speed 47 m/s, Risk coefficient K1=1.07 & Terrian category 2	Topography Factor (K3) & Importance factor (K4) shall be provided for wind pressure calculation	Bidder to follow technical specification & IS code 875.
262	VI/B	A-02	16 OF 67	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.	Bidder has provided Mechanical type support for Economiser coil in many OTSC boilers which are running successfully now. Hence, Mechanical type hanger support may be accepted. Failure of even one tube calls for immediate correction. Hence this practically will not occur. The design of hanger tubes for two times the calculated load is unnecessary.	Reply to this query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 966 of Clarifications 02.
263	VI/B	A-02	8 OF 67	3.06.00	Panel to panel welding in burner zone to be avoided to maximum possible extent. Profile shields/ erosion prevention measure to be provided on top and bottom burner panel bends.	Panel to panel welding in burner zone may be permitted.	Bidder's proposal is not accepted. Bidder to comply with tender requirements.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
264	VI/B	A-02	9 OF 87	1.05.05	(vi) Maximum depth of tube banks/sections in the direction of gas flow: 2 Meters or maximum soot blowing radius, whichever is lower.	Economiser bank depth may be allowed upto 2.5mtrs to include economizer future area addition with present for optimum design.	Reply to this query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 216 of Clarifications 02.
265	VI/B	A-02	4 OF 67	1.11.05	Header to be provided with hand hole at end cover for ease of inspection and removal of foreign material.	Due to design & arrangement requirements, Hand hole pipes cannot be provided at ends. However, it will be provided radially.	Bidder to comply with the specification requirements as it eases header internal inspection process.
266	VI/B	A-02	9 OF 67	4.01.00 (b)	The casing/pent 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/m³.	The roof panel for supercritical boilers is fin welded panel and hence the chance for ash ingress is very minimum. Hence casing/pent house supporting system shall be designed without considering ash load.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
267	VI/B	A-02	13 OF 67	7.01.01 (4)	All horizontal heat transfer surfaces shall be supported by steam or water cooled hanger tubes designed for a minimum of 2 times the calculated load so as not to cause any dislocation/damage to the tube banks/sections. Necessary calculations in support of this shall be furnished by the bidder. The stress in the hanger tubes under such condition also shall not exceed the maximum permissible limits as per IBR. One(1) mm erosion allowance shall be provided over and above the calculated thickness of hanger tubes.	Failure of even one tube calls for immediate correction. Hence this practically will not occur. The design of hanger tubes for two times the calculated load is unnecessary.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
268	VI/B	A-02	46 of 67	14.01.05 (c)	Temperature element on all drains lines, including soot blower drain line.	Temperature elements will be provided only for those drains which may be used during operation. Start-up and shut down drains will not be provided with temperature elements.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
269	VI/B	A-02	46 of 67	14.01.05 (d)	Motorized remote operated air release valves at locations, two in series, as required connected to a funnel, leading drains to drain trench.	One motorised isolation valve and one hand operated isolation valve in series shall be provided for all air release lines and drain lines which are not operated for regulation purpose during unit start-up and shut down.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
270	VI/B	A-02	47 of 67	14.01.07	Provide plugging/locking for each isolating drain valve such that to open the valve, the key has to be inserted and key can be withdrawn when the valve is closed	Chain and padlocking arrangement, which is simple and effective for the intended purpose, is envisaged for the furnace lower header drain valves only.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
271	VI/A	IIA-01	6 of 28	2.09.03	Manually operated isolation valves on steam supply line shall be provided at each stream of furnace blowers or as per standard proven practice of the bidder. These valves shall be designed for full flow and shall be tight shut off type.	For facilitate draining of the condensate, the soot blowers at various elevations are connected to steam line. This arrangement does not permit elevation wise isolation. Maintenance in LRSB can be done conveniently by closing the main isolating valve. Since the soot blowers are operated only once in a shift, no difficulty will be faced on account of closing the isolating valve for any maintenance work. This practice is followed in all boilers including NTPC units.	The specification requirement is clear. Bidder to comply with the same.
272	VI/A	IIA-01	4 of 28	2.07.01	The requirements indicated below for each leg of each stage of desuperheating spray system is for superheater spray system. Similar system shall be provided for reheater spray system also. (a) Two (2) nos. pneumatically operated spray control valves, each rated for full duty with two (2) nos. pneumatically/motor operated isolating valves upstream & two (2) nos. manually operated isolating valves down stream of the spray control valves	The superheater spray station will consist of one pneumatically operated spray control valve with one pneumatically/motor operated isolating valves up-stream & one manually operated isolating valve downstream of the spray con-trol valve for each of the 2 main lines and 2 bypass lines.	Bidder proposal is not accepted. Bidder to comply with the specification requirements.
273	VI/B	A-02	12 of 67	6.04.00	A CFD and FEM analysis to conform to specified cyclic requirements shall be carried out and furnished by the contractor along with the pump data sheet	The pump vendors are reputed and have supplied BCW pumps across the world including Bidder. The pumps supplied by them in the past, for NTPC/Non NTPC 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. Also vendors are not willing to carry the said analysis. In view of the above, CFD and FEM analysis of Pump requirement shall be exempted.	Bidder proposal is not accepted. Bidder to comply with the specification requirements. Reply to a similar query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 220 of Clarifications 02.
274	Part_E_Mech_Civil	Flow Diagram - start up drain system	Tender Drawings START-UP DRAIN SYSTEM – DRG No: 001-POM-A-019		NRV downstream the boiler recirculation pump in the drawing (ZONE-B6)	NRV at discharge of start-up recirculation pump will reduce the warm –up flow thereby affecting the performance of the system. Hence Non-return valve (NRV)/Check Valve at discharge of start-up recirculation pumps is not envisaged.	Bidder to refer to the Cl. No. 2.06.00 (2) SUB SECTION-II A-01, Part A of Section VI for the scheme of valves at the discharge of startup drain recirculation pump.
275	VI/B	D-1-8	10 of 20	8.07.00	All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections.	For SG Bidder agrees to provide the type of bolts mentioned in this clause for field connections Field Structural Connections shall be as follows, 1) Main Columns : Fully Bolted Connections 2) Column to Beam : Connecting Cleat is welded with Column and bolted with Beams 3) Column to Vertical bracings : Gusset is Welded with Column and Bolted with Bracings. 4) Ceiling Structures : Connecting Cleat is bolted with girder and welded with beams 5) Horizontal truss and mid landings : Fully Welded Connections 6) Platforms : Fully Welded Connections 7) ID system structure : Fully Welded Connections	Bidder's Proposal is not acceptable. Bidder to comply with the Technical specification requirement.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
276	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	Cl.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.	Specifications in Bidding document are clear. Provisions of Bidding Documents shall prevail.
277	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	Cl.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/e-mail/Internet) or in-Person (wherever required) support.	Training module, will be available in the Project Management tool.	Specifications in Bidding document are clear. Provisions of Bidding Documents shall prevail.
278	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 1 of 6.	Cl.No.-1.01.00 A.	Any other information required for the project management purpose.	Offered project management system will be comprehensive. Any other information required, may please be elaborated.	Please refer Amendment in this regard
279	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	Cl.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. Report of hinderance register should be made available to Bidder.	Specifications in Bidding document are clear. Provisions of Bidding Documents shall prevail.
280	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	Cl.No.-1.01.00 B.	Should support integration with existing NTPC Systems viz C-Folder, Dreams, Pradip, Windsor, Team-up etc. with proposed software solution. (APIs will be provided by NTPC, subject to security authentication by NTPC IT team).	Bidder will maintain its drawing through it's PEDM system and the same will be integrated to offered project management system.	Specifications in Bidding document are clear. Provisions of Bidding Documents shall prevail.
281	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 2 of 6.	Cl.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 of review meetings in the system as per the format prescribed by NTPC.	Specifications in Bidding document are clear. Provisions of Bidding Documents shall prevail.
282	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	Cl.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.	Provisions of Bidding Documents shall prevail.
283	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 3 of 6.	Cl.No.-1.01.00 B.	Any other custom reports as per the requirement and mutual agreement.	NTPC may please elaborate, which type of other reports required.	Since, Project progress is a dynamic process. Therefore, different kinds of reports needed at different intervals. In view of this Provisions of Bidding Documents shall prevail.
284	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 4 of 6.	Cl.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.	Provisions of Bidding Documents shall prevail.
285	SECTION– VI, PART-A	Annexure-A to subsection IIC (Project Management)	Page No. 4 of 6.	Cl.No.-1.01.00 C.	All the reports/Photographs/Videos are to be made available on Project management tool.	We are considering for achieving of all the reports/Photographs/Videos generated by Drone. The access link for the same may be provided in Project management tool.	Provisions of Bidding Documents shall prevail.
286	SECTION– VI, PART-D	Work & Safety Regulation	Page 27 of 64	44.22.00 (j)	Availability of Fire Tender shall be ensured by contractor before start of construction work	Availability of sufficient Fire extinguisher mechanism/Equipments shall be ensured. In any adverse eventuality, deployment of Fire Tender of Stage-I may be allowed.	Bidder's proposal reviewed but not accepted. Bidder to comply with tender requirements.

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
287	TECHNICAL SPECIFICATION SECTION-VI, PART-B	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"	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 871. Bidder to comply
288	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-01 STEAM GENERATOR AND AUXILIARIES	PAGE 3 OF 13	(d)	(d) i) SHOP WELDS: Finished butt welds shall be subjected to RT or UT. Wherever the code/standard/process specifies random sampling, the same shall be minimum 20%. (ii) FIELD WELDS: a) Finished butt welds shall be subjected to RT or UT. Wherever the code/standard/process specifies random sampling, the same shall be minimum 20% b) Finished butt welds not covered under random sampling for RT/UT, referred above at point(a) shall be subjected to RT or UT or PAUT.	Bidder propose to perform extent of RT/UT at field welds shall be same as Shop welds Additionally PAUT /Recordable UT may be used in lieu of RT/UT Bidder understand, claue (ii) b) will be applicable to joints not part of clause a) (i.e. 20%)	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 872. Bidder to comply
289	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-4 FLUE GAS DESULPHURISATION SYSTEM	PAGE2 OF 5	1.05.02	Pressure vessels: 2) Butt welds of dished ends shall be stress relieved and subjected to 100% RT.	Dished ends stress relieving shall be done as per the applicable design and manufacutring code.	Bidder to follow the technical specification
290	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION –E-05 LP PIPING PACKAGE (MECHANICAL)	2 of 2	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. Hydrotest is carried out to validate the design & strength of the component. Bidder to follow the technical specification"
291	TECHNICAL SPECIFICATION SECTION-VI, PART-B	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 874 . Bidder to comply
292	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-6 POWER CYCLE PIPING	Page 1 of 5	1.01.00	Piping (b) All pipe lengths under this package, including piping where alloy steel is used shall be subjected to 100 % ultrasonic examination as per material specification standard with acceptable notch depth of 5% of the selected wall thickness (1.5mm maximum) except for the following piping system:	All pipe lengths shall be subjected to100% Ultrosonic Examination or 100% Hydrotest as per Material specification.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 1031. Bidder to comply
293	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-6 POWER CYCLE PIPING	Page 1 of 5	1.01.00	Piping (e) Non-destructive examination of welds shall be carried out after post weld heat treatment, if any. Piping: (i) Wherever SR/PWHT is envisaged for alloy steel, above NDTs shall be after SR/PWHT.	Bidder request, RT or UT of butt joints will be done before PWHT and MPI or DPT will be after PWHT	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 878. Bidder to comply

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
294	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-06 POWER CYCLE PIPING	Page 2 of 6	2 3	Piping (h) Non-destructive examination of welds shall be carried out in accordance with the relevant design/manufacturing codes. However, as a minimum, the following requirements shall be met. Further statutory requirement, wherever applicable shall also be complied with. (1) Temperature > 400 Deg, C or pressure exceeding 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds. (ii) 100% MPE. (2) Temperature > 175 Deg, C upto 400 Deg. C or pressure exceeding 17 bar and upto 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds for pipe dia. more than 100 NB. (iii) 100% MPE.	Bidder request to provide option for performing Penetrant testing in lieu of MPE Where ever the vent pipes are used under these conditions will be 10% RT or UT tested as these are open to atmosphere. Also, alternative to RT, UT/Advanced NDT may be performed in line with bidder standard practice	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 875 . Bidder to comply
295	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-06 POWER CYCLE PIPING	3 of 5	1.05.00	(b) Hardened/stellitted 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 feature during the valve operation. (inline with Sub section E-08 1.07.01). Different places of the specification Hardened/stellitted valve disc and seat differently (Ex: Sub section E-08 1.07.01). Kinldy clarify	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 876 . Bidder to comply
296	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-6 POWER CYCLE PIPING	5Page 2 of	1.02.00	Fittings: Raw material of all forged/formed fitting shall be ultrasonically tested. All mother pipes used for fitting shall be ultrasonically tested or hydraulic tested.	All the pipes used for formed fittings shall be UT or Hydrotested as per pipe material specification. (There is a contracdictory statement in the first and second sentence.)	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 879 . Bidder to comply
297	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-08 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 25 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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 881 . Bidder to comply
298	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 13 of 26		(d) To ensure dimensional control of condenser, parts\sub assemblies shall be trial assembled at shop. BIDDER shall furnish his proposal in this regard, which will be subject to Employer's approval. The extent/need for trial Assembly of various parts of Condenser / sub assemblies like Water Box, Water Chamber, Hotwell, Main Tube plate and support plate, its alignment and trial insertion of few tubes etc. shall be as per Manufacturers standard established practices. Such established practices shall be furnished to NTPC during finalization of quality plan.	As per Bidder standard practice, all the Support plates and main tube sheets assembled one above the other for ensuring alignment through insertion of few tubes. As per Bidder standard, it is not envisaged to trial assemble water box, water chamber, hot well Main tube plate and support plate at the workshop.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 883 . Bidder to comply

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
299	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 16 of 26		1.04.02 Vacuum pump: The test should be conducted with the respective motors to be supplied.	The test shall be done either job motor or calibrated shop motor	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 882 . Bidder to comply
300	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 18 of 26		1.06.02 Metallic Expansion Bellows (f) Life cycle test, meridional yield rupture test and squirm test to be carried out on a prototype/expansion bellow as per Sec.D clause 3.2 of standards of Expansion joint Manufacturer Association (EJMA). In case these tests have already been accepted by NTPC on a prototype expansion bellow, as defined in Sec.D Clause 3.2 of Expansion Joints Manufacturers Association (EJMA) test reports may be furnished by manufacturer for consideration and approval of Employer.	The type test reports witnessed by NTPC or other customers or thrid party agencies of Metallic Expansion bellow manufacturers may be submitted in-place of performing actual test	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 884 . Bidder to comply
301	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 20 of 26		1.06.03 Rubber Expansion Joint (h) Life cycle test shall be carried out on bellows of each type, design and size. In case these tests have already been accepted by NTPC in earlier projects for the same type / size /design, test certificate for the same may be furnished for approval of Employer.	As pG17:H18cycle test is done then the lower sizes are automatically considered as approved. It is not envisaged to carryout life cycle test of each type, design and size of bellow.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 885 . Bidder to comply
302	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 23 of 26		1.07.03 Butterfly valves: (h) After assembly, one valve of each size with respective actuator shall be shop operated over the full range of movement in both the directions, with the body subjected to the full hydrostatic pressure conditions, to demonstrate that the unit is in working order without any leakage through the joints and torque switches/clutches, limit switches are operating satisfactorily. During the test, hand wheel operation, opening/closing time and current drawn shall also be checked.	As per all the Butterfly valve manufacturer practice, after assembly of valve, the valve functional test will be done with respective actuator operated over the full range of movement in both the directions without subjectiing the body hydrostatic pressure conditions. Please note that the body is already hydrotested in assembled condition.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 880 . Bidder to comply
303	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 25 of 26		(g) Condenser water boxes shall be tested hydraulically at a minimum test pressure of 1.3 times the design pressure.	Condenser water boxes shall be hydraulically tested at work shop. It is not envisaged to re-check again at site.	Bidder to follow the technical specification requirements.
304	TECHNICAL SPECIFICATION SECTION-VI, PART-B	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 857 . Bidder to comply

