

NTPC Limited

(A Government of India Enterprise)



SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1x800 MW)

TECHNICAL SPECIFICATION

FOR

EPC PACKAGE

PART – B

(BOOK 5 OF 5 – QUALITY ASSURANCE)

SECTION - VI

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

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PART – B

QA SPECIFICATION

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INTRODUCTION TO QUALITY ASSURANCE SPECIFICATION

Introduction to the Quality Assurance Specification

For fulfilment of the relevant clauses (Test and inspection) of the General Conditions of Contract and General Technical Requirements of Contract, the Quality Assurance Specification acts as a part of the Technical Specification and is included in the Contract.

This part of the Technical Specification shall be read in conjunction with other parts of the technical specifications, General Technical Requirements and Erection Conditions of the Contract.

This document specifies the quality requirements, to be detailed in terms of Tests/Checks/Procedures at the times of manufacturing, Testing, Inspection and also during installation of various Equipment / Components at the place of manufacturer and / or on the site.

Various standards referred in this document shall be the latest revisions.

The quality requirements are spelt out in the following ways;

- 1) Thorough description
- 2) In the form of tables

In either of the above two forms the test /checks / procedures are mentioned against particular item/ equipment/ component/ system etc.

This specification also contains the Indicative vendor list (with disclaimer) mentioned against particular item/ equipment/ component/ system etc.

The quality requirements specified in this document and also the vendor list are only indicative and not exhaustive.

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SUB-SECTION– E-01

STEAM GENERATOR AND AUXILIARIES

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	STEAM GENERATOR AND AUXILIARIES 1.00.00 SHOP TESTS FOR STEAM GENERATOR 1.01.00 Pressure parts The material which can be identified against mill sheet or manufacturer test certificate only shall be used in the manufacture of pressure parts. Material shall meet all the mandatory requirements (and supplementary checks if asked for) of specified specification. All Plates above 40mm & all bar stock / forgings above 40 mm dia shall be ultrasonically tested. For pressure parts, plates of thickness equal to or above 25 mm shall be ultrasonically tested. Each plate shall be subjected to a 100% normal ultrasonic at the mill to meet the minimum requirements of EN 10160:1999 / equivalent ASTM standards 1.01.01 Drum / Separator/ Storage Tank (a) Each plate shall be subjected to a 100% normal ultrasonic at the mill to meet the minimum requirements of EN 10160:1999 / equivalent ASTM standards. Elevated temperature tensile tests shall also be carried out on plate material for each heat. (b) After cutting to size and removal of cut outs, the plates shall be subjected to magnetic particle test along the edges of the plate and on areas adjacent to the cut outs. (c) All forged connections shall be examined by 100% UT before machining. (d) Fully machined connecting pieces of internal diameter 100 mm and above, shall be subjected to magnetic particle examination / liquid penetrant examination (e) Mechanical tests shall be carried out on specimens prepared from the production control test plates of the longitudinal welds. (f) Mechanical tests shall be conducted on the specimens from manhole cutouts of dished ends. (g) On completion of welding, the entire Drum / Separator / Storage Tank shall be subjected to stress relieving in the furnace. (h) All butt welds shall be subjected to 100% ultrasonic testing/radiography/PAUT+TOFD and magnetic particle examination after stress relief. (i) All full penetration welds shall be subjected to ultrasonic examination after stress relief. (j) After stress relieving (SR) all welds, internal and external shall be examined by MPI methods depending on size and accessibility and all butt welds shall be subjected to 100% radiography. (k) All connecting tubes & pipes shall be subjected to UT prior to fabrication as per BS 3602 or equivalent with longitudinal calibration notch of depth 5% of wall thickness (0.3 mm min. and 1.5 mm max.) Note: PT can be carried out in inaccessible areas where MPI cannot be done		
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1.01.04	at point(a) shall be subjected to RT or UT or PAUT. (e) Minimum 10 % of the fillet joints shall be subjected to MPI/ LPI. However, Fillet welds of material grades P15E and above or any other new material grade subject to the acceptance by NTPC shall be subjected to 100% MPI / LPI. (f) Tubes and fabricated panels/coils shall be subjected to hydraulic pressure test including water wall panels, burner panels, preheaters, super heaters & economizers. (g) 10% hardness survey on butt welds of P15E material group and above. 10% Hardness checks shall also be carried out on welds of T23 material grade. 3% Hardness checks shall also be carried out on welds of T22 material grade used in water wall panels. (h) In case of RT of tube welds with DWDI (elliptical view) number of exposure shall be as per relevant code / plant standard and will not be less than two exposures for each weld wherever there is no limitation in carrying out two RT shots. (i) Panel /Coils: In case of spiral water wall design, trial assembly of complete wall of each side including hopper shall be carried out.			
	Boiler Piping (a) All raw materials used shall have co-related mill test certificate meeting material specification. (b) All pipe lengths shall be subjected to 100 % ultrasonic examination as per BS 3602 or equivalent with longitudinal calibration notch of depth 5% of wall thickness (0.3mm min. and 1.5mm max.) shall be adhered to. (c) All bent pipes shall be checked for ovality and thinning by UT on first off lot & on random samples for subsequent pieces. Outer surface of bends shall be subjected to MPI/LPI. (d) The edge preparation for shop and site welds in stainless steel /alloy steel shall be subjected to dye penetrant check. Non-destructive examination of welds shall be carried out after post weld heat treatment, if any. (e) All butt welds in alloy steel piping of P91, X20 and X 22 shall be checked for RT/ UT and MPI after SR. UT shall be of Digital Recordable Type. (f) All weld joints in alloy steel piping of P 91, X20 and X22 & other material of P15E group and above shall be checked for Hardness. For PWHT Induction Heating shall be deployed. However PWHT can be done in furnace also. 3% hardness check shall be carried out on welds of other alloy steel piping. (g) All load bearing attachment welds shall be subjected to MPI after SR. (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.			
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IBR. (e) Air seat leak test shall be carried out as per applicable Standards/Codes. (f) Functional testing shall be carried out on each valve to check the following as per the approved valve data sheet (1) Smooth operation (2) Valve travel, closing and opening time. (3) Current drawn by actuators. (g) Springs for safety valves shall be tested with suitable NDT and for spring rate. (h) Safety and safety relief valves shall be tested for performance. (i) All forgings rounds above diameter 40 mm shall be ultrasonically tested. (j) All critical valve components shall be tested for mechanical and chemical properties. TABLE-1 <table><tr><th>Valve size NB in mm</th><th>ANSI Class upto 300</th><th>ANSI Class above 300 upto 600</th><th>ANSI Class above 600 below 900</th><th>ANSI Class 900 & above & below 4500</th></tr><tr><td>Less than 50</td><td>Visual</td><td>Visual</td><td>Visual</td><td>MPI</td></tr><tr><td>50 & above but below 100</td><td>Visual</td><td>Visual</td><td>MPI</td><td>MPI & RT (on 10% of valves on 100% area)</td></tr><tr><td>100 & above but less than 300</td><td>Visual</td><td>MPI</td><td>MPI & RT (on 10% of valves on change of section & weld ends)</td><td>MPI & RT (on 100% area)</td></tr><tr><td>300 and above</td><td>MPI</td><td>MPI</td><td>MPI & RT (on change of sections & weld ends)</td><td>MPI, RT on 100% area)</td></tr></table> Note: For body and bonnet forgings, UT with MPI may be adopted in place of RT. For austenitic steel MPI may be replaced by LPI. 1.01.07 Non Pressure Bearing Attachments Load bearing welds shall be subjected to examination by ultrasonic testing (UT) and magnetic particle inspection (MPI) techniques after stress relief (SR). No load bearing welds shall be subjected to MPI after stress relief. The toes of the welds adjoining the drum / separator shall be ground smooth prior to stress relieving before carrying out this examination. Note: LPI can be carried out in inaccessible areas in place of MPI 1.01.08 Steam coil Air Preheater and Fuel Oil Heater	Valve size NB in mm	ANSI Class upto 300	ANSI Class above 300 upto 600	ANSI Class above 600 below 900	ANSI Class 900 & above & below 4500	Less than 50	Visual	Visual	Visual	MPI	50 & above but below 100	Visual	Visual	MPI	MPI & RT (on 10% of valves on 100% area)	100 & above but less than 300	Visual	MPI	MPI & RT (on 10% of valves on change of section & weld ends)	MPI & RT (on 100% area)	300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT on 100% area)					
	Valve size NB in mm	ANSI Class upto 300	ANSI Class above 300 upto 600	ANSI Class above 600 below 900	ANSI Class 900 & above & below 4500																									
	Less than 50	Visual	Visual	Visual	MPI																									
	50 & above but below 100	Visual	Visual	MPI	MPI & RT (on 10% of valves on 100% area)																									
	100 & above but less than 300	Visual	MPI	MPI & RT (on 10% of valves on change of section & weld ends)	MPI & RT (on 100% area)																									
	300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT on 100% area)																									
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	(viii) Pump performance. (ix) Unit run at rated voltage (x) Starting current at rated voltage. (xi) Cold start up test. (xii) Endurance test of motor windings, joints and terminal seals (xiii) Noise level. (xiv) Inspection of dismantled unit. (xv) High voltage test. (h) For heat exchanger for these pumps, butt welds on pressure parts shall be tested with RT/UT and all other welds shall be tested with MPI/LPI. Hydraulic test shall be carried out both on tube side as well as shell side at min. 1.5 times the design pressure.			
1.01.11	Condensate Transfer Pump a) Static and dynamic balancing of the rotary parts shall be carried out. b) Hydraulic pressure test shall be conducted on pumps casing at min. 1.5 times the Design Pressure. c) Each pump shall be subjected to a performance test at the manufacturer's works under as near actual site conditions as possible.			
1.01.12	Hydraulic Test (a) The drum and all components which are to be subjected to fluid pressure shall be tested to minimum of 150% of the design pressure. In determining the value of the maximum attainable pressure for any component the contractor shall take in to account all relevant factors (e.g. safety valve blow off pressure, fluid surges, etc.), which may cause an elevation in the pressure. The contractor shall furnish details of the basis of the calculation of maximum attainable pressure tests. The duration of the pressure tests shall be sufficient, as approved by the Engineer, to show any leakage paths and to permit a through examination of the component whilst under pressure. (b) The temperature of the fluid used for the pressure test shall be such as to avoid any possibility of brittle fracture at a low temperature and the same to be modified and submitted to the Engineer for approval, before commencing the test. (c) The fluid used shall be of sufficient purity and where relevant, inhibits to avoid excessive corrosion and /or damage to temporary parts either during the test or prior to drying and cleaning.			
1.01.13	Pneumatic Test of Compensating Pads: All compensating pads shall be provided with two-threaded weep holes to test welds at 0.5 Kg/sq. cm. (g) with soap solution and “no leakage” shall be ensured.			
1.02.00	ROTATING AND OTHER EQUIPMENTS/ITEMS FOR STEAM GENERATOR			
1.02.01	(a) The material which can be identified against mill sheet or manufacturer test certificate only shall be used in the manufacture of pressure parts. Material shall			
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1.02.05	(a) Raw material for shaft, coupling, gears and pinions, top and bottom races and other rotating components shall be subjected to UT. MPI/LPI shall be carried out to check surface soundness. (b) Wear-resistant parts shall be UT/ RT tested to check soundness after suitable heat treatment. Check for chemical composition, hardness and microstructure shall be carried out. For ceramic materials check for various properties including hardness, density, wear rate and composition shall be carried out. (c) Butt welds in the tube/ separator /body casing of the mill shall be tested by UT / RT and MPI. All other welds in main tube/separator shall be tested by MPI/LPI for acceptance. The tube shall be statically balanced. (d) All gearboxes shall be run tested for adequate duration to check rise in oil temperature, noise level and vibration. Check for leak tightness of gear case also shall be performed. (e) Trail assembly (stacking) of at least one Mill complete with all major components needs to be carried out at shop. (f) Fabricated pipe welds should be examined by MPI. (g) Ceramic/basalt lined piping/bends shall be checked for proper layout. (h) Weldments on burner components shall be checked with suitable NDT. The burner assemblies shall be tested for operation at shop.			
	Coal Feeders			
	(a) Any welds in the casing/ pulley fabrication shall be checked with MPI. (b) Type tests including degree of protection and routine tests shall be done as per relevant Indian Standards or equivalent International Standards. (c) All major items like plates for casings, head pulley, tail pulley, Pulley shaft and major castings shall be procured with respective material test certificates. (d) Leak tightness test shall be done on individual feeder casing. Functional test for load cell shall be carried out. (e) Test for weighing accuracy, calibration and repeatability shall be carried out at various speeds by a coal flow on one feeder. (f) Calibration check shall be carried out on all feeder cabinet/ assemblies prior to dispatch.			
	Fuel Oil Pumps			
	(a) Bar stock/forging above 40 mm diameter shall be subjected to UT. Impeller and rotor shall be dynamically balanced. (b) Pump assemblies shall be subjected to hydraulic test. (c) All pumps including spare cartridges shall be subjected to performance test at the manufacturer's works under as near site conditions as possible and strip down			

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	(c)All welds shall be subjected to 100% magnetic particle/dye penetrant check and butt welds shall be subjected to 100% radiographic testing. (d)All the bellows subjected to vacuum service shall be subjected to vacuum test. (e)The bellows shall be subjected to movement test to establish suitability to perform satisfactorily in site conditions. During this test spring rate shall also be measured. (f)The testing of MEJ shall be as per Expansion joint Manufacturer Association (EJMA) standard.			
1.02.16	Quick erect Scaffolding structure (vertical)			
	(a)Critical components shall be tested for Mechanical & Chemical properties and Dimensional conformity. (b)Partial Trial assembly. (c)Load test of platform & Scaffolding structure (vertical).			
2.00.00	FIELD /ERECTION CHECKS FOR STEAM GENERATOR & AUX.			
2.01.00	(1)Raw Material, In process and Non Destructive Testing indicated during manufacture shall be applicable for site fabrication/erection of the respective item. (a)All rotary equipments shall be checked for its direction of rotation and free movement after placing it on the foundation. (b)All Valves shall be checked for its direction of flow. (c)Insulation shall be carried out only after satisfactory inspection of leak test. (d)Erection checks, tolerance limits and Quantum of NDE are indicated in respective Drawing, Field Quality plan and Field Welding Schedule.			
2.02.00	Hydraulic Tests of Pressure Parts			
2.02.01	On completion of erection of Steam Generator, Piping and Auxiliaries, the unit with its fittings and mountings in position shall be subjected to hydraulic pressure test in accordance with requirements of Indian Boiler Regulations & NTPC Technical Specification.			
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SUB-SECTION–E-02