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
305	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-10 CONDENSATE EXTRACTION PUMP SUB SECTION- G-05 STANDARD TYPE TEST PROCEDURE SUB-SECTION-E-12 BOILER FEED PUMP SUB SECTION- G-05 STANDARD TYPE TEST PROCEDURE	2 OF 2 Page 12 of 38 Page 2 OF 4 Page 2 of 37	Note 3.03.00 Note (2) 1.03.00	CEP: .NPSH (R) test shall be carried out on one Condensate Extraction Pump using cold water at pump flows of 25%, 50%, 80%, 100% and 125% of Design Flow at Design Speed. This shall be done at 3% head break by Suction Throttling Procedure / varying suction pressure. Plots will be made for NPSH vs head developed by 1st stage for all flows. From the plots NPSH values corresponding to 1% & 3% head drop will be determined for all the above % flows. Finally, Flow vs NPSH characteristic (1% & 3% head drop) will be drawn & value of NPSH at rated flow corresponding to "Design point" will be the requirement of the pump. BFP: ,NPSH (R) test shall be carried out on one Boiler Feed Pump and one booster pump using cold water at pump flows of 25%, 50%, 80%, 100% and 125% of Design Flow at Design Speed. This shall be done at 3% head break by Suction Throttling Procedure. Plots will be made for NPSH vs head developed by 1st stage for all flows. From the plots NPSH values corresponding to 1% & 3% head drop will be determined for all the above % flows. Finally, Flow vs NPSH characteristic (1% & 3% head drop) will be drawn & value of NPSH at rated flow corresponding to " Design point" will be the requirement of the pump.	.NPSH(R) test already done for the same model will be submitted for review and acceptance by Customer. If NPSH(R)already done for the same model, it is not envisaged to repeat the test. Bidder understand that, NPSH Test shall be performed at 3% head break by Suction Throttling Procedure. NPSH test at 1% head drop not envisaged	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 886 of Clarification 02.
306	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-10 CONDENSATE EXTRACTION PUMP	Page 2 OF 2		CEP: 1) Quantum of In-Process Checks/ Tests is 100% until & unless specified otherwise.	In process checks will be done 100% asper manufacturer standard practice and bidder will also witness the major tests, but the major inprocess checks will be offered to NTPC for 1 pump and and 100% final inspections will be offered to NTPC for witness.	Bidder to follow the technical specification requirements.Detailed test requirements shall be discussed during MQP finalisation.
307	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-12 BOILER FEED PUMP	Page 3 of 5	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further, the similar query has been responded in Clarification 01B of Sipat-III EPC Package (under bulk tender) at SN 170 & 171. Bidder to comply.
308	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-12 BOILER FEED PUMP	Page 3 of 5		BFP; Type tests mentioned (NPSH, Pressure pulsation & Axial thrust measurement in the specification.	BFP; Type tests mentioned (NPSH, Pressure pulsation & Axial thrust measurement) already done for the same model then the reports will be submitted for review.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer SN 888 of Clarification 02.
309	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB SECTION-E-13 RAW WATER SYSTEM (MECHANICAL)	Page 2 of 12 Page 7 of 12 Page 10 of 12	3) x xo vii ix	Hydraulic Test: 100%, 1.5 times the design pressure or 2 times the working pressure whichever is higher 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 Hydraulic Test	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 889 . Bidder to comply

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
310	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-17 AC AND VENTILATION SYSTEM(MECH	Page 2 of 3	3.04.00	3.00.00 CENTRIFUGAL PUMP: 3.04.00 Standard Running Test i) All pumps shall be tested in the manufacturer's works preferably with contract motor (or as specified in Engg Tech spec) for capacity, efficiency, head and brake horse power.	As per standard Manufacturer practice, pumps will be tested either contract motor or Calibrated shop motor.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 891 . Bidder to comply
311	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-59 QA Civil Works	Page 5 of 6	A. Fabrication Works B. Erection Works at site	CW LINER/DUCT: NDT by RT in various Options	It is proposed to carryout UT instead of RT	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 890 . Bidder to comply
312	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION E-59 CIVIL WORKS	PAGE 4 OF 6	II	(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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 891 . Bidder to comply
313	TECHNICAL SPECIFICATION SECTION-VI, PART-D	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 2 OF 71	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 / IIOT sensors duly password protected with a connectivity to remote server /Cloud .	Presently IBR inspectors accept only physical/hardcopy chart Digital Recorders with chartless recorder / IIOT 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 digitalSmart 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 we work this initiative as part of digital joirney, 10% of FWS may be used with such system	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 893 . Bidder to comply
314	TECHNICAL SPECIFICATION SECTION-VI, PART-D	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 42 OF 71	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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 894 . Bidder to comply
315	TECHNICAL SPECIFICATION SECTION-VI, PART-D	Part D ERECTION CONDITIONS OF CONTRACT	PAGE 3 OF 71	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 imact of use of existing method welding while operation of plant.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 895 . Bidder to comply
316		SUB SECTION-A-08 Power Cycle Piping	(c)	PAGE 5 OF 19	2. Supplementary requirement S5: 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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 896 of Clarification-02 of the same.

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
317	GENERAL TECHNICAL REQUIREMENTS SECTION - VI	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. c) Bidder understand, Items specified in the specification of E-60 Sub Vendor list, additional vendor approval will be submitted to customer. Other items are purchased based on bidders vendor approval process, no separate approval from customer envisaged	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 897 . Bidder to comply
318	GENERAL TECHNICAL REQUIREMENTS SECTION - VI	QACP (QA Coordination Procedure)	Page 3 of 7		13 d) Inspection Calls d) Inspection Calls: Bidder shall give inspection call to the respective Employer QA&I RIO in Windsor-X system. For foreign inspection calls Main Contractor shall give inspection call to Employer QA&I (in Windsor-X system) Coordinators and through email as well, as per following schedule:- i. Supplier of Indian origin : 15 working days	Considering the Project cycle time, Bidder considers the follwing inspection notification time; i. Supplier of Indian origin : 7 working days	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Further the similar query has been responded in clarification 2 of sipat III EPC Pkg at Sl no 898 . Bidder to comply
319	SECTION – VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	PAGE 29 OF 69	5.10.00	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.	Bidder would like to clarify that, there is limited exposure in Geopolymer based concrete within India and experincing in quick setting within 30-40 min with crack developement afterwards. This concrete is still under developement and esatblishment stage for its usage in Permanent Road works. Bidder request to consider Cement based Pavement quality concrete road also.	Bidder to refer amendment no. D1B-01, D1B-2, D1B-03 In this regard
320	SECTION – VI, PART-B	SUB-SECTION-D-1-5 CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	PAGE 30 OF 69	5.10.00.01	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 semimechanized methods may be permitted around BTG area provided acceptance criteria as per MORT&H specification is achieved.	Bidder would like to clarify that, there is limited exposure in Geopolymer based concrete is having low workable period & quick setting within 30-40 min. It is quite dificult to do with fully mechanized pavers fitted with electronic sensors within such low time. Owner is requested to allow aying /placing of Concrete DLC and PQC manually with hand-guided means or by semimechanized methods In case of geo-polymer concrete.	Bidder to refer amendment no. D1B-01, D1B-2, D1B-03 In this regard
321	SECTION – VI, PART-B	SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION	PAGE 3 OF 20	8.01.02.29	Interlocking concrete block confirming 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.	Owner is requested to allow cement concrete based interlocking concrete blocks/kerb blocks/Precast blocks confirming to respective standards.	Bidder to follow technical specification
322	SECTION-VI, PART-B	SUB-SECTION-D-1-8 CIVIL WORKS GENERAL SPECIFICATION	PAGE 4 OF 20	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 is 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's proposal reviewed but not accepted. Bidder to comply with tender requirement.

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
323	SECTION-VI, PART-B	SUB-SECTION-D-1-10 CIVIL WORKS MATERIAL SPECIFICATION	PAGE 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 ashbased 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.**	Bidder's query is not clear. Bidder to follow technical specification.
324	SECTION – VI, PART-B	SUB-SECTION--E-59 QA CIVIL WORKS	PAGE 3 OF 4	2.00	2.0 LABORATORY AND FIELD TESTING The field laboratory for QA and QC activities …. The contractor shall establish the requisite laboratory equipment/set up and skilled QA&QC manpower within 30 days from the mobilization date of Main contractor at site.	Bidder would like to clarify that, Skilled QA& QC manpower will be mobilized at site as per discipline wise work progress,	Setting up of Site lab with skilled QA / QC manpower within 30days from mobilization date of main contractor at site is requred for minimizing delays in testing and adversely affecting site work progress. Also well equipped lab and manpower reduces non confirmity from approved quality plans. For discpline wise QA & QC manpower requirement, provision is already envisaged in indicative FQP. Hence Bidder has to follow the Technical Specification reqirements
325	SECTION-VI, PART-A	SUB-SECTION-D-1-7	PAGE 15 OF 25	8.07.01.4	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.	In case of already qualified welders are available then those welders Qualification certificates will be shared with Customer and those will be deployed for welding without any re-qualification.	Bidder's proposal is not acceptable
326	SECTION-VI, PART-A	SUB-SECTION-D-1-7	Page 15 OF 25 Page 16 OF 25	8.07.01.5 8.07.01.6	b) Production Test Plate 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. a) Fillet Welds ii. Macroetch examination on production test coupons for main fillet weld with minimum one joint per built up beam, column, and crane girder, etc. b) Butt Welds iii) Mechanical testing of production test coupons - minimum one joint/built up beam, column and crane girder.	Qualified WPS and PQR with Welder Qualification (WPQ) performed as per reference standard. Qualified WPS/PQR/WPQ will be used in lieu of performing PTC As Qualified WPS/PQR/WPQ along with NDT will provide integrity and strength of the material	Bidder's proposal is not acceptable
327	SECTION VI, PART- B	SUB SECTION-B-02 MOTORS	10.01.00	PAGE 3 OF 4	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 elastimold type terminations	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 910 of Clarification-02 of the same.
328	SECTION VI, PART- B	SUB-SECTION-B-03 VFD	28.02.00	PAGE 10 OF 11	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 911 of Clarification-02 of the same.
329	SECTION VI, PART- B	SUB-SECTION B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	1.11.02	PAGE 19 OF 36	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 600076-5, annexure B will be considered	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 912 of Clarification-02 of the same.

Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
330	SECTION VI, PART- B	SUB-SECTION B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	1.11.04	PAGE 25 OF 36	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 913 of Clarification-02 of the same.
331	SECTION VI, PART- B	SUB-SECTION B-04 TRANSFORMERS AND ASSOCIATED MAINTENANCE, MONITORING & TESTING EQUIPMENTS	1.11.04 Sr. No 31	PAGE 23 OF 36	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	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 914 of Clarification-02 of the same.
332	SECTION-VI, PART-A,	SUB-SECTION-I-A PROVENNESS / NUMERICAL RELAYS & NETWORKING	5.8.0	Page 31 OF 42	1.1 Bidder/ Sub Vendor should have manufactured and supplied and successfully configured at least one hundred (100) numbers of Numerical Relays with IEC 61850 used for application in Feeder Protections/Transformer Protections/Motor protections. These relays should have been in successful operation for at least two (2) years. 1.2 Bidder/ Sub Vendor should have manufactured/ integrated and successfully done Site Acceptance Test (SAT) for a network on IEC 61850 with at least one hundred (100) numbers of Communicable Numerical Relays.	Bidder would like to clarify under make in India Scheme , above qualificiaition for parent company to be considered	Bidder proposal is reviewed and not acceptable. Bidder to follow specification requirement.
333	SECTION-VI, PART-A,	AUXILIARY OIL FILLED TRANSFORMERS AND HT TRANSFORMERS	5.12.1	PAGE 31 OF 42	Bidder/Sub-Vendor should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).	Bidder would like to clarify : (Except Short circuit and Impulse test): Clarificaiton : Impulse test is a Type test and same can be done at Third Party lab	Bidder proposal is reviewed and not acceptable. Bidder to follow specification requirement.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
334	SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	6 of 8	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 H2, CO2 and N2 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 H2, CO2 and N2 for Generator) and essential chemicals shall be supplied by Bidder till Full Load/COD whichever is earlier.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 477 of Clarification-02 of the same.
335	SECTION – VI, PART-A	SUB-SECTION-D-1-5 CIVIL WORKS	6 of 8	2.01.00	Development of Bidders temporary staff colony and worker colony along with toilets & fencing etcFor safety of worker, bidder to provide separate approach road for their movement, as per site conditions, which shall be completely isolated from material movement road/path. No material movement shall be allowed on approach road meant for worker colony. Sole responsibility of development and maintenance of above facilities for construction workers hired by the Contractor or his sub-contractors shall rest with the Contractor. Land, water, electricity for the worker & staff colony shall be arranged by the Contractor as stipulated elsewhere in Technical Specification.	For construction of labor colony Land of 30,000 SqM may please be provided by customer within plat premises/in proximity of plant premises free of all charges. Apart from this ownner may kindly provide adequate water, electricity fuel supply, sanitation, fire prevention and fire-fighting equipment for contractor's staff and labour free of all charge	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 478 of Clarification-02 of the same.
336	SECTION – VI, PART-A	SUB-SECTION-D-1-5 CIVIL WORKS	6 of 8	2.02.00 (3)	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.	Owner may please provide land free of charge for 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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 479 of Clarification-02 of the same.
337	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 I/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 I/c / Safety Officer of NTPC will also issue a notice in this regard to the contractor.	Owner is requested to delete the penalty clause. No penalty shall be imposed on contractor as mentioned in the clause.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 481 of Clarification-02 of the same.
338	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 costumer's responsibility.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 482 of Clarification-02 of the same.
339	SECTION – VI, PART-A	SUB-SECTION-IIB ELECTRICAL SYSTEM / EQUIPMENTS	11 OF 20	1.16.04.(Point l)	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.	Since, the underground facilities are not visible, the underground facilities to be modified/ re-routed/ dismantled may please be taken care by the Owner. Hence, Scope of dismantling may please be deleted from bidder's scope. If above proposal not acceptable to customer,please share the details (drawing, quantity in nos., weight in tonnage etc.) for any existing above and below ground facilities which are to be dimolished/ rerouted/ reinstalled/dismantled.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 8 of the same.
340	SECTION VI, PART- B	SUB-SECTION E-59 QA 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 kindly be allowed without any approval from NTPC after the award.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 177 of Clarification 01 the same.