ELECTROSTATIC PRECIPITATOR

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	ELECTROSTATIC PRECIPITATORS 1.00.00 DISCHARGE AND COLLECTING ELECTRODES 1.01.01 1) Work tests for Discharge electrodes include the following (for the wire type electrodes) (a.) Chemical and tensile tests. (b.) Metallographic examination-longitudinal and transverse (250X) (c.) Surface finish and surface purity from chloride ions. (d.) Spring back and surface finish after coiling (applicable to helical discharge electrodes) For all other type of electrodes, testing to be carried out as per the applicable standards. (2) Work tests for collecting electrodes and rigid discharges electrode include the Following: (a) Chemical and mechanical properties. (b) Check for profile and straightness. (c) Check for surface finish and dimensional accuracy. (d) Cupping test for deep drawn sheets as per IS 513. 1.02.00 Thermal insulation shall be subjected to all tests as per IS: 8183. LRB mattresses/sections of Rockwool / Glass wool confirming to & tested as per relevant clauses of Indian Standards and shall meet the requirements of NTPC data sheet. Type tests except Thermal Conductivity shall be regularly carried out once in three months, Thermal Conductivity Type Test shall be carried out minimum once in twelve months by the manufacturer. Wire mesh of diameter 0.71mm (min.) or as per approved data sheet shall only be used. Requirements of various components like Binding wires, Lacing wires, Wire mesh, etc. shall be as per NTPC approved data sheet / as given in (Technical Requirements of Electrostatic precipitator). 1.03.00 ESP Structure (a) Only material which has been identified against mill sheet or test certificates shall be used for construction. All plates above 40mm thickness shall be 100% ultrasonically tested. (b) Visual inspection of all welds shall be performed in accordance with AWS D.1.1. (c) NDT requirements of structural steel welds shall be as under:- (i) 100% RT/UT on butt-welds of plate thickness ≥ 32 mm. (ii) For plates of $25\text{mm} \leq \text{thickness} < 32\text{mm}$ - 10% RT/UT and 100% MPI. (iii) For plates of thickness $< 25\text{mm}$ - 10% MPI/LPI. (iv) All fillet welds of structural members shall be inspected 100% by MPI. (d) Edge for shop & field weld shall be examined by MPI for plate thickness $\geq 32\text{mm}$.		
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SUB-SECTION–E-03

NOT USED

SUB-SECTION–E-04

FGD SYSTEM

CLAUSE NO.	QUALITY ASSURANCE 		
	FLUE GAS DESULPHURISATION SYSTEM 1.00.0 FLUE GAS DESULPHURISATION SYSTEM 1.01.0 Mills: 1.01.01 Raw material for shaft, coupling, gears and pinions, top and bottom races and other rotating components shall be subjected to UT. MPI/LPI shall be carried out to check surface soundness. 1.01.02 Wear-resistant metallic parts, if applicable shall be UT/RT tested to check soundness after suitable heat treatment. Check for chemical composition, hardness and microstructure shall be carried out. 1.01.03 Butt welds in the tube/body/shell casing of the mill shall be tested by RT and MPI. All other welds in main tube/ body casing shall be tested by MPI/LPI for acceptance. 1.01.04 All gearboxes shall be run tested for adequate duration to check rise in oil temperature, noise level and vibration. Check for leak tightness of gear case also shall be performed. 1.01.05 No load run test of the assembly shall be demonstrated at shop/site depending upon its design/feasibility. 1.02.0 Feeders: 1.02.01 Any welds in the casing/pulley fabrication shall be checked with MPI. 1.02.02 Routine tests shall be done as per relevant Indian Standards or equivalent International Standards. 1.02.03 All major items like plates for casing, head pulley, tail pulley, pulley shaft and major castings shall be procured with respective material test certificates. 1.02.04 Calibration check shall be carried out on all feeders. 1.03.0 Dampers: 1.03.01 All the dampers shall be subjected to operational test/checks with the job actuator. 1.03.02 Gas tight Dampers shall be subjected to shop leakage test to demonstrate the guaranteed tightness as per NTPC Tech Specification. 1.04.0 PIPING, VALVE AND SPECIALITIES: 1.04.01 All pipes and fittings shall be tested as per applicable code. 1.04.02 All valves shall be hydraulically/Air tested for body, seat and back-seat (if applicable) as per relevant standard. 1.04.03 NDT on valves shall be as per relevant standard. 1.04.04 Valves shall be offered for hydro test in unpainted conditions. 1.04.05 Functional checks of the valves for smooth opening and closing shall also be done.		
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1.05.00	TANKS / VESSELS:			
1.05.01	Atmospheric tanks:			
	i) All welds joints shall be DP tested and tanks shall be water fill tested up to liquid level as per construction Code. ii) All atmospheric storage tanks fabricated and erected at site shall be subjected to tests (NDT and Vacuum) according to design code/standard as applicable. iii) Lining of the tanks/vessels shall be tested for hardness and spark test etc, as per applicable standard.			
1.05.02	Pressure vessels:			
	1) NDT on weld joint shall be as per respective code requirements or the minimum as specified as below: i) 100% DPT on root run of butt weld, nozzle welds and finished fillet welds. ii) 10% DPT on all finished butt welds. iii) 10% RT (covering all 'T'/cross joints) of butt welds. 2) Butt welds of dished ends shall be stress relieved and subjected to 100% RT. 3) Each finished vessels shall be hydraulically tested to 150% of the design pressure for a duration of 30 minutes.			
1.06.00	HEAT EXCHANGER/HEATER:			
1.06.01	All material shall be tested for chemical and mechanical properties and NDT as per relevant standard.			
1.06.02	NDT on welds and other checks shall be as per relevant code.			
1.06.03	Air heaters shall be subjected to dimensional and clearance checks as per standard practice			
1.06.04	Lube. oil system, drive system, soot blowing system etc. of Air heaters shall be checked suitably as per standard practice			
1.07.00	PUMPS:			
1.07.01	UT on shaft forgings (greater or equal to 40mm) and MPI/DPT shall be done on shafts and impeller to ensure freedom from defects.			
1.07.02	The pump casing shall be hydraulically tested at 200% of pump rated head or at 150% of shut off head, whichever is higher. The test pressure shall be maintained for at least half an hour.			
1.07.03	The pump rotating parts shall be subjected to static and dynamic balancing.			
1.07.04	All pumps shall be tested at shop for capacity, head efficiency and brake horse power as per relevant/applicable standard.			
1.07.05	Noise and vibration shall be measured during the performance testing at shop.			
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1.08.00	STRUCTURES , DUCTS, HOPPERS:		
1.08.01	All materials shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% ultrasonically tested.		
1.08.02	Visual inspection of all welds shall be performed in accordance with AWS D1.1.		
1.08.03	NDT requirements of structural steel welds shall be as under: i) 100% RT/UT on butt-welds of plate thickness >= 32mm. ii) For plates of 25mm<=thickness<32mm-10% RT/UT and 100% MPI. iii) For plates of thickness <25mm-10% MPI/LPI.		
1.08.04	Edge for shop and field weld shall be examined by MPI for plate thickness >= 32mm.		
1.08.05	Cladding material and its application on the ducts shall be tested as per applicable standard.		
1.09.00	VACUUM BELT FILTER SYSTEM:		
1.09.01	Impeller, casing and shaft of vacuum pumps shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% ultrasonically tested.		
1.09.02	UT on shaft (if greater or equal to 40mm) and impeller shall be carried out.		
1.09.03	All vacuum pumps shall be tested at shop for capacity, power, pressure, efficiency, noise and vibration etc.		
1.09.04	Filter cloths and belts shall be tested for physical properties as per relevant standard		
1.09.05	Hydro cyclones shall be checked by visual, dimensional etc.		
1.10.00	SPRAY NOZZLES:		
1.10.01	Spray nozzles shall be tested for physical properties		
1.10.02	Spray nozzles also shall be subjected to performance test.		
1.11.00	AGITATORS:		
1.11.01	Lining of the agitator shall be tested for hardness and spark test etc. as per applicable standard.		
1.11.02	Impellers shall be tested for dimensional and balancing check. All impeller welds shall be tested by PT / MT.		
1.11.03	Gear Boxes shall be tested for run test as per standard practice		
1.12.00	FANS:		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-4 FLUE GAS DESULPHURISATION SYSTEM
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CLAUSE NO.	QUALITY ASSURANCE			
1.12.01	Impeller, casing, blades and shafts of fans shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% ultrasonically tested.			
1.12.02	Rotor components shall be subjected to ultrasonic test at mill and magnetic particle inspection / liquid penetrant examination after rough machining.			
1.12.03	Butt welds in rotor components shall be subjected to 100% RT and all welds shall be magnetic particle/dye penetrant tested after stress relieving. Due to design of the rotor in case RT is not feasible then in lieu of RT, UT shall be performed.			
1.12.04	All rotating components and assemblies of fan shall be balanced dynamically			
1.12.05	Performance test shall be carried out on fans as per Technical specification/ Relevant standard			
1.12.06	Test for Natural Frequency and hardness of Fans blades shall be carried out as per Technical specification/ relevant standard.			
1.13.0	OXIDATION BLOWER			
1.13.01	Impeller, casing, gears and shafts of oxidation blowers shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% ultrasonically tested.			
1.13.02	Butt welds in rotor components shall be subjected to 100% RT and all welds shall be magnetic particle/dye penetrant tested after stress relieving (if applicable).			
1.13.03	All rotating components and assemblies of blower shall be balanced dynamically.			
1.13.04	Performance test shall be carried out on blowers as per Technical specification/ relevant standard.			
1.14.00	ABSORBER			
1.14.01	All weld joints shall be tested to suitable NDT techniques as applicable to the materials being welded, joint design , weld profile and corrosion protection requirement etc. according to design code/ standard as applicable.			
	Tanks shall be water fill tested up to liquid level as per construction Code.			
	Vacuum test according to design code/standard as applicable.			
1.14.02	Cladding / Bonding material and its application shall be tested as per applicable standard. Corrosion test on Corrosion Resistant Alloy shall be performed as per ASTM G48/applicable relevant standard for C276 Gr material.			
	For Ti Cladding Material shall meet the NTPC Datasheet and shall be tested as per relevant applicable Indian/International standard as applicable.			
1.14.03	Absorber fabricated and erected at site shall be subjected to all tests according to design code/ standard as applicable.			
1.15.00	Thermal Insulation, Lagging & Cladding:			
	(a) Lightly resin bonded mineral wool:			
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CLAUSE NO.	QUALITY ASSURANCE		
	LRB mattresses/sections of Rockwool/ Glass wool shall conform to & tested as per relevant clauses of Indian Standards and shall meet the requirements of NTPC data sheet. Type tests except Thermal Conductivity shall be regularly carried out once in three months, Thermal Conductivity Type Test shall be carried out minimum once in twelve months by the manufacturer. Requirements of various components like Binding wires, Lacing wires, Wire mesh, etc. shall be as per NTPC approved data sheet / as given in respective Sub-Section of Technical Requirements of Steam Generator & Auxiliaries. (b) Lagging & Cladding: All insulation shall be protected by means of an outer covering of Aluminum sheeting confirming to ASTM B-209-1060 temper H14 from reputed manufacturer meeting the requirements of NTPC data sheet. 1.16.00 OTHER CRITICAL EQUIPMENTS: 1.16.01 Checks/ NDTs shall be done as per relevant Indian Standards or equivalent International Standards. 1.17.00 BOROSILICATE LINING: Borosilicate block shall conforms to NTPC data sheet and to be tested as per Relevant applicable standard .		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-4 FLUE GAS DESULPHURISATION SYSTEM	Page 5 of 5