341	SECTION VI, PART- B	SUB-SECTION E-59 QA CIVIL WORKS	2-3 of 6	4.0 (b)	In case of non-availability of certain steel section/s i.e. Angle smaller than 100x100x10 mm, MS flats, rounds, square bars and chequered plate from above acceptable primary steel producers, an option is given to the Main contractor to source these sections directly from SAIL Conversion/Wet Leasing agent subject to the conditions given at point no. A) below:-------	Procurement from BIS APPROVED SOURCES HAVING VALID BIS LICENCE may kindly be allowed without any approval from NTPC after the award.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 178 of Clarification 01 the same.
342	SECTION VI, PART- B	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL, SUB-SYSTEM:SG(MECH)	4 of 25	15	-	Procurement from BIS APPROVED SOURCES HAVING VALID BIS LICENCE may be allowed without any approval from NTPC after the award.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 179 of Clarification 01 the same.
343	SECTION-VI, PART-A	SUB-SECTION–I-A, Proveness	32 of 35	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/Nuclear Power Plant, Earth work in filling involving mechanical compaction and cutting in rock, piling, Main power house building and Foundation for Turbo-generator..--- ---	For civil work proveness criteria - subagency through consortium to be allowed. For civil work proveness criteria work in any infrastructure project may kindly be considered.	Bidder's proposal is not acceptable
344	SECTION-VI, PART-A	SUB-SECTION–IA	32 of 35	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/Nuclear Power Plant, Earth work in filling involving mechanical compaction and cutting in rock, piling, 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 & structuralworks 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
345	SECTION – VI, PART-A	SUB-SECTION-IID CIVIL WORKS	8 OF 8	2.03.00	Bidder shall use a Lay down area as shown in tender GLP drawing. area marked in GLP totalling 50 acres (approx.) are identified as laydown /preassembly area. Fencing of the laydown area in the area marked for laydown is in bidder's scope.	Owner may please provide encumbrance free land (70-75 acre approx.) suitably marked in the plot plan free of charge for temporary offices, fabrication yard, and storage facilities within plant boundary. Incase any additional land is required to construction/erection facility like lay -down, pre asssembly,offices outside plant shall also be arranged by Owner . Kindly confirm	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no.709 of Clarification-02 of the same.
346	ERRATA TO SECTION VI TECHNICAL SPECIFICATIONS	Amendment 03 to Technical Specifications (Section VI)	611 of 700	D3-59	**No additional land** than what is mentioned in technical specifications, shall be pro vided by Owner for site fabrication. Bidder has to make all necessary arrangements of land, electricity, water, security, etc. on its own. No claim, whatsoever, regarding time extension and financial implication for site fabrication shall be entertained at any point of time.		
347	SECTION – VI, PART-A	SUB-SECTION–IIA-21 (SOLAR P.V.)	pdf pg 575 of 953	bullet point 3	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.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 492 of Clarification-02 of the same.
348	SECTION – VI, PART-A	SUB SECTION IIA-11 CW SYSTEM	3 of 4	1.04.0 (8)	Supply of all chemicals and O&M for complete CW Treatment System for one (1) year operation after PG test including first fill for all the units, etc. for the complete plant as per system requirement and as specified.	Owner is requested to delete the scope of O &M from the scope of the bidder.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 493 of Clarification-02 of the same.

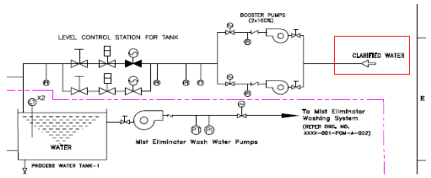
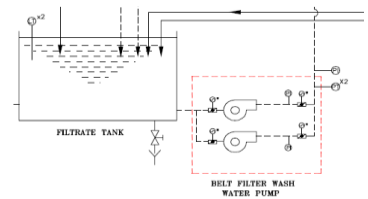
349	SECTION – VI, PART-A	SUB-SECTION-IIC CONTROL & INSTRUMENTATIO N SYSTEM	18 OF 19	25.00.00	Comprehensive Annual Maintenance Services (AMS) for three (03) years after warranty period shall be provided for the following system 1. Distributed Digital Control, Monitoring & Information System (DDCMIS) 2. Analyzer instruments of DM / PT, LET, Chlorination (ClO2), CWT and CPU plant. 3. CEMS and EQMS 4. Public address system (PA) 5. Wireless Instruments & System including fieldbus instruments 6. Closed circuit television system (CCTV)	Owner is requested to delete the scope of three years Annual Maintenance Services (AMS) from the scope of the bidder.	Bidder to refer to resolution against Sr. no. 494 of EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES ON SECTION VI TECHNICAL SPECIFICATIONS (CLARIFICATIONS-02). Bidder's request is not acceptable as Comprehensive AMS for the indicated systems is required considering the Owner's perspective and is not a new stipulation. Bidder to comply to the Technical Specifications in toto.
350	SECTION – VI, PART-A	SUB-SECTION-IID CIVIL WORKS	1 OF 8	1.00.00	Site clearance including cutting of trees of girth less than 30 centimeters. Cutting of trees of girth more than 30 centimeters shall be done by the owner. However, removable and disposal of roots, trees of girth less than 30 centimeters and other vegetations in the bidder scope.	The land with approach for disposal shall be identified and arranged by the Owner within maximum leads upto 5 Km from Plant boundary free of all cost.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no.495 of Clarification-02 of the same.
351	ERRATA TO SECTION VI TECHNICAL SPECIFICATIONS	Amendment 01 to Technical Specifications (Section VI)	45 of 700		Site clearance including cutting of trees of girth less than 30 centimeters. Cutting of trees of girth more than 30cm shall be done by the Owner after finalization of GLP. However, removal and disposal of roots of trees of all girths (including trees of girth less than 30cm or more) and other vegetation is in Bidder's scope		
352	SECTION – VI, PART-A TECHNICAL SPECIFICATION SECTION-VI, PART-A	Annexure- C to subsection II C SUB-SECTION-I-A PROVENNESS	20 of 21 31 of 35	N(1) 6.6 (f)	Safety Control Room: 1) IP based PTZ dome camera (HD)(wired/wireless) Proveness Criteria: The combination of offered make of IP based camera and offered make of video management software, for CCTV system, should have been in successful operation for a period of not less than one (1) year in a large industrial setup viz power plant, cement plant, petroleum refinery, steel plants or coal mine, having installation of minimum forty (40) nos. cameras.	As per Bid condition readiness of safety control room is Criteria for processing of RA bill, in view of above it is proposed that Camera with same specificaton shall be installed for safety control room however Provenes shall shall not be established at that time. Bidder's RA bills shall be processed without establishment of Proveness Criteria. Further, Proveness shall be established at the time of installation of O &M cameras as both has to be interchangable and earlier cameras shall be taken back by bidder.	Bidder to refer to resolution against Sr. no. 497 of EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES ON SECTION VI TECHNICAL SPECIFICATIONS (CLARIFICATIONS-02). Bidder's proposal is not accepted .Bidder to comply to the technical specifications.
353	SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	5 of 8	4.02.00	Pre-commissioning and commissioning activities Commissioning Fuel	Calorific Value and other parameters of Fuel Oil and Coal should be specified and same may please be incorporated in the formula for arriving at corrected coal quantity to be issued free of cost.	Reply to this query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 498 of Clarifications 02.
354	SECTION – VI, PART-C	GENERAL TECHNICAL REQUIREMENTS	44 of 119	26.02.00	**Initial Operation:** …(b) The 'Initial Operation' of the complete facility as an integral unit shall be conducted for 720 continuous hours. During the period of initial operation of 720 hours, the contractor shall conduct the trial run as per clause 26.05.00 to demonstrate the compliance to the requirements as stipulated in the CERC (Indian Electricity Grid Code) Regulations, 2023. The Initial Operation shall be considered successful, provided that each item/part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.	Operating parameters shall be within specified limits and at or near predicted performance provided necessary boundary conditions are met at the least. Hence, this portion of this clause may be modified as below. The Initial Operation shall be considered successful, provided that each item/part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility **subject to the condition that specified boundary/battery limit conditions are met and fuel oil and coal with specified characteristics are fired.**	Reply to this query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 499 of Clarifications 02.

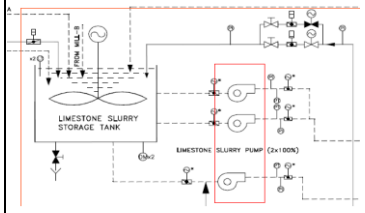
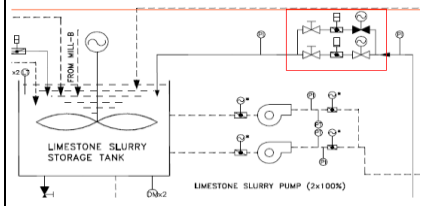
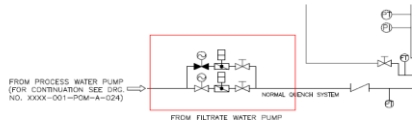
355	SECTION – VI, PART-A	SUB-SECTION-IV FUNCTIONAL GUARANTEES	11 of 73	1.01.03.02 (e)	Unless otherwise specified, the guarantees shall be based on design coal firing with coal/ ash analysis as given in the table at Annexure-IV-2, Sub-Section-I-B (Project Information) of Part-A of Technical Specification. The performance guarantee test will be carried out along with the Initial Operation of facilities or as per the time frame specified for a particular equipment/ plant/ system in the Technical specifications. Delay in conductance of the test beyond this period will not be normally permitted by the EMPLOYER. In the event of EMPLOYER agreeing to conductance of such tests after Initial Operations, for reasons not attributable to the EMPLOYER, as assessed by the Employer, no factor for ageing shall be considered for computing performance of the equipment.	This clause should specify a way out or suitable compensation if Employer is not able to fire design coal. Firing coal beyond specification may cause accelerated deterioration of equipment and same may be economically irreversible. This situation may lead to potential loss, both direct and indirect, to bidder. Owner is requested to delete the clause.	Reply to this query is already included in the section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Calrifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 500 of Clarifications 02.
356	General				Excavated earth disposal	NTPC to confirm the availablity of land for disposal along with approach road at the start of the project. Employer may also provide lead distance upto disposal site.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 504 of Clarification-02 of the same.
357	General				2 Nos. of material entry/exit gates requied	NTPC to confirm the exact location of entry gate and material gate in GLP. These should be provided near bidders identified storage yard. Further there should be no hinderance (viz. Overhead transmission line etc.) from Entry gate till Construction site/storage yad/Fabrication yard etc. Owner may kindly confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 505 of Clarification-02 of the same.
358	General					Start up power (Electrical Power) for charging the station transformer and onward testing, commissioning, Initial operation, Trail run, Full load , performance guarantee test and running the plant in any other condition shall be provided by Owner free of all charges.	Bidder's understanding is correct.
359	General					Raw Water for testing, commissioning, Initial operation, Trail run, Full load , performance guarantee test, and running the plant in any other condition shall be provided by Owner free of all charges.	Raw/Construction water may be supplied at one point on chargeable basis based on availability. Rate of the same shall be decided by NTPC based on the cost to NTPC, which shall be intimated during the execution stage.
360	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	6 OF 8	4.03.00	All the consumables and one year topping requirement of consumables such as greases, oil, lubricants, servo fluids / control fluids, gases (excluding H2, CO2 and N2 for Generator) and essential chemicals 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. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.	Bidder under stand **chemicals for BOP packages** (viz. ETP, STP, DM Plant, Pre Treatment Plant, CPU plant,CWTP etc.) is not part of this clause. Further, BOP Chemicals shall be supplied by Bidder till Full Load/COD whichever is earlier. Kindly confirm	Bidder to supply all essential chemicals to put the equipment covered under the scope of specifications into successful commissioning / initial operation and to establish completion of facilities. Bidder to comply with tender requirements.
361	SECTION-IV (GCC)	NTPC SAFETY RULES/Sect-I	22 (pdf pg 372 of 524)	26	Any Heavy equipment (crane, winch machine, etc.) manufactured less than 15 years from the current year shall be only allowed to be used at our project Site's. Pre-safety Inspection of the equipment by safety deptt. shall be done before mobilizing the equipment at our project site.	Owner is requested to delete the clause and allow the follwing criteria for deloyment of Heavy Equipment (Crane, winch, Machine etc.):- Any Heavy equipment (crane, winch machine, etc.) after Third Party inspection by competent authority shall be only allowed to be used at our project Site's. Pre-safety Inspection of the equipment by safety deptt. shall be done before mobilizing the equipment at our project site.	Bidder's proposal reviewed but not accepted. Bidder to comply with tender requirements.
362	TECHNICAL SPECIFICATION SECTION – VI, PART-D	ERECTION CONDITIONS OF CONTRACT	31	44.22.j)	Availability of Fire Tender shall be ensured by contractor before start of construction work	To cater emergency situation at construction activity, bidder shall ensure availability of sufficient no. of Fire extinguisher at working location at project site. However, if required bidder will tie up with local fire tender department viz. Fire department and/or available local agencies at project site to cater any eventuality. Hence, owner is requested to delete the clause.	Bidder's proposal reviewed but not accepted. Bidder to comply with tender requirements.

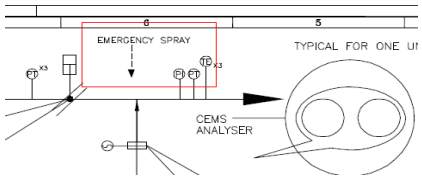
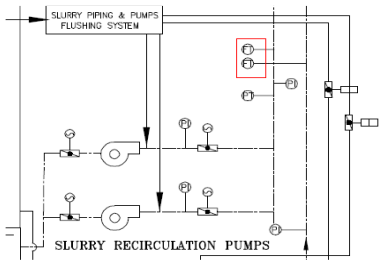
363	Site Visit					Bidder request NTPC for proper entry to site & Storage yard/lay down area. The complete land for Stage-III is in MGR bulb wherein only two entry points are available. One is underpass which is very low in height and material/T&P movement is not possible throuh it. Second access is above ground, howver, the MRG rail has to be crossed for that and we envisage following difficulties : 1) Each Consignment has to cross MGR Rail crossing with overhead transmission line as height of underpass is too low. Due to the Overhead transmission line each of the ODC may be stranded at the aforesaid rail crossing. It is most likely that the transmission line has to be removed for few of the ODC consignments. Due to retention of vehicles, contractor will have to pay huge demurrage charges also to its transporter as hydraulic trailers carrying ODC consignment have very high demurrage charges. 2) During Peak erection time, movement of vehicles will be hindered due to Railway crossing and this may lead to long queue of vehicles within existing plant. 3) 20 Acre of laydown area is outside MGR. Movement of erection material/equipment from that area to the erection site is difficult. This has safety issues also. NTPC is requested to provide clear access to the site/storage/laydown area. If hinderence free entry is not provided , Bidder request NTPC to arrange any type of clearance/ liasoning/ associated fees etc. with appropriate authority for shutting down the transmission line or removing and re-connecting the line (if required) by railway approved vendors for movement of /ODC Consignment/Plant/ Machinery etc. at their end. Any delay in arranging the permission shall not be attributable to bidder. Any cost incurred by bidder due to retention of vehicles/ demurrage charges etc. shall be reimbursed by Emoloyer. Owner may kindly confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 649 of Clarification-02 of the same. Further, for ODC consignment requiring removal of MGR overhead transmission line inside the plant, bidder may note that the employer shall make necessary arrangements for facilitating movement of the same.
364	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	7 OF 8	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 vendor / contractor is expected to carry out the 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. 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 charted accountant once every fiscal year.Such activities will be undertaken by the contractor / vendor in consultation with the Employer	Bidder have their own CSR policy in conformance with extant requirements under the Companies Act 2013, the Companies (CSR Policy) Rules, 2014, as amended from time to time. All CSR activities are being carried by bidder as per the aforesaid CSR policy. **Hence , no certification is required .** **Hence, bidder request Owner to delete this clause .**	Bidder's proposal reviewed and not accepted. Bidder to comply with tender requirements.