SUB-SECTION–E-05

LOW PRESSURE PIPING

LOW PRESSURE PIPING

PIPES, FITTINGS, BENDS, VALVES, COATING-WRAPPING, STRAINERS EXPANSION, JOINTS, TANKS, FASTENERS, LINING ETC.

	Tests/Check Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y ^a	Y ^b			Y ¹			Y			Y	
2	Diaphragm Valves	Y ^a				Y ⁵			Y		Y ⁶		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y ⁷		
	Body	Y ^a	Y ^b										
	Disc	Y ^a	Y ^b										
	Shaft	Y ^a	Y	Y ^c									
3B	Fabricated Butterfly Valves	REFER NOTE 14											
4	Gate/ Globe/Swing Check / Ball Valves	Y ^a	Y ^b	Y ^c		Y ⁵	Y	Y	Y	Y	Y ⁸		
5	Dual Plate Check Valves	Y ^a	Y ^b	Y ^c		Y	Y	Y	Y	Y	Y ⁴		
6	Rolled & Welded Pipes and Mitre Bends	Y ^a	Y ³		Y	Y ³			Y		Y ^{3&15}	Y	
7	Coating & Wrapping of Pipes	Y ²									Y ²		
8	Tanks & Vessels	Y ^a	Y ^b		Y	Y			Y		Y ¹⁶		
9	Strainers	Y ^a	Y ^b		Y #	Y					Y ¹¹		#For Fabricated Strainer
10	Rubber Expansion Joints	Y ^a				Y ¹²		Y	Y		Y ¹³		
11	Internal Lining of Pipes	Y ^a							Y		Y ⁹		
12	Site Welding		Y ¹⁰		Y	Y							
NOTES (MEANING OF SUPERSCRIPTS)													
a	One per heat/heat treatment batch/lot.												
b	On machined surfaces only for castings and on butt welds.												
c	For shaft/spindles > or = 40 mm												
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.												
2	Spark Test, Adhesion Test and Material Test for primer and enameled & Coal Tar Tapes as per AWWA-C-203-91/ IS-10221 & IS 15337 as applicable.												
3	Followings are the testing requirements for fabrication of pipes at site												
	TESTS					QUANTUM OF CHECKS							
	WPS, PQR, Welder Qualification Test					100% Welders and WPS shall be qualified as per ASME- section IX							
	DPT on root run					100% for pipes up to 1200 mm diameter							
	DPT after back gauging					100% for pipes above 1200 mm diameter							
	RT / UT by (TOFD/PAUT) Technique					5% (100% of T Joints)							
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LOW PRESSURE PIPING

	DPT on finished butt weld joints	10%
	Hydraulic Test	100%, 1.5 times the design pressure or 2 times the working-pressure whichever is higher.
4	Dry Cycle Test on Dual Plate Check valve spring for one lakh Cycles shall be carried out as a type test. If Dry Cycle test carried out earlier for same material & diameter, Test report shall be reviewed.	
5	Seat Leakage Test for Actuator Operated Valves, shall be done with by closing the valves with actuator.	
6	Tests on rubber parts shall be conducted per batch of rubber mix for tensile, Elongation, hardness, adhesion, spark test, bleed resistance test. In addition, type test for 50,000 cycles of each type of diaphragm shall also be conducted.	
7	Hydraulic Test of Body, Seat and disc-strength shall be carried out in accordance with governing design standard in presence of owner / owner's representatives. Actuator operated valves shall be checked for Seat Leakage by closing the valves with actuator. For Proof of Design Test refer respective chapters of engineering portion in the technical specification.	
8	Blue matching, wear travel for gates, valves, pneumatic seat leakage, and reduced pressure test for check valves shall be done as per relevant standard. Maximum allowable vacuum loss is 0.5 mm of Hg abs. for valves to be tested for vacuum operation for internal pressure 25 mm of Hg abs. for a period of 15 minutes. Fire safe test for ball valve shall be done wherever specified. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives. Valves shall be offered for hydro test in unpainted condition.	
9	Tensile, Elongation, Hardness, Specific Gravity, Lining Thickness, Humidity Check, Pipe temperature check, Adhesion Test and Holiday Detection Test etc as per applicable standard shall be done for all lining material and application.	
10	10% of welds (Root and finished welds) shall be subjected to DPT. (100% DPT for compressed air line and boiler & deaerator fill line.).	
11	Pressure drop across the strainer for each type and size as a special test shall be carried out. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives.	
12	During hydraulic and vacuum tests at 25mm Hg abs in 3 positions, the change in the circumference of arch should not be more than 1.5%. 24 hrs after the test permanent set in dimension should not exceed 0.5%.	
13	Tests on rubber for tensile, elongation, hardness, hydraulic stability check as per ASTM D 471, ozone resistance test as per ASTM D 1149/IS 3400 Part 20 aging test and adhesion strength of rubber to fabric, rubber to metal adhesion shall be carried out.	
14	In addition of all tests as indicated for Cast Butterfly valve being applicable for fabricated butterfly valves, following test shall be done for Fabricated Butterfly Valve: - UT as per ASTM A-435/IS 11630 & IS 4225 on plate material for body and disc shall be carried out for plate thickness 25mm and above. 100% RT and DPT as per ASTM, Section-VIII, Division-I, on butt joins of body and disc. 10% DPT on other welds shall be done. - Post weld heat treatment as per ASME, Section-VIII, Division-I on butt joints of body and disc. - Welders and WPS shall be qualified as per ASME- section IX	
15	Maximum number of segments in segmental flanges shall be four (04) only. All butt weld joints in the segmental flanges shall be examined by RT/UT. Segmental flanges exceeding 37.5 mm thickness shall be stress relieved as per norms of ASME Section VIII after welding.	
16	For pressure vessel welds RT shall be done as per design code requirements.	

All Valves shall be offered for inspection in unpainted condition.

No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.

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SUB-SECTION–E-06

POWER CYCLE PIPING

CLAUSE NO.	QUALITY ASSURANCE			
	POWER CYCLE PIPING			
1.00.00	H.P.PIPING FOR STEAM GENERATOR AND TURBINE GENERATOR & AUX.			
1.01.00	Piping: (a) All raw materials used shall have co-related mill test certificate meeting material specification. All tests, as given in respective material code (other than supplementary requirements), shall be carried out as minimum. This includes the tests wherein it is specified in the ASTM code that “the test is to be carried out when specified by the purchaser” or any such indication, in the code (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: DOWN STREAM OF AUX. PRDS (where carbon steel is used) and aux. steam piping system (station HDR, unit HDR, interconnection) where notch depth of 12.5% of the selected wall thickness (1.5mm maximum) will be adhered to. (c) The edge preparation for shop and site welds in stainless steel /alloy steel shall be subjected to a dye penetrate check. (d) Pipe bend shall be checked for ovality and thinning by ultrasonic or other acceptable methods on first off lot & on random samples for subsequent pieces for high pressure applications. Outer surface of bends shall be subjected to magnetic particle examination/LPI. (e) Non-destructive examination of welds shall be carried out after post weld heat treatment, if any. (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. (g) For welds in P91, X20 & X22 and material P15E group & above Materials requiring heat treatment, induction type of heating shall be deployed for post weld heat treatment, or heat treatment can be carried out in furnace. (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.			
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CLAUSE NO.	QUALITY ASSURANCE			
1.02.00	(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. (3) For all other pipes not covered above, shall be subjected 100% MPE/ DPT in case of underground pipes and 10% MPE/DPT in case of piping above the ground. Further, 10% of butt welds of underground piping shall be subjected to RT. (i) Wherever SR/PWHT is envisaged for alloy steel, above NDTs shall be after SR/PWHT. (j) Hardness survey of welds shall be carried out on alloy steel/stainless steel piping (100% Hardness survey of welds on P91, X20 & X22 & above material grade of P15E above piping) and 3% hardness survey on welds of other alloy steel. Fittings: (a) Raw material of all forged/formed fitting shall be ultrasonically tested. All mother pipes used for fitting shall be ultrasonically tested or hydraulic tested. Forged fitting shall be ultrasonically tested and formed fittings shall be MPI tested. All tests, as given in respective material code (other than supplementary requirements), shall be carried out as minimum. This includes the tests wherein it is specified in the ASTM code that “the test is to be carried out when specified by the purchaser” or any such indication, in the code (b) Fittings shall be subjected to suitable NDT as per applicable standards. However following minimum. NDE requirement shall be applicable / met. (i) For fittings X20, P-91 & P-92 and material group P15E & above - 100% MPI & - 10% hardness check. - Also 100% UT/RT, for fittings of 200 NB & above (ii) 100% UT/RT for fittings of 200 NB & above for boiler feed discharge, recirculation and spray piping of boiler feed system. (iii) 100% UT/RT for fittings of all other piping of size OD 508 mm & above.			
	1.03.00	Hangers & Supports:		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-6 POWER CYCLE PIPING	Page 2 of 5

CLAUSE NO.	QUALITY ASSURANCE
	(a) All raw materials used shall have co-related mill test certificate meeting mandatory checks of material specification. (b) Completed springs shall be tested for Scragging Test & Load vs Deflection Test and for dia. > 25mm MPI shall be carried out. (c) Butt Welds shall be tested for UT and fillet welds shall be tested for MPI. (d) Turn buckle/ pipe clamps/ Hangers of thickness > 25mm shall be checked by MPI/DPT on bent portion. (e) Assembled Hangers shall be checked for Variation in deflection and Travel vs Load test and shall meet the requirements of NTPC data sheet. Thermal Insulation & Lagging, Cladding: Light resin bound mineral wool: LRB mattresses of Rockwool / Glass wool confirming to IS-8183, tested as per relevant clauses of IS 3144 and shall meet the requirements of NTPC data sheet. Type tests except Thermal Conductivity shall be regularly carried out once in three months, Thermal Conductivity Type Test shall be carried out minimum once in twelve months by the manufacturer. Requirements of various components like Binding wires, Lacing wires, Wire mesh, etc. shall be as per NTPC approved data sheet / as given in respective Sub-Section of Technical Requirements of Power Cycle system. Lagging & Cladding: Aluminum sheeting confirming to ASTM B-203-1060 temper H14 from reputed manufacturer meeting the requirements of NTPC data sheet. Valves: (a) Pressure retaining parts of valves shall be subjected to (min.) NDT as per Table 1. (b) Hardened/stellitted valve disc and seat are to be subjected to LPI and hardness check. (c) Color matching of valve disc/plug and seat shall be carried out to ensure min. 80% contact and no through passage. (d) Hydraulic pressure test and seat leak test shall be carried out as per ANSI 16.34/ IBR. (e) Air seat leak test shall be carried out as per applicable Standards/Codes. (f) Functional testing shall be carried out on each valve to check the following as per the approved valve data sheet (1) Smooth operation (2) Valve travel, closing and opening time.
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(3) Current drawn by actuators.

(g) Springs for safety valves shall be tested with suitable NDT and for spring rate.

(h) Safety and safety relief valves shall be tested for performance.

(i) All forgings rounds above diameter 40 mm shall be ultrasonically tested.

TABLE-1

Valve size NB in mm	ANSI Class up to 300	ANSI Class above 300 up to 600	ANSI Class above 600 below 900	ANSI Class 900 & above & below 4500
Less than 50	Visual	Visual	Visual	MPI
50 & above but below 100	Visual	Visual	MPI	MPI & RT (on 10% of valves on 100% area)
100 & above but less than 300	Visual	MPI	MPI & RT (on 10% of valves on change of section & weld ends)	MPI & RT (on 100% area)
300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT on 100% area)

NOTE: For body and bonnet forgings UT with MPI may be adopted in place of RT

For austenitic steel MPI may be replaced by LPI.