365	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	7 OF 8	4.10.00	The vendor / contractor shall visit the site to ascertain the position of land acquisition etc. and it is presumed that the contractor submitted his bid after considering the facts on the ground and that once vendor / contractor is successful in his bid, he will work in cooperation with the client for smooth execution of the project	Resolution of all land acquisition related issues shall be directly dealt by customer. Customer shall hand over clear encroachment free land with boundary / fencing to bidder for execution of project work at site. No responsibilities lies with the bidder in this regard. Hence, bidder request Owner to delete this clause .	Provisions of Bidding Documents shall prevail.
366	SECTION – VI, PART-C	GENERAL TECHNICAL REQUIREMENTS	46 of 119	26.05.00 (v)	v) Primary response through injecting a frequency test signal with a step change of ±0.1 Hz at 55%, 60%, 75% and 100% load. Provision of injecting external frequency test signal in control system for primary frequency response testing shall be in the contractor's scope.	Deputatio of CERC approved vendor shall be in owner's scope. However bidder shall provide all necessary assistance.	Bidder's understanding is correct. Bidder to further note that the Technical Specification requirements are clear and the same shall be followed.
367	SECTION - VII,BOOK 3 OF 3 (PART-1B)					As additional tender documents viz." EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES ON ECTION VI TECHNICAL SPECIFICATIONS (CLARIFICATIONS 01 & 02" & ERRATA TO SECTION VI TECHNICAL SPECIFICATIONS (Amendments 1 to 11 has been provided with bid document. NTPC to indicate proper Order of precedence as the same clause of the specification has been revised at a number of clarification, amendment & errata. During bid preparation & contract execution it is not possible to locate the latest modified requirement under that clause.	Bidder to refer Sl. No. 91 of Clarification-1B issued for Sipat-III (1x800 MW) EPC Package (under bulk tender) in this regard.
368	General				Approach road to construction site shall be done by NTPC.	Bidder understands Owner will provide roads and approach roads upto the Main Plant for construction material, plant and equipments, ODCs etc upto main gate. NTPC may kindly confirm	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 503 of Clarification-02 of the same.
369	TECHNICAL SPECIFICATION SECTION -VI, PART-B	SUB SECTION E-24 FIRE PROTECTION SYSTEM	4 of 4	1.09.00.c(1),c(2)	(c.) Welding of Pipes:		Bidder to follow technical specifications.
					(1.) ERW Black / rolled welded:	(1.) ERW Black / rolled welded:	
					100% DPT on root of butt and finish weld of butt and fillet. RT on 10% randomly selected joints shall be carried out (for underground piping).	10% DPT on finish weld of butt.RT on 5% randomly selected joints shall be carried out (for underground piping)	
					(2.) GI Pipes	(2.) GI Pipes	
					Welding on GI Pipes in general shall not be done. Welding of GI Pipes, if permitted by design, (butt / socket / fillet weld) shall be done strictly as per approved drawing and procedure approved by NTPC Engineering. For all such welds 100% DP test and random 1% RT shall be done.	Welding on GI Pipes in general shall not be done. Welding of GI Pipes, if permitted by design, (butt / socket / fillet weld) shall be done strictly as per approved drawing and procedure approved by NTPC Engineering. For all such welds 10% DP test and random 1% RT shall be done.	
370	TECHNICAL SPECIFICATIONS SECTION – VI, PART-A BID DOC. NO.	SUB-SECTION-IIC CONTROL & INSTRUMENTATIO N SYSTEM	16 OF 19	11.03.00	All the chemicals and reagents required for initial commissioning and warranty period (18 months operation after successful commissioning) of SWAS is to be supplied in phased manner depending on shelf life, in addition to that indicated under mandatory spares. Contractor shall initially supply reagents for two months operation, further supply shall be based on commissioning schedule of Units and confirmation by site Engineer. Contractor to provide shelf life of all reagents during detail Engineering. All the reagents supplied to site shall have at least 90% of remaining useful life at the time of dispatch	All the chemicals and reagents for SWAS system shall supplied till I Full Load/COD whichever is earlier.	Bidder's proposal is not acceptable. Bidder to comply to the Technical Specifications.

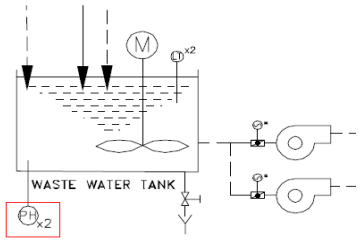
Sr. No.	Section / Part	Sub-section / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	NTPC's Clarification
371	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-E-6 POWER CYCLE PIPING	Page 2	1.01.00	(h) Non-destructive examination of welds shall be carried out in accordance with the relevant design/manufacturing codes. However, as a minimum, the following requirements shall be met. Further statutory requirement, wherever applicable shall also be complied with. (1) Temperature > 400 Deg, C or pressure exceeding 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds. (ii) 100% MPE. (2) Temperature > 175 Deg, C upto 400 Deg. C or pressure exceeding 17 bar and upto 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds for pipe dia. more than 100 NB. (ii) 10% RT/UT on butt welds and full penetration branch for pipe dia up to 100NB. (iii) 100% MPE.	If any of the piping falls under vent piping then the following NDT will be carrid out. (i) 10% RT /UT on butt welds and full penetration branch welds (ii) 100% MPE or DPT	Bidder's understanding is not correct. Technical specifications are clear in this regard, bidder to comply.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	Employer's response
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
372	VI / A	Attachment 3K	63 of 361	1	1. If qualification sought as per clause 4.26.1 then the details of the sub vendor (manufacturer) shall be filled by the bidder in the format A to G. 2. If the qualification sought as per the clause 4.26.2, then the details of JV/Subsidiary Company formed for manufacturing of such equipments in India shall be furnished individually for each equipment by the bidder such as	We conduct open tender process with NTPC QR condition for procurement of FGD BOI. Therefore, Attachment 3K, which pertains to FGD BOI components such as Agitators, Slurry Recirculation Pumps, etc., will be submitted after the award of the contract. Please accept.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 96 of Clarification-01 of the same.
373	VI / A	IB	11 of 19	Annexure-IV-2	DOMESTIC COAL CHARACTERISTICS	Kindly provide chloride/fluoride value in coal or HCL/HF conc. in absorber inlet flue gas for FGD design.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 98 of Clarification-01 of the same.
374	VI / A	IB	3 of 19	13.02.00	**CW system blow down water shall be used for** plant service water requirement, dust suppression system of coal handling plant fire water tanks, **FGD (process water)** facilities, sealing of Vacuum pumps (if applicable) of Ash Handling plant. **Make-up to** AHS Cooling system, HVAC System & **FGD system** shall be met from PT plant of CW system (PT-CW). The waste service water collected from various areas and coal laden water from coal handling plant shall be treated as per requirement and reused. The quality of Raw water is given in this sub-section at Annexure-III-A, and III-B.	Source of FGD process water/make up water mentioned in two clauses are contradictory to each other. Kindly confirm whether source of FGD process water/make up water is from CW blowdown or from PT plant of CW system.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 99 of Clarification-01 of the same.
375	VI / B	A-05	24 of 29	13.01.00	Two (2) Process water Storage tanks (each tank catering to the requirements of 1 x 800 MW units) along with two numbers of 2x100 % Booster water pumps, if required, (Each pump catering to the process water requirements of 1 x 800 MW units) along with all necessary piping, valves, control & instrumentation **to feed the clarified water shall be provided by the Contractor**..... The **tank shall receive clarified water**	As per referred clause, FGD process water storage tank will receive clarified water. However, in another section of the tender specifications(VI/A-IB-13.02.00), source of FGD process water is indicated as CW blowdown water. Kindly clarify and confirm the source of FGD process water.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 100 of Clarification-01 of the same.
376	VI / E	Tender Drawing	34 of 91		Tender Drg. No. xxxx-001-POM-A-024 (zone E1) Scheme of Gypsum Dewatering System 	Source of FGD process water is indicated as clarified water in referred tender drawing. However, in another section of the tender specifications(VI/A-IB-13.02.00), Source of FGD process water is indicated as CW blowdown water. Kindly clarify and confirm the source of FGD process water.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 101 of Clarification-01 of the same.
377	VI / E	Tender Drawing	34 of 91	-	Tender Drg. No. xxxx-001-POM-A-024 (zone A7) Scheme of Gypsum Dewatering System 	In the tender drawing, it is observed that the belt filter wash water pump is drawing its suction from the filtrate tank. However, the filtrate tank contains slurry with solids, making the filtrate water unsuitable for belt filter washing. Hence, as per our proven practise, process water will be used for Belt filter washing. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 102 of Clarification-01 of the same.

378	VI / E	Tender Drawing	33 of 91		Tender Drg. No. xxxx-001-POM-A-023 (zone G3) Scheme of FGD Milling System 	In the tender drawing, it is depicted that there are 3 nos. of limestone slurry pumps for each limestone slurry storage tank. However, under Sec VI-A, Sub Sec IIA-04, clause 3.01.04, the tender specification says total 2 nos. of limestone slurry pumps for 1x800 MW to be provided. Kindly confirm the correct number of pumps to be provided.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 103 of Clarification-01 of the same.
379	VI / E	Tender Drawing	33 of 91		Tender Drg. No. xxxx-001-POM-A-023 (zone H2) Scheme of FGD Milling System 	In the tender drawing, it is shown that process water is added to the limestone slurry tank via control station. Adding process water to limestone slurry tank will dilute the limestone slurry contained in the tank. Hence, it is not recommend to add process water to limestone slurry tank. Please accept.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 104 of Clarification-01 of the same.
380	VI / E	Tender Drawing	32 of 91		Tender Drg. No. xxxx-001-POM-A-022 (zone D8) Scheme of FGD Absorber System 	In tender drawing, normal quench system is shown. However, in tender specification, there is no mentioning of normal quench system. As per our collaborator proven FGD design also, normal quench system is not applicable. Kindly clarify what is the purpose of normal quench system and if it is mandatorily required, kindly provide the specification for the same.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 105 of Clarification-01 of the same.
381	VI / E	Tender Drawing	32 of 91		Scheme of FGD-Absorber system: Note 6- All instruments in slurry lines shall be provided isolation valves and diaphragm.	Bidder does not recommend valves in the impulse lines of slurry pipes in order to keep the stub length as minimum as possible and to prevent slurry settlement/blockage issues. Bidder request NTPC to review and confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 106 of Clarification-01 of the same.
382	VI / E	Tender Drawing	32 of 91 & 34 of 91		Scheme of FGD-Absorber system & Scheme of Gypsum Dewatering system	At the common discharge line of Filtrate water pumps, Valve station and instruments are repeatedly indicated in both the schemes of absorber system and Gypsum dewatering system. Bidder understand that one set of instruments and a valve station are only to be provided. Bidder request NTPC to review and confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 107 of Clarification-01 of the same.

383	VI / E	Tender Drawing	32 of 91		Tender Drg. No. xxxx-001-POM-A-022 (zone H6) Scheme of FGD Absorber System 	Emergency Spray is indicated in the FGD bypass duct to chimney in zone H6 of tender drawing. Kindly clarify whether this Emergency Spray is required since this is not called for elsewhere in the tender specification. Please note that, for other NTPC tenders also, NTPC clarified that Emergency spray is not required vide pre bid replies.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 108 of Clarification-01 of the same.
384	VI / E	Tender Drawing	32 of 91		Tender Drg. No. xxxx-001-POM-A-022 (zone E2) Scheme of FGD Absorber System 	In tender drawing, Flow Transmitter is shown on the RC pump discharge header. Magnetic type flow transmitter is applicable for slurry and magnetic flow transmitter required minimum 5D/2D straight distance upstream and downstream of flow meter. RC pump header size is typically around 1.8 m. ~13 m Straight distance required for magnetic flow meter. As per RC pump piping layout, it is not possible to provide this much straight distance and hence it is not technically possible to provide flow meter in RC pump discharge header. Hence, kindly delete flow meter.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 109 of Clarification-01 of the same.
385	VI / A	IB	15 of 19	4	The above represent limestone quality to be considered for basic sizing and guarantees. Further the bidder is required to collect limestone samples from site for analysing is characteristic including reactivity. Bidder shall indicate in its bid the quantity of limestone required for such testing.	Kindly clarify whether limestone reactivity test is to be carried out after award of contract or before award of contract.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 110 of Clarification-01 of the same.
386	VI / A	IIA-04	1 of 7	1.02.00	In case of higher pressure /flow requirements are envisaged for instrument & service air and water Contractor shall make its own arrangement.	As per this clause, we understand instrument air & service air will be provided by customer upto certain predefined limit. Kindly specify the ceiling limit for instrument & service air.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 112 of Clarification-01 of the same.
387	VI / A	IIA-04	2 of 7	2.06.00	The waste water from the system shall be collected and neutralized using lime and shall be pumped to the mixing tanks of HCSD System or in any other area with **suitable treatment** so as to suit/ not disturb the destination fluid quality.	Kindly specify a. type of treatment required for FGD waste water and b. quality of waste water required after treatment so as to bring uniformity among bidders	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 113 of Clarification-01 of the same.
388	VI / A	IIA-04	4 of 7	4.01.04	2x100 heaters for absorber outlet gate & **bypass gate**	We understand that FGD bypass gate is not applicable. The reference to the bypass gate in this clause is a typographical error. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 114 of Clarification-01 of the same.
389	VI / A	IIA-04	4 of 7	4.01.09	Piping from gypsum bleed pumps to gypsum dewatering system, along with recirculation lines (if required) necessary isolation and **control valves**	Control valve is not required in gypsum bleed pump line as per our proven practise. All valves (as per tender P&ID) will be provided for gypsum bleed pump line. Please accept. If control valve is mandatory in gypsum bleed pump line, please inform the purpose of control valve and type of control valve required.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 115 of Clarification-01 of the same.
390	VI / A	IIA-04	5 of 7	7.00.00	PROCESS WATER& COOLING WATER STORAGE & PUMPING SCHEME	This section does not stipulate any specific requirement for cooling water storage. Kindly confirm whether cooling water storage is required. If cooling water storage is required, provide specification for cooling water storage if required.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 116 of Clarification-01 of the same.