1.06.00

CHEMICAL DOSING SYSTEM (HP/LP/OXYGENATED)

(a) Pumps of chemical **dosing** system shall be performance tested as per relevant international codes.

(b) In case of diaphragm type of pumps, the life cycle test shall be done on pumps. If this test is already conducted for same model in earlier projects of NTPC, then TCs for same shall be reviewed.

(c) Dosing skid shall be subjected to leakage test and functional test.

CLAUSE NO.	QUALITY ASSURANCE		
1.07.00	(d) Oxygen cylinders shall be as per relevant standard meeting statutory requirements. MEATLLIC EXPANSION JOINT FOR PIPING (IF APPLICABLE) (a.) Hydraulic pressure test shall be carried out on each pipe and expansion bellow. (b.) Longitudinal butt weld on bellow shall be subjected to suitable NDT examination before forming, and after forming MPE / DP test shall be carried out. (c.) All welds shall be subjected to 100% magnetic particle/dye penetrant check and butt welds shall be subjected to 100% radiographic testing. (d.) All the bellows subjected to vacuum service shall be subjected to vacuum test. (e.) The bellows shall be subjected to movement test to establish suitability to perform satisfactorily in site conditions. During this test spring rate shall also be measured. (i.) The testing of MEJ shall be as per Expansion joint Manufacturer Association (EJMA) standard.		
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SUB-SECTION–E-07

NOT USED

SUB-SECTION–E-08

STEAM TURBINE & AUXILIARIES

CLAUSE NO.	QUALITY ASSURANCE			
1.00.00	STEAM TURBINE & INTEGRAL AUXILIARIES			
	GENERAL REQUIREMENTS			
	Refer QA & I portion of General Technical conditions of technical specification.			
	(a) Shop Tests Shop tests shall include all tests to be carried out at Contractor's works, at works of his sub-contractor and at works where raw material is manufactured for equipment. Testing requirement of major equipment over and above the respective code/standard requirements are given for ST & Aux. including Condenser, HP Bypass System & Vibration Isolating System. (b) Site Tests The Contractor shall prepare and submit detailed field quality plans in the format prescribed by NTPC setting out the quality practice and procedures to be adopted by him for assuring quality for each equipment of material at this specification from the receipt of material at site, during storage erection, pre-commissioning to final commissioning of the plant. However, the bidder may furnish the quality plans in his standard formats provided such quality plans contain the details required as per format enclosed as Annexure-II. These procedures shall necessarily include all checks/tests conducted at site for preservation, assembly, alignment, positioning of the equipment, foundation preparation, welding/bolting heat treatment, non-destructive examination, hydraulic test, running test, performance test etc. The Contractor shall also furnish detailed quality procedure proposed by him for storage, preservation, painting, acid cleaning, alkali boil out, steam blowing, hydraulic test air/gas tightness test etc. to the Employer. The same shall be discussed and finalised with the Employer and six numbers of such finalised copies shall be submitted.			
1.01.00	STEAM TURBINE AND ASSOCIATED EQUIPMENT			
1.01.01	High Pressure Cast Steel Enclosures: High pressure Cast Steel Enclosures (for example High pressure and Intermediate Pressure Inner and Outer Cylinders, Steam Chests and liner, Steam Inlet Pipes, nozzle boxes etc.). (1) Test pieces fully representative of the material and condition of the casting shall be made available at OEMs works to enable the properties of material to be determined.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 1 of 26

CLAUSE NO.	QUALITY ASSURANCE 		
	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 maximum 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 maximum test duration of 1000 hrs/mutually agreed parameters for NTPC approval. d) Unspecified alloying elements shall be controlled as per the applicable standard. (2) Each casting shall be subjected to magnetic particle examination on the entire inner and outer surfaces after heat treatment. (3) Each casting shall be subjected to a 100% examination for internal flaws by ultrasonic/ radiographic method after heat treatment and suitable preparation. (4) Cast enclosure shall be subjected to a hydraulic pressure test based on established practice of manufacturer unless there is a geometrical constraint for doing hydro test. Bidder to furnish their practice in this regard for Employer's approval. (5) Excavated area of all the defects shall be subjected to MPI/DPI to ensure excavation up to sound area. All the areas repaired/upgraded by welding shall be examined by UT, RT (where UT results cannot be analyzed correctly) and MPI. Sketches/reports of location of repair and reports of NDT carried out on repaired areas shall be submitted along with certificates. Hardness survey shall be carried out on the repaired area. (6) Where stub pipes and transition pieces are welded to the main body of an enclosure the following shall be carried out: (i) Radiographic examination or Ultrasonic testing and Magnetic particle or dye penetrant examination of weld preparation.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 2 of 26

CLAUSE NO.	QUALITY ASSURANCE			
1.01.02	(ii)	Magnetic particle examination of finished welds after stress relief.		
	(iii)	Radiographic or ultrasonic examination of finished welds.		
	(iv)	Before despatch to site, the site weld preparations on the stub pipes and transition pieces shall be subjected to 100% RT/UT and magnetic particle examination / Dye penetration test.		
	(v)	Hardness survey on the weld joint, HAZ and parent material.		
	(7)	Wall thickness measurement by ultrasonic for critical and highly stressed zones of the casting shall be carried out.		
	(8)	Colour matching of castings by putting two halves together or feeler gauge tightness check from outside to ensure required contact area and joint tightness shall be carried out.		
	Low Pressure Enclosure (Fabricated)			
	(a)	Where welds are made by chipping and grinding back to the first side weld before completing the weld from second side, a magnetic particle or dye penetrant examination of the chipped area shall be carried out.		
	(b)	Bidder to furnish their practice regarding stress relieving of the fabricated enclosures for Employer's approval.		
	(c)	Bidder to furnish their standard practice regarding NDT on welds for Employer's approval, however following are minimum NDT requirements:		
	Butt welds	10% RT or UT and 10% MPE/DP test		
	Fillet welds	10% MPE/DPT		
	Nozzle welds	10% MPE/DPT		
	Lifting lug & other load bearing fillet welds	100% MPE/DPT		
	Site weld edge preparations	10% MPE/DPT		
(d)	Bidder to furnish his proven practice for hydraulic pressure tests. If it is not their practice, the justification for not carrying out hydraulic test shall be furnished for Employer's approval.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 3 of 26

CLAUSE NO.	QUALITY ASSURANCE 		
1.01.03	(e) Feeler gauge tightness check from inside and outside to ensure required joint tightness shall be carried out. Rotors (a) Forgings Rotor forgings (monoblock and/or discs), Impulse Wheel & Nozzle Box and coupling forgings : (1) Fully representative tangential or radial test pieces shall be provided at each end of the body, at each shaft end and radial test piece from the trepanned core (when a core is trepanned) respectively to determine mechanical properties including impact, brinell hardness etc. and tests for notch toughness i.e. FATT (both transition temperature and room temperature impact values). (2) 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 maximum 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 maximum test duration of 1000 hrs/mutually agreed parameters for NTPC approval. d) Unspecified alloying elements shall be controlled as per the applicable standard. (3) Heat treatment should be carried out in such a way so as to ensure minimum residual stress in the rotor. Residual stress measurement will be carried out. (4) Each forging shall be subjected to a 100% ultrasonic examination. Normal probes and angular probes with different probe angles shall be used for thorough examination to ensure complete soundness of the forging.		
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	Supplier should furnish the proposal, alongwith scanning plan and probe angles to be used, for Employer's approval. (5) When a rotor forging is bored, a visual and magnetic particle examination of the bore shall be carried out. (6) Thermal stability tests shall be carried out on HP and IP rotor forgings to ensure the thermal stability of the rotors in service and at over speed. (7) Following tests shall be carried out on the rotor welds: (i) Ultrasonic examination with normal and angular probes of the weld to ensure complete coverage and freedom from harmful defects. (ii) Run out of rotor before and after welding (iii) MPE on finish welds. (iv) Hardness survey on the welds. (v) Stress relieve annealing. (vi) Test reports of filler material used. (vii) Dimensional record of weld preparation. (8) Dimensional Examination of the rotor blade grooves and other important dimensions to be carried out to ensure the conformance to drawing dimensions, Log sheets/records shall be prepared for all important dimensions. (b) Complete Rotors (1) Axial & radial run-outs and surface finish checks shall be carried out before and after blading and after over speed tests. (2) Check for clearance between rotor groove and blade at the root in line with manufacturer's standard and proven practice being followed. (3) Rotors shall be dynamically balanced at rated speed. (4) An over speed test shall be carried out during which the rotor shall withstand an over speed of 125% for two continuous minutes. If bidder's practice is different from as stated above, then same shall be furnished to Employer's		
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1.01.04	approval. During this test vibration measurement and analysis shall be carried out. (5) After blading, rotor stages with free standing blades over 225 mm of active length are to be given standing vibration tests to determine natural frequencies in various vibration modes to ensure that the ranges are outside operating frequencies and to check correct fitment of blades. The modes to be tested are: Bucket group tangentials, wheel axials and group axials. (6) In case, impulse stage and or blade discs are fitted on the rotor, fit up between such disc and rotor to be checked up before and after over speed. (7) Lock blade lift after the over speed, if applicable based on manufacturer's standard design & practice shall be checked and record for same shall be maintained.		
	Stator & Rotor Blades and Shroud Bands (a) Fully representative test pieces shall be made available at OEMs works to enable mechanical properties of the material to be determined. In case of blades machined from bar stock, mechanical tests shall be carried out on the hardest and softest specimens of each heat treatment batch. Hardness test will be carried out on 100% basis. (b) Creep requirements shall be similar as applicable for High Pressure cast steel enclosures. (c) Each bar stock for machining blades and forging shall be subjected to 100% ultrasonic examination. (d) When erosion shielded, the erosion shield and blade joint shall be radiographed. In case of flame and laser hardening MPI shall be done. (e) Dye penetrant checks shall be made on the erosion shield and blade joint in manufacture prior to fitting to the wheel and after over speed tests. (f) Magnetic particle inspection or dye-penetrant examination (when MPI is not applicable) shall be carried out on finish machined blade profile, roots and shrouds. (g) All moving blades of over 225mm active length are to be moment weighed and assembled on shaft in a prescribed sequence to ensure optimum balancing of rotor.		
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1.01.05	(h) Natural frequencies of the L.P Turbine blades shall be determined before mounting on rotors to ensure that the same are outside operating frequency range. (i) Shroud bands after punching and after riveting shall be subjected to 100% DPT to ensure freedom from harmful surface defects. (j) In case of cast blades, following testing shall be done:- (1) Chemical analysis/Mechanical testing per heat/heat treatment batch. (2) Rough machined/finish machined blade surface shall be subjected to MPI/DPT respectively. (3) -RT/UT on blades as per supplier standard practice. (4) Before starting mass productions, following technological tests shall be carried out on the first lot of 10 to 15 blades:- (i) 100% radiography and 100% MPI on blades (ii) 100% hardness testing. (iii) Mechanical testing and metallurgical testing. (iv) Weld repair shall not be permitted unless prior approval of Employer is obtained. In case of repair is allowed, manufacturer shall submit WPS/PQR and defectogram for Employer's approval before welding. After weld repair, RT shall be carried out on repaired area.		
	Diaphragms (a) Welded and fabricated Diaphragms (1) Concentricity checks shall be carried out on finally machined diaphragms to ensure that there are no negative overlaps between guide and moving blades. (2) 10% Ultrasonic examination and 10% magnetic particle examination / dye penetration examination shall be carried out on finished, stress relieved and machined welds (b) Cast/Forged/Machined Diaphragms (1) Details of the results of the tests conducted to determine mechanical properties together with chemical analysis, metallographic/ metallurgical examination, and heat		
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1.01.06	treatment procedures recommended and actually followed shall be recorded on certificates. (2) Concentricity, flatness, blade drop and area checks shall be carried out on finally machined diaphragms to ensure that there are no negative overlaps between guide and moving blades and port wall. Finish shall be to Project Manager's approval. (3) A 100% ultrasonic examination shall be carried out on diaphragm materials. Blade junction areas with the side walls shall be checked by magnetic particle or dye penetrant testing. (c) Colour matching of all the diaphragms by putting two halves together or feeler gauge tightness check shall be carried out. Stop, Control and bypass valves, actuators/servo-motors and steam strainers (a) Test pieces shall be made available at OEMs works to enable the mechanical properties of valve bodies, bonnets, valve disc and seat, and valve spindle material to be determined. Test Creep requirements: i. Steels chosen for design metal temperatures less than 400°C are exempt from creep /stress rupture testing. ii. 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 maximum test duration of 1000 hrs/ mutually agreed parameters for NTPC approval. iii. 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 maximum test duration of 1000 hrs/mutually agreed parameters for NTPC approval. Unspecified alloying elements shall be controlled as per the applicable standard. (b) Dye penetrant checks shall be carried out on stellited components in finish ground or honed condition. For nitrided areas DPT will be carried out in case of doubt during visual inspection. Hardness			
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1.01.07	check shall be carried out to ensure required hardness on test sample. (c) Valve body and bonnet castings/forgings shall be subjected to 100% radiography or 100% ultrasonic examination. Body and bonnet shall also be subjected to 100% magnetic particle examination on entire surface. All pressure containing welds in body and bonnet shall be subjected to 100% RT/UT and MPI examination. (d) Wall thickness of the body and bonnet after finish machining shall be measured by ultrasonic method and valve seat bore shall be checked for size and concentricity. (e) Bar stock for valve stem shall be subjected to ultrasonic examination and finish machined stem shall be subjected to magnetic particle/Dye penetrant examination. (f) Each valve body and bonnet shall be hydraulically tested at minimum 1.5 times the maximum working pressure after applying temperature corrections. (g) All the actuating cylinders/servomotors shall be performance tested. (h) Performance testing shall be carried out on valve operators/actuators to check functional requirements like trip closing and opening time, valve lift and hysteresis. (i) Colour matching of the valve disc and seat to ensure the required contact area is to be carried out. Cast and Forged Steel Components such as LP casing, in case of cast design, inlet & extraction/exhaust connections, shaft seal covers and rings, governor shaft, breach nut, threaded ring, angle ring, U-ring, servomotor parts such as body, piston, cover, yokes; turning gear casing and other items which are not specifically covered elsewhere (a) Results of tests conducted to determine mechanical properties, chemical analysis, metallurgical/ metallographic examination for nodular cast iron, if any and heat treatment procedures recommended and actually followed shall be recorded on certificates. (b) Each pressure containing enclosure shall be subjected to a hydraulic pressure test at 1.5 times the design pressure. (c) Each casting/forging shall be subjected to suitable non-destructive examination by Radiographic or ultrasonic and magnetic particle or dye penetrant examination methods to ensure freedom from harmful defects.		