391	VI / A	IV	1 of 73	1.00.01	All CAT-1 Performance Guarantee tests shall be conducted along with initial operation except following a) Coal Pulveriser Wear Parts Warranty b) Particulate Emission/ESP Efficiency, **FGD.**	Kindly specify when FGD PG test is to be done. Is it after completion of initial operation?	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 117 of Clarification-01 of the same.
392	VI / A	IV	20 of 73	1.01.07.01 note 5	Guaranteed Unit Auxiliary Power Consumption of FGD system shall be taken by considering the additional pressure drop in the FGD system during FGD SO2 removal efficiency test at specified guarantee point conditions. For this purpose, difference of FGD system pressure drop during FGD SO2 removal efficiency test and that at Unit Auxiliary Power Consumption test shall be loaded as additional Auxiliary Power Consumption.	We understand that if booster fan is not provided, difference in ID fan power consumption measured during FGD SO2 removal efficiency test and that measured during Unit Auxiliary Power Consumption Test will be considered for FGD Power Consumption on account of FGD pressure loss. If booster fan is provided, booster fan power consumption only will be considered for FGD power consumption on account of FGD pressure loss. Kindly confirm our understanding is right.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 118 of Clarification-01 of the same.
393	VI / A	IV	22 of 73	1.01.07.02 c)	c) FGD System i. Limestone Gravimetric feeder, Wet ball mill and their integral Auxiliaries ii. Vacuum Belt Filter, Vacuum Pump and its integral auxiliaries iii. Booster water pump iv. Waste water pump v. Limestone Slurry Tank Agitators vi. Filtrate Pump(s) vii. Belt Filter Wash Water Pump viii. Hydro-cyclone Waste Water Sump Pump and Waste Water Pump	Wet Ball Mill System and Gypsum Dewatering System along with their associated equipment do not run continuously and are operated in batch mode. As per ASME PTC 40, Bidder calculates duty factors based on running time of equipment at guarantee point conditions and accordingly guaranteed auxiliary power will be furnished. Please accept. Otherwise NTPC is requested to specify duty factors for equipment indicated at sl. no. i to viii.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 119 of Clarification-01 of the same.
394	VI / A	IV	22 of 73	1.01.07.02 c)	c) FGD System viii. **Hydro-cyclone Waste Water Sump Pump** and Waste Water Pump	The name of this pump (Hydro-cyclone Waste Water Sump Pump) is ambiguous, and we are unable to understand its intended purpose or service. We kindly request clarification	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 120 of Clarification-01 of the same.
395	VI / A	IV	30 of 73	1.03.03 iv)	Pressure Drop across FGD The contractor shall demonstrate that the total pressure drop in the gas path across the FGD System shall not exceed the guaranteed values for the range of coal and loads specified in the Technical Specification	FGD pressure drop is directly related to power consumption of ID fan or booster fans the case may be. There is guarantee for Auxiliary Power Consumption envisaged in the tender. FGD pressure drop is already accounted in auxiliary power consumption guarantee. Hence, we request NTPC to remove FGD pressure drop guarantee for this project in line with other NTPC tenders.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 121 of Clarification-01 of the same.
396	VI / A	IV	30 of 73	1.03.03 vi)	The contractor shall demonstrate that the purity of the gypsum produced shall not be less than 90%, chloride content shall not be more than 100ppm and the moisture content shall not be more than 10% for the range of specified coal(s) and based on CaO content of 51% in limestone.	As per sub section IV, limestone purity to be considered for Gypsum purity guarantee is CaO 51% =>**CaCO3 91%** As per Sub section IB, limestone purity to be considered for Gypsum purity guarantee is **CaCO3 89%** Both clauses are contradictory. Kindly clarify.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 677 & 678 of Clarification-02 of the same.
397	VI / A	IB	14 of 19	Notes. 1	Guaranteed parameters (guarantee on limestone consumption, auxiliary power consumption & gypsum purity) shall be based on available (reactive) CaCO3 content of 89%.		
398	VI / A	IV	30 of 73	1.03.03 vii)	The Contractor guarantees that the maximum purge flow rate to **waste water treatment system** from FGD system for 1x800 MW unit shall be less than 10m3/h averaged over a 24 hour period for a the range of specified coal(s).	As per this clause, we understand that waste water from FGD system is sent to waste water treatment system. However, We could not find requirement of FGD waste water treatment system in other sections of tender specification. Kindly clarify the requirement or details of FGD waste water system.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 122 of Clarification-01 of the same.
399	VI / A	IV	30 of 73	1.03.03 vii)	The Contractor guarantees that the maximum purge flow rate to waste water treatment system from FGD system for 1x800 MW unit shall be less than **10m3/h** averaged over a 24 hour period for a the range of specified coal(s).	FGD waste water purge flow quantity is arrived to limit chloride content in absorber slurry < 20000 ppm. Source of chloride in absorber slurry is mainly from coal. Kindly provide coal chloride content to check adequacy of FGD waste water purge flow quantity.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 123 of Clarification-01 of the same.

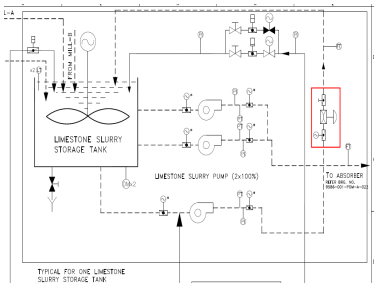
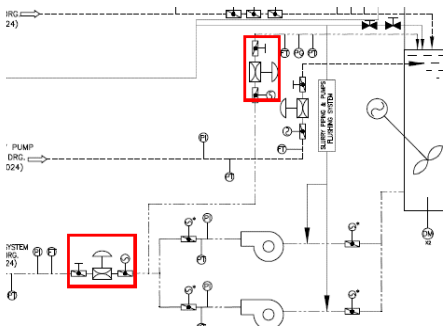
400	VI / A	IV	30 of 73	1.03.03 vii)	The Contractor guarantees that the maximum purge flow rate to waste water treatment system from FGD system for 1x800 MW unit shall be less than **10m3/h** averaged over a 24 hour period for a the range of specified coal(s).	FGD waste water purge flow of 10 m3/hr is too less for 1x800 MW unit. Bidder recommends that at least 15 m3/hr waste water purge flow per unit otherwise it will result in accumulation of high TDS/chloride content in the recirculated slurry which will impact FGD performance. NTPC is requested to review the clarification and provide necessary amendments.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 124 of Clarification-01 of the same.
401	VI / B	A-01	17 of 87	3 viii)	Pressure drop through FGD System 150mm WC or actual whichever is higher (Alternately, separate booster fans for FGD system may be provided. if pressure drop through FGD system exceeds 150 mm WC. In such case, specified pressure drop through FGD system shall not be considered for sizing of ID fan.)	We understand that separate booster is not mandatory even if FGD pressure drop is more than 150 mmwc. ID fan taking care of FGD pressure drop will be provided. Please confirm our understanding is correct.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 125 of Clarification-01 of the same.
402	VI / B	A-05	7 of 29	iv)	The slurry recirculation pumps shall have motor /pneumatic driven knife gate valve at pump suction.	Based on the proven practices of our collaborators, it is highly advisable to install a pneumatic butterfly valve at the suction point of the slurry recirculation pumps. Knife gate valves have a longer opening and closing time, approximately 5 minutes, in comparison to butterfly valves(15 sec). If a knife gate valve is used at the pump suction, it may cause delays in starting the recirculation pump, as one would have to wait until the suction gate valve is fully open. Please accept pneumatic butterfly valve at the suction point of the slurry recirculation pumps.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 126 of Clarification-01 of the same.
403	VI / B	A-05	9 of 29	5.04.00	Provision shall also be provide in the Gypsum Bleed Pumping system by provision of tap off, valves etc. for pumping the gypsum bleed to alternate source.	We understand that only provision for tap off with isolation valve will be provided in gypsum bleed pump discharge header pipe. Piping from tap off to alternate destination is not in bidder's scope. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 127 of Clarification-01 of the same.
404	VI / B	A-05	4 of 29	2.00.00	The complete installation of liners shall be made under the supervision of the liner supplier as per their guidelines.	Since absorber is made of C276 clad plate, no liner is applicable. Hence, clause related to "supervision of the liner supplier" may be deleted.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 128 of Clarification-01 of the same.
405	VI / B	A-05	19 of 29	7.07.05	In case Bidder opts to provide additionally Lamella separator before the waste water tank and after the secondary hydro cyclone for removing impurities from the system, the solids con-centration in waste water up to max 10% can be acceptable.	Kindly clarify whether Lamella separator (before the waste water tank and after the secondary hydro cyclone) is mandatory or not.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 129 of Clarification-01 of the same.
406	VI / B	A-05	19 of 29	7.07.07	A pH monitor shall be provided at the discharge of the pumps for measurement and control.	As per Part B, pH analyser to be provided at discharge of the waste water pump. As per Tender drawing, ph analyser to be provided in waste water tank. Both clauses are contradictory. As per our proven practise, ph analyser will be provided in waste water tank. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 130 & 131 of Clarification-01 of the same.
407	VI / E	Tender Drawing	34 of 91	-	Tender Drg. No. xxxx-001-POM-A-024 (zone F3) Scheme of Gypsum Dewatering System 		

408	VI / B	A-05	20 of 29	7.07.09	The lime storage silo shall be of minimum 24 hr capacity equivalent to the requirements of FGD system of **2x800 MW** at Design point and shall be complete with supporting steel structure, platforms, power operated outlet gates	2x800 MW mentioned in referred clause is typo error. It shall be 1x800 MW. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 132 of Clarification-01 of the same.
409	VI / B	A-05	20 of 29	7.08.01	Bidder to provide the portable pumps of suitable capacity to drain the remaining slurry from the tank in max 2 hour into absorber area sump.	As per our proven practise, by opening drain valves in absorber, remaining slurry in absorber will flow automatically by gravity to absorber area sump via trench within 2hrs. Portable pumps to drain absorber tank is therefore not required. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 133 of Clarification-01 of the same.
410	VI / B	A-05	21 of 29	8.04.00	All the slurry pumps shall be provided with motorized suction and discharge valves.	As per Part B, All the slurry pumps to be provided with motorized suction and discharge valves. However, the tender drawings allow for the provision of pneumatic valves based on the proven practices of the bidder for slurry pump suction/discharge. as per our proven practise, we will provide pneumatic valves for slurry pump suction/discharge. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 134 of Clarification-01 of the same.
411	VI / B	A-05	22 of 29	9.01.00	Contractor shall make arrangements for pumping the drainage water back to the respective system with 2x100% vertical sump pumps.	As per referred clause, 2x100% sump pumps to be provided. However, in tender drawings, only one no. sump pump is shown for each of the respective sumps. Both are contradictory. Kindly clarify.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 135 of Clarification-01 of the same.
412	VI / B	A-05	22 of 29	10.01.00	Slurry tanks: Replaceable Chlorobutyl/Bromobutyl rubber lining of minimum 5 mm thickness	We interpret that the lining material and lining thickness for slurry tanks, such as the limestone slurry tank, wastewater tank, filtrate tank, and secondary hydrocyclone feed tank, should conform to the specifications provided in their respective sections or headings. The lining material and lining thickness details mentioned in this clause are intended for other slurry tanks for which such specifics are not explicitly stated.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 136 of Clarification-01 of the same.
413	VI / B	A-05	22 of 29	10.01.00	Coarse-screen(s) at suction-side of slurry recirculation pumps shall be provided	Both clauses are contradictory. As per our proven practise, Suction screens shall be installed inside the Absorber vessel to protect the Slurry recirculation pumps. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 137 & 138 of Clarification-01 of the same.
414	VI / B	A-05	12 of 29	5.06.22	Suction screens shall be installed inside the Absorber vessel to protect the Slurry recirculation pumps.		
415	VI / B	A-05	25 of 29	14.03.00	An adequately sized manhole with platform (min. 2 sq. m) shall be provided above each spray level	Manhole size (min. 2 sq.m) asked in tender is very large and there is a risk of fall associated with larger manhole. As per our proven practise, manhole of size 600 x 900 mm is adequate and will be provided above spray level. Please accept.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 139 of Clarification-01 of the same.
416	VI / B	A-02	40 of 67	13.01.02 c	For flue gas ducts downstream of ESP, additional fly ash loading on the surface or for one tenth of duct full of ash or for maximum possible accumulation of ash in the ductwork, under	Kindly provide additional fly ash loading for absorber outlet duct upto bypass duct.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 140 of Clarification-01 of the same.
417	VI / B	A-01	20 of 87	1.05.14.01 a 3	Maximum Flue gas velocity from ESP out-let to chimney inlet shall be 15 m/sec.	We understand that maximum Flue gas Velocity for Absorber inlet duct and absorber outlet shall be 15 m/s. Please confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 141 of Clarification-01 of the same.
418	VI / A	IIA-04	2 of 7	3.01.05	On/Off type Diaphragm valves in Limestone circulation lines to be provided instead of pinch control valve.	Similar to limestone recirculation line, on/off type Diaphragm valves shall be provided in gypsum bleed pump recirculation line instead of pinch control valve. Please accept. Note. There is no requirement of control valve in recirculation line as per our proven design.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 142 of Clarification-01 of the same.

419	VI / B	A-05	4 of 29	3.01.00	5. Maximum flue gas velocity through the Absorber (M/sec) - Not more than 4 m/s at Design Point Conditions (not applicable for bubbling type absorber)	Gas Velocity inside the Absorber are design specific parameter and as per our DCFS FGD standard design practice, maximum flue gas velocity through the Absorber is maintained at 4.5m/s. Bidder request NTPC to review and kindly accept.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 143 of Clarification-01 of the same.
420	VI / B	A-01	26 of 87	1.05.21.01	7. SO2 Removal Efficiency **Guarantee Point** To be worked out by the Bidder to achieve SO2 emission in the chimney to less than 60 mg/nm3 (6% O2 dry basis) **Design Point** To be worked out by the Bidder to achieve SO2 emission in the chimney to less than 80 mg/Nm3 (6% O2 dry basis)	Bidder proposes the following Outlet SO2 limits 1.Guarantee Point : 80 mg/Nm3 (6% O2 dry basis) 2.Design Point : 90 mg/Nm3 (6% O2 dry basis) The above mentioned SO2 emission limits are below the Emission norms and it will ensure optimized FGD design. Bidder request NTPC to review and kindly accept the proposal.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 144 of Clarification-01 of the same.
421	VI / B	D-1-5	25 of 69	5.06.01	The civil works for FGD system shall comprise of civil, structural and architectural works below and above ground level of ball mill building, ball mill foundations, FGD control room building, **slurry re-circulating pumps & oxidation blowers building**	The referred clauses are contradictory. Bidder understands & considers that Slurry re-circulating slurry pumps & Oxidation blowers shall be installed in a shed only as per Section-VI, Part-A Sub-section-IIA-04 page 4 of 7 clause 4.01.12 and inline with all ongoing NTPC FGD contracts. Bidder request NTPC to review and confirm.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 145 & 146 of Clarification-01 of the same.
422	VI / A	IIA-04	4 of 7	4.01.12	All Slurry re-circulating slurry pumps & Oxidation blowers shall be installed in a shed provided with roof sheeting to be provided by the Contractor as per specifications specified elsewhere.		
423	VI / B	A-05	11 of 29	5.06.11	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.	Glass flake lining is the preferred material for FGD absorber linings worldwide owing to its inherent advantages. Our collaborator, MHI Japan, widely recommends the use of Glass Flake Resin Lining in absorber, citing its ease of application and maintenance. MHI Japan has successfully executed over 80% of their supplied absorbers with Resin Lined Carbon Steel globally. Glass Flake Resin Lining is a cost-effective alternative to alloy material, providing substantial savings in both material and installation costs. This alternative can significantly reduce the overall project budget. Glass Flake Resin Lining offers exceptional resistance to a wide range of corrosive chemicals and temperature conditions typically found in FGD systems. It can withstand the high corrosive/abrasive environment effectively, ensuring a longer service life for FGD. In view of the above, we request NTPC to review and accept 3 mm thickness vinyl ester based glass flake lining for absorber.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 147 of Clarification-01 of the same.
424	VI / B	A-05	5 of 29	3.02.04	Absorber outlet to bypass duct & duct after by pass damper/gate to chimney inlet shall be made of cladded 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	Glass Flake Resin Lining offers exceptional resistance to a wide range of corrosive chemicals and temperature conditions typically found in absorber outlet duct. It can withstand the high corrosive/abrasive environment effectively, ensuring a longer service life for FGD ducts. In view of the above, we request NTPC to review and accept 2 mm thickness vinyl ester based glass flake lining for absorber outlet duct in line with NTPC Dadri FGD.	Reply to this query is already included in the section 'Employer's response to typical Bidder's queries on Section VI' to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 148 of Clarification-01 of the same.

SN	Reference Specifications	Bidder's query	Employer's response
425	Errata to Section VI Technical Specifications (Amendment 11)	NTPC has changed the limiting values of Unit heat rates at 100% & 55% TMCR from earlier. Limiting value provided by NTPC at 100% TMCR is **2069 kcal/kWh**. As per latest CERC guidelines Unit Heat rate @ 100% TMCR works out to **2069.4 kcal/kWh** (1790 (TG HR) / 86.5% (Boiler eff)) • Request NTPC to increase the limiting values of Heat rate @ 100% TMCR inline with value derived from CERC guideline. • Based on the coal properties provided in the specifications it is not possible to achieve the Boiler efficiency of 86.5% as per CERC guidelines for Sipat project. Hence request NTPC to either modify the coal properties in order to achieve 86.5% Boiler efficiency values or increase the limiting values of Heat rate.	Bidder's proposal reviewed but not accepted. Bidder to comply with technical specification requirements.

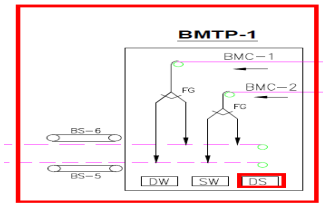
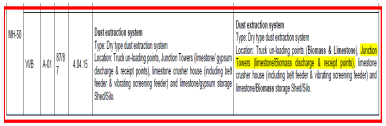
CLARIFICATION-02B FOR SIPAT-III (1X800 MW) EPC PACKAGE (UNDER BULK TENDER)

Sr. No.	Volume/ Section / Part	Chapter / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	Employer's Response
184	SECTION-VI, PART-A	SUB-SECTION-IIA-04	2 OF 7	3.01.05	Limestone slurry piping to each absorber, along with recirculation lines, all isolation and control valves. On/Off type Diaphragm valves in Limestone circulation lines to be provided instead of pinch control valve.	As per bidders past reference and proven practice, bidder proposes pneumatic control ceramic ball valve. Please confirm.	The requirement of the specification is clear. Bidder to comply with the specificaiton requirement.
185	SECTION – VI, Part-E	-Scheme of FGD Milling System	-	XXXX-001-POM-A-023			
186	Sipat_Errata_Technical_ Specs	Amendment 02 to Technical Specifications (Section VI)	473 of 700	SG.12	Limestone slurry piping to each absorber, along with recirculation lines, all isolation and control valves. ~~On/Off type Diaphragm valves in Limestone circulation lines to be provided instead of pinch control valve.~~ Pinch control valves shall be provided in the Limestone slurry recirculation lines. Alternatively, the bidder can also provide On/Off type Diaphragm valves as per its proven practice.		
187	SECTION-VI, PART-A	SUB-SECTION-IIA-04	4 OF 7	4.01.09	Piping from gypsum bleed pumps to gypsum dewatering system, along with recirculation lines (if required) necessary isolation and control valves.	As per bidder's past reference and proven practice, bidder proposes pneumatic operated on/off Diaphragm / Butterfly valve. Please confirm.	The requirement of the specification is clear. Bidder to comply with the specificaiton requirement.
188	Sipat_Errata_Technical_ Specs	Amendment 02 to Technical Specifications (Section VI)	473 of 700	SG.14	Piping from gypsum bleed pumps to gypsum dewatering system, along with recirculation lines (if required) necessary isolation and control valves. **Pinch control valve shall be provided in the gypsum slurry recirculation lines. Alternatively, the bidder can also provide On/Off type Diaphragm valves as per its proven practice.**		
189	SECTION – VI, Part-E	SCHEME OF FGD - ABSORBER SYSTEM	-	1150-001-POM-A-022			
190	Sipat_Errata_Technical_ Specs	Amendment 02 to Technical Specifications (Section VI)	473 of 700	SG.15	2x100% cake washing pumps for each vacuum belt filter.	As only one VBF will be in operation and also a separate cake wash tank (1 No.) for storing shall be considered, hence, bidder proposes 2x100% Cake washing pumps common for both vacuum belt filters.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement.
191	Sipat_Errata_Technical_ Specs	Amendment 02 to Technical Specifications (Section VI)	473 of 700	SG.16	2x100% cloth washing pumps for each vacuum belt filter.	As only one VBF will be in operation and also a separate cloth wash tank (1 No.) for storing shall be considered, bidder proposes 2x100% Cloth washing pumps common for both vacuum belt filters.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement.

Sr. No.	Volume/ Section / Part	Chapter / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	Employer's Response
192	SECTION-VI, PART-B	SUB-SECTION-A-05	9 OF 27	5.06.02	The design of flue gas ducts and inlet and outlet hoods of the FGD as well as [guide vanes and baffle plates shall ensure a homogeneous flue gas flow with respect to the distributions of: (i) temperature (ii) velocity (iii) dust content (iv) slurry injection and distribution. The above shall be proven by two phase Computational Fluid Dynamics simulations (liquid and gas). The scope of modelling shall include flue gas path inside the absorber vessel including inlet and outlet duct.	Since JBR technology is a proven technology worldwide, Bidder will conduct CFD model of the FGD system gas path excluding absorber	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1203 of Clarifications 02.
193	SECTION-VI, PART-B	SUB-SECTION-A-05	11 OF 27	5.06.10	The raw gas inlet duct of the absorber shall be equipped with a flushing device of the side walls and the ground, which shall operate continuously as well as intermittently.	Please note that, in the offered JBR type absorber, the gas cooling mechanism which is provided at raw gas inlet duct of the absorber will be continuously operated. Hence, no separate flushing devise is required and envisaged.	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1207 of Clarifications 02.
194	SECTION-VI, PART-B	SUB-SECTION-A-05	15 OF 27	7.04.03	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.	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1215 of Clarifications 02.
195	SECTION-VI, PART-B	SUB-SECTION-A-05	17 OF 27	7.07.06	2x100% horizontal centrifugal pumps shall be provided for pumping the waste water from waste water tank to the mixing tanks of HCSD system or in any other area with suitable treatment so as to suit/not to disturb the destination fluid quality. 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.	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1219 of Clarifications 02.
196	SECTION-VI, PART-B	SUB-SECTION-A-05	18 OF 27	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 slacked 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.	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1220 of Clarifications 02.
197	SECTION-VI, PART-B	SUB-SECTION-A-05	21 OF 27	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 as per proven practice.	Reply to this query is already included in section VI under "Employer's response to typical Bidder's queries on Section VI technical Specifications (Clarifications 01 & 02)" to clarify & avoid similar queries. Bidder is requested to refer Sl. no. 1225 of Clarifications 02.
198	SECTION-VI PART-A	SUB-SECTION-IV	31 of 77	1.03.03	(vii) Waste Water The Contractor guarantees that the maximum purge flow rate to waste water treatment system from FGD system for 1x800 MW unit shall be less than 10m3/h averaged over a 24 hour period for a the range of specified coal(s).	Bidder recommends that the guaranteed maximum purge flow rate to waste water treatment system from FGD system for 1X800 MW units shall not be restricted as the waste water bleed depends on the specified coal(s) and the quality of water used in the FGD system. If such scenario arises the accumulation of high TDS/chloride content will be recirculated in the gypsum slurry which will impact FGD performance. Bidder request owner to review the clarification and provide necessary amendments.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement. The Bidder to design the FGD system including the material of construction to meet the performance as specified in the Bidding documents.
199	SECTION-VI, PART-B ---------- Sipat_Errata_Technical_ Specs	SUB-SECTION-A-01 ---------- Amendment 02 to Technical Specifications (Section VI)	27 OF 87 ---------- 471 of 700	1.05.22.01 ---------- SG.2	EXISTING (As per Base Specification) A "wet Chimney" shall be installed ….without insulation for borosilicate lining. The stack shall be designed as per the latest guidelines of EPRI Wet Stack Design Guide. The design of wet ducts and stacks system shall consider the Stack liquid discharge (SLD), Corrosion/chemical attack, Condensate collection system and its drainage etc. A wet stack study shall……not be less than 8000mm. ---------- READ AS A "wet Chimney" shall be installed ….without insulation for borosilicate lining. The stack shall be designed as per the latest guidelines of EPRI Wet Stack Design Guide. The design of wet ducts and stacks system shall consider the Stack liquid discharge (SLD), Corrosion/chemical attack, Condensate collection system and its drainage etc. **To cater to the requirements of FGD running in bypass mode, the components of Condensate Drain collection system (such as ring collectors, gutters, condensate drain piping etc.) exposed to high temperature flue gas shall be made of Alloy C276 / Alloy 59 / Titanium Gr-II.** A wet stack study shall……not be less than 8000mm.	As the condensate drain pipe does not come in contact with flue gas inside the chimney, hence the MOC of drain pipe shall be FRP. Same is followed in our ongoing EPC project. Please accept.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement.

Sr. No.	Volume/ Section / Part	Chapter / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	Employer's Response
200	SECTION-VI, PART-B	SUB-SECTION-A-05	15 of 29	6.05.04	All parts of the mill including mill body, trunnion, integral pipes, mill circuit pumps and other parts in contact with limestone slurry shall be provided with replaceable rubber wear liners. ****	For limestone slurry pipes mentioned in clause no. 6.05.04 and 6.07.03 MOC shall be considered as per clause no. 12.02.00 SECTION-VI, PART-B SUB-SECTION-A-05 (FGD), Page 23 OF 29, i.e. "All the pipes handling slurry shall be provided slurry pipes size up to 400 NB made up of FRP material as per ASTM 2310 and testing as per ASTM B2583(silicon carbide coating on slurry exposed surface)." Please accept and confirm.	The specification requirement is clear with respect to the applicability of the FRP for pipes used for limestone slurry transport. Bidder to comply with the same.
201	SECTION-VI, PART-B	SUB-SECTION-A-05	16 of 29	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.**		
202	SECTION VI, PART-B	SUB-SECTION- A-9	4 of 20	2.03.05	5. Effluents from Neutralization pit - MSRL	As per bidder's standard practice, Carbon steel piping is considered for transferring waste oil from transformer sump pump.	Bidder's proposal is not acceptable. Bidder to comply the technical specificaiton requirements.
203	SECTION VI, PART-B	SUB-SECTION- A-9	7 of 20	2.07.02	For pipe size 350Nb and above mitre bends may be used for all pipes except rubber lined pipes. However, mitre bends are also acceptable for rubber lined pipes above 1200 NB. The bend radius shall be 1½ times the nominal pipe diameter. 90 deg. bends (mitre) shall be in 4 pieces (3 cuts) and 45 deg. mitre bends shall be in 3 pieces 22½ deg. Fabrication of mitre bends shall be as detailed in BS 2633/BS534.	Bidder proposes, Pipe size 450Nb and above mitre bends may be used for all pipes.	Bidder's proposal is not acceptable. Bidder to comply the technical specificaiton requirements.
204	SECTION-VI PART-B	SUB SECTION-A-01	18 of 87 20 of 87	1.05.13.02 1.05.13.03	(x) Pressure required at chimney inlet: + 40 mm WC (In case separate booster fans for FGD system are provided, ID fans shall be sized for minimum +10 mm WC of pressure requirement at chimney inlet for any FGD bypass operation.)	Bidder understands that + 40 mm WC of Pressure required at chimney inlet is applicable only for sizing of ID and not for Booster fan. Booster fan shall be sized as per the actual calculated head required to overcome the pressure drop in absorber & ducts and maintain required stack inlet pressure. Please confirm.	Bidder's understanding is not correct. In case booster fan is envisaged by the bidder, the Pressure required at chimney inlet to be considered as + 40 mm WC
205	EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES (CLARIFICATIONS 01 & 02)	Clarification no. 1233	141 of 147	--	Bidder to provide screw takeup arrangement for conveyor having length more than 25 m with travel of 4% of the total belt length.	Bidder requests owner to relook at the type of take up arrangement to be considered. Since the clause mentions to consider all conveyors with lengths more than 25m as screw takeup. Generally screw take-up can be considered for the conveyor lengths less than 60m as per IS 11592 with take up travel length of 1.5% of horizontal crs of conveyor length as per IS 4776. For all other conveyor lengths either VGTU or HGTU will be considered as per the conveyor profiles with take up lengths 2.5% of horizontal crs of conveyor length as per IS 4776. NTPC to confirm.	Bidder to provide screw take-up arrangement for conveyor having length up to 25 mts (Except the boom conveyor of stacker reclaimer) with take-up travel of 4% of horizontal of conveyor length(crs). For conveyor length more than 25 mts, HGTU or VGTU can be provided. The type of take-up and travel length adjustment shall be as per stipulation of standard technical specification & its amendment (For Detail Refer the earlier issued amendment no. 2 of section-VI/B, SN-MH-43).

Sr. No.	Volume/ Section / Part	Chapter / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	Employer's Response
206	SECTION – VI, PART-A	SUB-SECTION-A-14 LIMESTONE AND GYPSUM HANDLING PLANT	PAGE 4 OF 5	3.03.00	Minimum four (4) Nos. sump pumps in gypsum storage shed complete with motors, local control panel, level switches, individual discharge piping with fittings and valves up **to ash disposal slurry sump.**	There are discrepancies in mentioned clause regarding discharge of sump water in Gypsum storage area sump pumps. Sump Pump discharge lines shall be terminated up to nearest surface drain. Please confirm	Bidder to prefer the ash slurry disposal pump house sump or nearest plant drain (Except storm water drain) up to 50m distance from the gypsum storage shed, whichever is minimum.
	SECTION-VI, PART B	SUB-SECTION-A-20 Coal & Biomass and Limestone & Gypsum Handling Plant	48 of 79	2.5.2	Sump pump Piping: **to nearest plant drain**		
	SECTION-VI, PART B	SUB-SECTION-A-20 Coal & Biomass and Limestone & Gypsum Handling Plant	Page 16 of 79	4.11.8	Sump pumps along with level switches & piping **upto nearest drain** (max upto 50.0 mtrs. From outside the building) shall be provided at all locations wherever natural drainage is not possible.		
207	SECTION – VI, PART-A	SUB-SECTION-IIC	PAGE 5 OF 19	2.02.00	**For CHP DDCMIS, necessary signal exchange with Employer's existing stage-I CHP DDCMIS 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. All necessary hardware/ logic modifications/ upgradation, as required at Employer's existing system shall be in Employer's scope.	Bidder understands that these IO Counts are adequate to fulfil interface requirements with Existing Stage. Same shall not be exceeding during detailed Engineering . Please confirm.	Noted. However the final count can only be arrived at after detailed engineering by the EPC contractor.
208	SECTION – VI, PART-A	SUB-SECTION-IIA-15	PAGE 4 OF 6	2.08.00	Suitable temperature monitoring throughout the storage mass inside Silo/Hopper/Bin to be provided.	Bidder proposes to have Non-Contact Type Temperature Measurement arrangement to suit the biomass application. 1 No. Temperature monitoring unit along with required accessories shall provided for each silo. Please confirm.	Bidder to note that the Technical specifications indicated are functional and the bidder to consider the measurement system which shall be most suitable for biomass co-firing. The same shall be discussed and finalized during detailed engineering.
209	SECTION – VI, PART-A	ANNEXURE C TO IIC SUB-SECTION-IIA-04	PAGE 16 OF 21 PAGE 7 OF 7	1.03.00 11.02.00	SOx ANALYSERS FOR FGD SYSTEM: 1. SO2 Analyzer at FGD Outlet 2. SO2 Analyzer at FGD inlet Contractor shall provide air conditioning for the FGD control room and Analyser room (if separately provided) & ventilation for the FGD system buildings.	1. Bidder understands that SO2 Analyzer used for FGD application shall have inbuilt 6% O2 Correction features, no separate O2 Analyzers are required for FGD Application. 2. Bidder also understands that Technical Requirements Fumished under Clauses 6.02.00, 6.03.00 & 6.04.00 in SUB-SECTION-IIIC-04 ,SECTION-VI, PART-B for CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) shall holds good for SO2 analyzers to be installed in Duct for FGD Application. 3. Bidder also understands that in case of In-situ type application ,analysers room are not required. Kindly confirm our understanding.	For point at Sr. No. 1, Bidder to refer note of clause no. 1.01.00, of Annexure-C to II-C, Part-A for the requirement of O2 measurement for correction of SO2 and shall further comply with the requirements of SO2 removal efficiency based on Sr. No. 7 of clause no. 1.05.21.01 of Sub-section-A-01, Section-VI, Part-B of the Technical Specifications. Bidder's understanding on the points at Sr. No. 2 & 3 is correct.
210	SECTION – VI, PART-A	SUB-SECTION-IIC	PAGE 2 OF 19	1.06.01	**Close Loop controls:** For close loop control of following applications of main plant SG/TG/BOP (Auxiliaries of SG and TG), conventional i.e. 4-20 mA / (HART) based actuators along with 4-20 mA(HART) based electronic transmitters (which are directly used in control of final control element), shall be provided. For balance measurements for even these areas/ applications fieldbus based PT/DPT/TT shall be provided. **FGD (a) Booster Fan Blade Pitch Control** For balance applications of main plant and for all applications of other areas including offsite areas fieldbus based control system, fieldbus based actuators and fieldbus based PT/DPT/TT shall be provided.	For FGD Application, addition to Booster Fan Control Loop bidder recommends to have conventional i.e. 4-20 mA / (HART) based actuators along with 4-20 mA(HART) based electronic transmitters considering the criticality of following loops; 1. Absorber Level Control 2. Absorber pH Control 3. Gypsum Bleed Control 4. Oxidation Air Flow Rate Control 5. Reclaim Water Return Control Kindly accept the same.	Bidder's proposal cannot be accepted. There are ready references of successful FGD implementations in NTPC in accordance with the stipulations in the Bid Specification indicated here and hence Bidder to comply to the Technical Specifications.
211	SECTION – VI, PART-A	SUB-SECTION-IIC	PAGE 3 OF 19	1.06.02	**Open loop controls:** For open loop control of complete main plant and offsite areas fieldbus based control system, fieldbus based actuators, Profibus DP based IMC in LV SWGR/MCC and fieldbus based PT/DPT/TT shall be provided excluding applications given in Note-A.	Bidder proposes to have 4-20 mA / (HART) based Conventional Actuators & HART Based Transmitters for certain specific applications of FGD ,where skid mounted Instruments & actuators are supplied or operation of system envisaged through OEM's supplied LCP i.e.; scoop coupling, Traveling tripper, Plough Feeder, Lime Sampling Unit , Dust Extraction etc.. Considering the above integration issues at package level , The control system and devices (Actuators, instruments) shall be conventional for above listed areas of FGD(offsite package). Kindly Accept the same.	For electrical actuators bidder to refer to reply at Sr. No. 416 of EMPLOYERS RESPONSE TO TYPICAL BIDDER'S QUERIES ON SECTION VI TECHNICAL SPECIFICATIONS (CLARIFICATIONS 01 & 02). However for PT / DPT / TT, Bidder shall comply with the stipulations of the Technical Specifications.
212	SECTION – VI, PART-A	ANNEXURE C TO IIC	PAGE 17 OF 21	26.00.00(K)	Contractor shall provide Phase marker sensor for ID, FD, PA, BFP, CEP, ACW, ECW as a minimum. Contractor shall provide compatible buffered phase marker and vibration signals required for integrated diagnostics and analysis of vibration of all the above equipment's **and for crushers as a minimum and other drives as per OEM recommendation for connectivity to the analysis system**.	1. For Limestone Crusher Vibration Sensors shall be provided at DE & NDE end. Phase Marker is only required for future diagnostic purposes. Hence, bidder shall provide Notch on the Rotor(NDE) of Limestone Crusher as a future provision for mounting Keyphasor. 2. Bidder understands that Key phasor requirements are not envisaged for FGD application ,the requirement is only for the mentioned main plants equipment. Kindly Clarify .	For Sr. No. 1, Bidder's understanding is correct. For Sr. No. 2, Bidder's understanding is not correct. Key phasor is envisaged for critical drives (mainly HT drives) in FGD application as well.

Sr. No.	Volume/ Section / Part	Chapter / Drawing No.	Page no.	Clause No.	Bid Specification Stipulation	Statement of Prebid Queries & Clarification	Employer's Response
213	SECTION – VI, PART-B	SUB-SECTION-IIIC-08	PAGE 4 OF 5	7.01.00	FGD Bypass Damper is very critical for the safe evacuation of flue gas when FGD is not in operation. Normally it shall be in CLOSED condition most of the times when FGD is in operation. But during emergency need, if it fails to OPEN, it can lead to high furnace pressure and subsequent MFT. Therefore, a PARTIAL STROKE TEST for the Bypass damper to be carried out in AUTO at regular intervals..... Contractor shall provide positioner with intrinsic Partial Stroke Test (PST) facility to achieve the above functionalities for the FGD Bypass Damper with all suitable pneumatic and electrical connections.	As per bidder standard practice, we are proposing Pneumatic Damper with inbuilt Fail Safe Operation. Such Partial Stroke Test disrupt boiler operation. When Booster Fans are in operation (Blade Pitch Actuators in Auto) in synchronous with Boiler Total air Flow Rate & Bypass Damper is in Closed Condition. It's not feasible to achieve the said functionality in Pneumatic Damper due to operational Philosophy as recommended by QFGDM. Kindly Consider the same.	Bidder to note that the Technical Specification requirements are clear and these requirements are meant for safe operation of the unit and therefore the same shall be complied to in totality.
214	TECHNICAL SPECIFICATIONS SECTION-VI, PART E(2)	COAL + BIOMASS FLOW DIAGRAM Drg. No.-XXXX-001-POM-A-040	PAGE 52 of 91	COAL + BIOMASS FLOW DIAGRAM Drg. No.-XXXX-001-POM-A-040	 	As per flow Diagram 'DS' system show in BMTP-1. but as per Clause no.4.04.15 (MH-50) - DE system is mentioned for Junction Tower (Biomass Discharge & Receipt Points). There are said discrepancy found between flow diagram & Amendment 02. Bidder understand that, Dry type Dust Extraction system to be provided instead of DS in BMTP-1. Bidder request Owner to confirm bidder's understanding is correct.	Bidders understanding is correct. DE to be provided in BMTP-1.

SL. NO	ENQUIRY SPECIFICATION				SPECIFICATION REQUIREMENT	COMMENTS / CLARIFICATIONS	EMPLOYER'S RESPONSE
	SEC/ PART	SUBSEC.	PAGE NO.	CLAUSE NO.			
215	VI/A	II-C	12 of 19	4.00.00 (d)	Temperature Transmitters: (i) In case of multiple measurements of temperature for any application, resulting in trip / protection, where logic implementation tolerates failure of one TE (e.g. 2v3, 2v4 etc.), for only one of the TE, dual TT is to be provided.	For temperature elements of PA/FD/ID fan bearings & HT motor bearings, as per Cl 4.00.00 (d)-Vol VI-Part A-Sec II-C-Page 12 of 19, one number of dual input TT & two numbers of single input TT are envisaged. M/s. NTPC is requested to confirm.	Bidder to refer Amendment Sl. No. C-01B, C-02B, C-03B and C-04B in this regard.
	VI/B	II-A-02	31 of 67	10.08.07	PRIMARY AIR FANS (d) Three nos. Duplex Pt-RTD (100 ohm at 0 deg.) with dual input temperature transmitters shall be provided for local and remote monitoring of each bearing metal temperature of fans.		
	VI/B	II-A-02	37 of 67	12.05.00	FD & ID FANS Fan Bearings (c) Three nos. Duplex Pt-RTD (100 ohm at 0 deg.) with dual input temperature transmitters shall be provided for local and remote monitoring of each bearing metal temperature of fans.		
	VI/B	II-B-02	3 of 4	7.07.00	Each bearing of HT motor shall be provided with 3 numbers duplex RTDs connected to three numbers dual input transmitters with display.		Bidder to comply with tender requirements.
216	Section-VI Part-A	Sub-Section-VI Chapter-01 List of Mandatory Spares for SG & Auxillaries	6 of 38	1.05.00.C.2- PA Fan	2. Fan Bearings including bearing housing-2 sets	We are offering spares against sub-clauses sl no: 2.1 (Fan bearing: 2 sets) & sl no: 2.2 (Fan bearing housing: 1 set) which are the overall constituents of spares against sl no: 2 (Fan Bearings including bearing housing). Owner to confirm our understanding.	Bidder to refer to Amendment Sl. No. SG-01B in this regard
217	Errata to Section VI Technical Specifications	Amendment No. 2	19	MH-27	SINGLE LINE FLOW DIAGRAM OF ASH CLASSIFIER SYSTEM (PRESSURE SYSTEM) - XXXX-001-POM-A-029-Rev B	Since the capacity of classifier silo for vacuum system is 60 MT capacity whereas the classifier silo of pressure system is mentioned as 150 MT. Please review and confirm the capacity	It is 100MT for both the cases. Bidder to refer amendment Sl. No. MH-03 B for the revised SLD for both the case.

Sl. No.	Section / Part / Chapter / Volume	Clause No.	Page no.	Bid Specification Stipulation	Bidder's Query	Employer's Response
218	SECTION-VI, PART-A, SUB-SECTION-I-A PROVENNESS	4.1.3 (b)	7 of 44	The Bidder/ Bidder's sub-vendor who fulfill the requirements at clause 4.1.3(a) above, shall also have an on-going Collaboration Agreement/Technology Licensing agreement prior to the date of submission of proposal for sub-vendor with such a manufacturer of Electrostatic Precipitators, who meets the requirements of clause 4.1.1 above.	We request you to delete the clause 4.1.3(b) for the regular ESP design/supply/Manufacturers of ESPs and meeting the requirement of clause 4.1.3(a).	Bidder's proposal reviewed but not accepted. The requirements specified are quite clear. Bidder to comply with the same
219	ATTACHMENT - 3K	2(a)	360 of 361	(a) We shall provide design, manufacturing and assembly drawings of……. (name of equipment/system*). ……. (name of equipment/system*) which shall be manufactured and supplied as per above design provided by us and the drawings approved by the Employer.	We request you to modify the clause as below; a) ~~We shall provide design, manufacturing and assembly drawings of……~~ (name of equipment/system*). ……. (name of equipment/system*) ~~which~~ shall be manufactured and supplied as per ~~above~~ design provided by us and the drawings approved by the Employer.	

Amendment-8B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

SN	Specification Reference				Existing	Read as
	Part	Sub Sec	Clause No	Page No		
TG-50B	B	A-07, Steam Turbine and Auxiliaries System	1.16.00(i)	5 of 25	LP Bypass stop and control valve main plug and pilot plug area shall be sized and selected in such a way that the pressure balancing of lower and upper chamber occurs in shortest possible time without transmitting any unbalance force to the stem/spindle. **Calculation for pressure balancing time and force being transmitted to the main plug stem during valve opening for each design cases of LP bypass shall be submitted by the Bidder/ LP Bypass valve supplier during detail engineering.**	LP Bypass stop and control valve main plug and pilot plug area shall be sized and selected in such a way that the pressure balancing of lower and upper chamber occurs in shortest possible time without transmitting any unbalance force to the stem/spindle. **During detail engineering confirmation shall be given that adequate design consideration regarding dynamic forces acting on valve trim has been considered enabling quick pressure balancing without transmitting any unbalance force to stem during transient operating condition.**

Amendment-6B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

<table>
<tr><th rowspan="2">SN</th><th colspan="4">Specification Reference</th><th>Existing</th><th>Read as</th></tr>
<tr><th>Part</th><th>Sub Sec</th><th>Page No</th><th>Clause No</th><th></th><th></th></tr>
<tr><td>GEN -03B</td><td>A</td><td>IV – FUNC-TIONAL GUARAN-TEES</td><td>5 of 73</td><td>1.02.01</td><td>
AMOUNT OF LIQUIDATED DAMAGES APPLICABLE FOR CATEGORY-I GUARANTEES
If the performance guarantee(s) … the Contract Price:
<table>
<tr><th>S. No</th><th>Guarantee</th><th>Rate of Liqui-dated Damages (LD)</th><th>Limiting Value</th></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>(x)</td><td>For increase in the Unit Auxiliary power consumption in kW for unit auxiliaries re-quired for continuous unit operation at 100% TMCR i.e. 800 MW unit load.</td><td>US $ 5,025

(US Dollar Five Thousand Twenty Five only) per 1 kW increase in Unit Auxiliary Power Consumption.</td><td>Not more than 42000 KW</td></tr>
<tr><td>(xi)</td><td>For increase in Sta-tion auxiliary power consumption compris-ing of all station Auxil-iaries required for continuous station op-eration at 1x800 MW (i.e. 100% rated load of the unit).</td><td>US $ 5,025

(US Dollar Five Thousand Twenty Five only) per 1 kW increase in Sta-tion Auxiliary Power Con-sumption.</td><td>Not more than 14300 KW</td></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td></tr>
</table>
</td><td>
AMOUNT OF LIQUIDATED DAMAGES APPLICABLE FOR CATE-GORY-I GUARANTEES
If the performance guarantee(s) … the Contract Price:
<table>
<tr><th>S. No</th><th>Guarantee</th><th>Rate of Liqui-dated Dam-ages (LD)</th><th>Limiting Value</th></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>(x)</td><td>Deleted</td><td>Deleted</td><td>Deleted</td></tr>
<tr><td>(xi)</td><td>For increase in the Aux-iliary Power Consump-tion [Unit Auxiliary power consumption for unit auxiliaries required for continuous Unit oper-ation + Station auxiliary power consumption com-prising of all Station Aux-iliaries required for con-tinuous Station opera-tion] in kW at 1x800 MW i.e., 100% rated load of the Unit.</td><td>US $ 5,025

(US Dollar Five Thousand Twenty Five only) per 1 kW increase in Station Auxil-iary Power Consumption.</td><td>Not more than 52500 kW</td></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td></tr>
</table>
</td></tr>
</table>

Amendment-6B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING	Read as
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
PM-02B	VI/C	GTR	15 of 119	8.03.03.02	The Contractor shall submit a Project Completion Report at the time of handing over the plant.	**Project Completion Report** The Contractor shall submit a Project Completion Report at the time of handing over the plant. Completion report of works would in particular include but not limited to the following: a. As constructed drawings including details of new designs incorporated if any. b. Salient features of each work/project like peak rate of Earth work/ Concreting /Structural steel fabrication or erection, Pressure parts erection, Critical piping, Insulation, equipment erection etc. c. Resources deployed during peak of construction works in terms of manpower, construction equipment, T&Ps etc. d. Total executed value of important items like excavation, piling, concreting, Structure steel erection, cabling, piping etc. e. Major challenges faced and their mitigation strategies including tackling of unforeseen surprises like geological surprises etc. f. Time for completion of work as originally stipulated and as actually spent for its completion with dates of actual achievement of Milestones vis-à-vis Project schedule. g. Best Practices and new erection strategies adopted in the Project implementation. h. Surprises encountered during commissioning phase and action plan to deal with the surprises. i. Quality related issues faced during execution and measure to avoid future recurrence. j. Details of Safety incidents and measure to avoid future recurrence. Overall Safety Management System and its implementation /performance.

Amendment-5B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING	Read as
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
PM-01B	VI/A	Annex-ure-A to subsec-tion IIC	6 of 6	1.01.00 (H)	----------	4D Model 4D modelling is the integration of a 3D model with con-struction schedule in order to visualise the sequence and progress of construction. Referring to clause 8.03.04 GTR part C section VI, Agency to represent actual site progress of construction activity with respect to planned progress based on Schedule in 4D model to NTPC every month.

Amendment-3B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING	Read as
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
WS-01B	VI/B	A-11	2 of 16	2.04.00	During start up conditions… ……. ……. ……. For design purposes, average crud loading shall be considered as 500 ppb. Under such…on their requirement.	During start up conditions… ……. ……. ……. For design purposes, average crud loading shall be considered as 500 ppb. Under such…on their requirement. **Useful service run under startup condition shall be min. 50 hours before regeneration.**

Amendment-3B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING (As per Base Specification)	Read as
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
SG-02B	VI/A	IV	20 of 73	1.01.07.01 ab)	ab) Electrostatic Precipitator with all TR sets , all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes working and rapping system in normal operation. During the test all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes will be kept in continuously ON condition at 100% duty condition and set point temperature shall be kept 5 degree Celsius above the flue gas temperature. (Refer Note 4 below)	ab) Electrostatic Precipitator with all TR sets , all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes working and rapping system in normal operation. During the test all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes will be kept in continuously ON condition **with the Set point temperature (cut in temperature) kept at least 5 deg. Celsius above the flue gas temperature corresponding to the ESP guarantee point or the operating flue gas temperature whichever is higher. (Refer Note 3 below).**
SG-03B	VI/A	IV	29 of 73	1.03.02 (v)	(a) Maximum tube to tube temperature differential between any two adjacent tubes.	(a) Maximum tube to tube temperature differential between any two adjacent tubes. **Water wall tube to tube temperature will be limited to 80 Deg. C. The same shall be further substantiated by the values as achieved by the Contractor in its similar reference steam generator which are operating successfully.**
SG-04B	VI/A	IV	29 of 73	1.03.02 (viii) (New clause added)	New clause added	**(viii) Rated Steam Generator Temperatures (Main steam/ HRH): The Contractor shall demonstrate the rated Steam Generator temperatures (Main Steam/HRH) at rated flow corresponding to 100% TMCR (800 MW Unit Load)) with design coal firing under stipulated ambient air condition i.e. 27 degree Celsius temperature , 60% RH and rated excess air not exceeding 20%.**

Amendment-3B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING (As per Base Specification)	PROPOSED CHANGE
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
SG-05B	VI-A	II-A-03	Page 2 of 2		**Scope for biomass…** …biomass co-firing with safety to be provided. Annexure-IV-7(A), (B) & (C) of Sub-Section-IB, Part-A, for '……in Government of India, Ministry of Power OM No F. No***. tL***/ 86/ 2017-Th.II (C.No 238797) dated 03.05.2023 placed at Annexure to this Sub Section.	**Scope for biomass…** …biomass co-firing with safety to be provided. Annexure-IV-7(A), (B) & (C) of Sub-Section-IB, Part-A, for '…..in Government of India, Ministry of Power Addendum, F. No. **11**/ 86/ 2017-Th.II (C.No 238797) dated 03.05.2023 placed at Annexure to this Sub Section.
SG-06B	VI-A	IIA-04	2 of 7	2.04.01	The FGD System shall be in operation… for the details of smart positioner. The design of the damper shall ***ensure 99.95%*** leak tightness, on flow basis, without seal air. The damper shall be 100% leak tight with seal air fans under the above conditions.	The FGD System shall be in operation… for the details of smart positioner. The design of the damper shall ***ensure 99.5%*** leak tightness, on flow basis, without seal air. The damper shall be 100% leak tight with seal air fans under the above conditions.
SG-07B	VI/B	G-06	9 of 14	3.03.09	**No fuel oil support shall be required above 40% TMCR** Contractor shall demonstrate that oil support for flame stabilization shall not be required beyond 40% of BMCR load when firing … the Steam Generator does not require any oil firing for stable and efficient boiler operation at and above 40% BMCR loads.	**No fuel oil support shall be required above 40% TMCR** Contractor shall demonstrate that oil support for flame stabilization shall not be required beyond 40% of TMCR load when firing … the Steam Generator does not require any oil firing for stable and efficient boiler operation at and above 40% TMCR loads.
SG-08B	VI/B	G-06 Annexure-IV	1 of 1		**Demonstration/Acceptance tests during Commissioning/Initial Operation** The following tests …. 4.Steam Temperature Imbalance 5. No fuel oil support shall be required above 40 % BMCR 6. …	**Demonstration/Acceptance tests during Commissioning/Initial Operation** The following tests …. 4.Steam Temperature Imbalance 5. No fuel oil support shall be required above **40 % TMCR**. 6. …
SG-09B	VI-B	A-02	Page 11 of 67	6.01.00 (iv)	(iv) Pressure transmitter to be installed downstream on control valves in the line connecting individual level control valves with flash tank for each unit (4 Nos.).	(iv) Control valves for controlling level of separator shall preferably be unbalanced type and designed to operate for minimum conditions equivalent to 50% TMCR (or higher value as per vendor practice) and for handling small debris parti-

S. NO.	SPECIFICATION REFERENCE				EXISTING (As per Base Specification)	PROPOSED CHANGE
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
						cles. Further, valves shall also be designed as a system together with back pressure devices (dump tube ,orifice etc.), associated piping and shall be installed as close as possible to flash tank. Pressure transmitter to be installed downstream on control valves in the line connecting individual level control valves with flash tank for each unit (4 Nos.).
SG-10**B**	VI-B	A-02	54 of 66	17.01.11 (b)	(b) APH Baskets Platforms (minimum 100 Sq m of platforms) with proper approach near APH(s) for storage of APH Baskets. Weight of stored APH baskets shall be accounted in the structure and platform design.	(b) APH Baskets Platforms (minimum **500 Sq m** of platforms) with proper approach near APH(s) for storage of APH Baskets. Weight of stored APH baskets shall be accounted in the structure and platform design.
SG-11B	VI-B	A-02	60,61 of 66	3.02.00	Minimum 2.0M wide platforms… rain shall also be provided. Five (5) nos. of staircases (one each between the two ESP casings, ….. Further, the platforms between all the ESP casings shall be interconnected at least at one intermediate elevation.	Minimum 2.0M wide platforms… rain shall also be provided. Five (5) nos. of staircases (one each between the two ESP casings, ….. Further, the platforms between all the ESP casings shall be interconnected at least at one intermediate elevation. **Common platform of 1200 mm width for maintenance /access to ESP Inlet gate actuator to be provided. Similar platform for maintenance of ESP Outlet gates actuator to be provided.**
SG-12B	VI-A	IIA-01	3 of 28	2.07.00	**Superheater and Reheater Desuperheating Spray Systems** Desuperheating spray … Boiler Feed Pumps.	**Superheater and Reheater Desuperheating Spray Systems** Desuperheating spray … Boiler Feed Pumps. **Suitable Handling arrangement with hoist and monorail for spray station valves and actuators shall be provided.**
SG-13B	VI-B	A-05	7 of 29	5.01.00 A	vi) The slurry pumps shall also comply with the requirements stipulated in Clause 9.00.00 of this sub-section	vi) The slurry pumps shall also comply with the requirements stipulated in **Clause 8.00.00** of this sub-section.
SG-14B	VI-B	A-05	16 of 29	6.07.02	The limestone slurry pumps shall be designed to .... **Cl.No.9.00.00.** of this Sub-Section.	The limestone slurry pumps shall be designed to… **Cl.No.8.00.00.** of this Sub-Section.
SG-15B	VI-B	A-05	10 of 29	5.06.06	Three stage chevron …the third stage of mist eliminators. Wash water arrangement shall	Three stage chevron … the third stage of mist eliminators. Wash water arrangement shall also be provided at the back

S. NO.	SPECIFICATION REFERENCE				EXISTING (As per Base Specification)	PROPOSED CHANGE
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
					also be provided at the back end of the **second** stage of mist eliminator. If the mist eliminator washing system is designed for cyclic washing of different sections, all the valves required for cycling shall be motorized or pneumatically operated. NA The ME system shall be equipped with … at Mist Eliminator casing only for the portion which is not exposed to slurry. Ease of replace ability….defined sequence of time.	end of the **third** stage of mist eliminator. If the mist eliminator washing system is designed for cyclic washing of different sections, all the valves required for cycling shall be motorized or pneumatically operated. **Blanking plates used in left out area after placement of ME shall be minimized and shall either be made of Alloy 59/ C276 or lined with minimum 2 mm Alloy 59/ C276.** The ME system shall be equipped with … at Mist Eliminator casing only for the portion which is not exposed to slurry. **ME wash pipe supporting arrangement shall either be made of Alloy 59/ C276 or lined with minimum 2 mm Alloy 59/ C276**. Ease of replace ability….defined sequence of time.
SG-16B	VI-B	A-05	11 of 29	5.06.17	The spray headers (if provided) and air supply headers (exposed to slurry in any form) shall be made of FRP or Carbon Steel with Chlorolobutyl/ Bromobutyl rubber lining **(minimum 10 mm natural rubber lining**), corrosions…	The spray headers (if provided) and air supply headers (exposed to slurry in any form) shall be made of FRP or Carbon Steel with Chlorolobutyl/ Bromobutyl rubber lining **(minimum 10 mm thick rubber lining**), corrosions…
SG-17B	VI/B	A-05	17 of 29	7.03.05	The hydro-cyclone shall … replaceable rubber lining. The feed chamber shall be provided with a minimum lining thickness of 12mm …	The hydro-cyclone shall … replaceable rubber lining. The feed chamber ***and overflow launder*** shall be provided with a minimum lining thickness of 12mm…
SG-18B	VI/B	A-13	5 of 8	2.02.00A New clause added		Refer Annexure-SG-18B to this amendment for the clause.
SG-19B	VI/B	A-13	7 of 8	2.03.00 9) IV	Air & Flue Gas ducts with external stiffeners shall have first layer of insulation between the stiffeners and a second layer of insulation over stiffeners so that stiffeners are also insulated and a level surface is achieved. Other requirements are same as given in as specified at clause no 21.10.00 of this chapter.	Air & Flue Gas ducts with external stiffeners shall have first layer of insulation between the stiffeners and a second layer of insulation over stiffeners so that stiffeners are also insulated and a level surface is achieved. Other requirements are same as given in as specified at clause no. **2.02.00 and 2.02.00A** of this chapter.
SG-20B	VI/B	A-05	28 of 29	17.01.00	Thermal Insulation along with aluminum cladding shall be provided for all the equipments/ surfaces having skin temperature more than	Thermal Insulation along with aluminium cladding shall be provided for all the equipments/surfaces having skin temper-

Amendment-3B to Technical Specifications (Section VI) of SIPAT-III (1X800 MW) EPC Package

S. NO.	SPECIFICATION REFERENCE				EXISTING (As per Base Specification)	PROPOSED CHANGE
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
					60degree Celsius. The specification of the insulation including type, density, thickness, heat conductivity and finish shall be as specified in Sub-Section A-13, Part B of the Technical Specification.	ature more than 60 degree Celsius except for absorber**. Further, Thermal insulation of min 75 mm shall be provided for absorber outlet flue gas duct irrespective of skin temperature**. The specification of the insulation including type, density, thickness, heat conductivity and finish shall be as specified in Sub-Section A-13, Part B of the Technical Specification.
SG-21B	VI/B	A-13	1 of 9	1.00.00 b) i)	The minimum insulation thickness, however, shall not be less than 75 mm for Steam Generator surfaces and 25 mm for other surfaces.	The minimum insulation thickness, however, shall not be less than 75 mm for Steam Generator / ESP / FGD surfaces and 25 mm for other surfaces.