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1.01.08	Bolts and nuts for pressure Retaining enclosures and Rotor Couplings (a) Bar stock greater than or equal to 50 mm in diameter for bolts shall be subjected to ultra- sonic examination. (b) Finish machined bolts (Joint Bolts & Coupling Bolts) shall be subjected to magnetic particle examination /DPT for surface defect examination. (c) Coupling bolts and nuts shall be suitably identified after weight control checks.			
1.01.09	Governing and Protection System Equipment such as Electro-hydraulic Controller, Hydraulic Amplifier, Hydraulic Controller, Electro hydraulic Convertors, Hydraulic Convertors, Hydraulic Speed Governor, Trip Devices etc. (a) All pressure retaining parts shall be subjected to hydraulic testing. (b) All the major castings/forgings shall be subjected to suitable NDT methods depending upon their application and criticality to ensure the freedom from harmful defects. (c) All the main assemblies and sub-assemblies shall be subjected to functional test. (d) All butt welds shall be subjected to minimum 10% RT/UT and all fillet and corner welds shall be subjected to MPI/DPT. (e) All control equipment shall be subjected to rig testing, if it is not possible to test it on the steam turbine light run. The purpose of rig testing shall be as far as practical to prove that the functioning of the control equipment is in accordance with the approved design. (f) Nitrided and stellited components will be subjected to DPT and hardness check shall be carried out on test sample.			
1.01.10	Inspection of Completed Turbine The steam turbine shall be assembled in the manufacturer's works to such an extent that a thorough inspection can be carried out. The purpose of this inspection will be to ensure that the fit between mating components is correct and that all clearances are in accordance with the design requirement. Contractor will prepare the checklist in this regard and submit the same for Employer's approval. However, minimum clearances which are required to be checked and records to be maintained during assembly of Inner Casing - Rotor, Inner Casing - Outer Casing, Rotor - Outer Casing, Gland Steam Housing - Shaft - Casing etc.			
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	and shroud diameters, axial distances for shroud bands for casings, clearance between shaft seal casings and shaft seal rings, radial and axial blade clearance in blading section, axial and radial alignment of rotor in respect of shaft seals, alignment of overspeed governor etc. by actual assembly. However, if the Bidder's standard practice provides for verifying the clearances by any other method, such as, computer aided assembly, the same is acceptable, in case the bidder is having experience for similar or higher rating turbine. This is indicative check only. However, the details shall be finalised during QP finalisation stage. These check lists shall be designed so that a comparison can be made between the design clearances, the clearances measured during works assembly, and those measured during the site turbine build. The vendor shall state, in his proposal, whether or not it is his practice to carry out no load works running tests on the steam turbine. If not carried out, the vendor shall give details of their normal works practice in order to verify compliance with the design of the steam turbine control and emergency control equipment.			
1.02.00	AUXILIARIES OF STEAM TURBINE			
1.02.01	Bearing Pedestals and Bearings			
	(a) Cast Pedestals & Housing			
	Leakage tests shall be conducted on pedestals.			
	(b) Fabricated Pedestals & Housing			
	(1) Leakage test shall be conducted on pedestals.			
	(2) 10% weld shall be checked after stress relieving by magnetic particle test or DPT and minimum 10% of the butt welds will be checked by RT or UT.			
	(c) Bearings shell			
	(1) The shell and castings\forgings shall be subjected to suitable non destructive examination like RT\UT & MPI as applicable.			
	(2) Colour matching of the shells by putting two halves together or feeler gauge tightness checks from inside and outside to ensure required contact area and joint tightness shall be carried out.			
	(3) The fabricated /cast shell shall be subjected to hydraulic pressure test / water fill test as applicable.			
	(4) Chemical analysis of white metal shall be carried out. The effectiveness of the white metal adhesion shall be checked			
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	(4) The complete purifier shall be tested at manufacturer's works for capacity, mechanical running sequential operation and interlocks, moisture content(if not covered under Type Test clause of technical specification), vapour tightness, vibration, noise level, quality improvements etc. (c) REFER RELEVANT CLAUSES OF THE SPECIFICATION FOR OTHER ITEMS SUCH AS PIPING, HEAT EXCHANGERS, VALVES, FILTERS, BLOWERS / EXHAUSTERS ETC IN THIS SYSTEM.			
1.03.00	CONDENSERS FOR MAIN TURBINE AND DRIVE TURBINE:-			
1.03.01	WATER COOLED CONDENSERS FOR MAIN TURBINE AND DRIVE TURBINE (IF OFFERED)			
	(A) SHELL, HOTWELL, WATER BOXES, DOORS AND TUBESHEETS			
	(a) All welds shall be visually examined. Radiographic examination of 10% of butt welds shall be carried out. However, for vacuum containing welds, R.T. on at least 10% of each butt weld shall be carried out. Surface defect examination by magnetic particle inspection or equivalent test method shall be carried out for minimum 10% weldments. This shall apply to site welds also. (b) All edge preparations shall be examined for surface defects. Edge preparation for welds to be carried out at site shall be checked by magnetic particle inspection/Dye penetrant examination method before despatch. (c) In case of fabricated flanges, welds shall be checked by 100% radiographic/ultrasonic and 100% magnetic particle inspection methods to ensure freedom from internal and surface defects. (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. (e) Bidder to furnish his practice regarding stress relieving of the water boxes and water chambers.			
	(B) TUBES			
	Condenser Tubes shall be tested as per the requirements of relevant codes and standards.			
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1.03.02	AIR COOLED CONDENSERS FOR MAIN TURBINE AND DRIVE TURBINE (IF OFFERED) (A) FABRICATION OF CONDENSER AND ACCESSORIES (a) All welds shall be visually examined. Radiographic examination of 10% of butt welds shall be carried out. However, for vacuum containing welds, R.T on at least 10% of each butt weld shall be carried out. Surface defect examination by magnetic particle inspection or equivalent test method shall be carried out for minimum 10% weldments. This shall apply to site welds also. (b) All edge preparations shall be examined for surface defects. Edge preparation for welds to be carried out at site shall be checked by magnetic particle inspection/Dye penetrant examination method before despatch. (c) In case of fabricated flanges, welds shall be checked by 100% radiographic/ultrasonic and 100% magnetic particle inspection methods to ensure freedom from internal and surface defects. (B) FAN (a) Ultrasonic Test shall be carried out on shaft material diameter ≥ 40 mm. (b) Fan hub and fan blade shall be tested as per relevant material code requirement and shall be tested for internal defects as per relevant code. (c) Moment weight test on blades, blade track variation, tip clearance shall be checked. (d) In case of fabrication of hub and blades by welding, the weld joint shall be tested by RT. (e) Assembly fit up and balancing shall be checked. (C) GEAR BOX (a) Gear box shall be tested as per relevant standard for performance, noise, vibration etc. (b) Gear box shall be tested for no load run test for 4 hours. (D) MOTOR The respective specification covered elsewhere is to be referred. (E) PIPING (a) All piping joint shall be tested for 10% RT/UT. IBR code regulations 1950 shall be ensured for IBR piping and relevant original IBR certificates shall be furnished. (F) TUBES		
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1.03.03	(a) Condenser tubes/finned tubes shall be tested as per the requirements of relevant codes and standards. Steam Throw Off Device (If Offered)	
1.03.04	(a) Edge preparations shall be examined for surface defects by MPI/DPT. 10% radiographic or ultrasonic examination shall be carried out for all weldments. (b) Welds shall be subjected to surface defect examination by 10% magnetic particle/dye penetrant examination. SPRING ASSEMBLY (If Offered)	
1.04.00	(a) Static load testing of the springs shall be carried out and spring characteristics shall be drawn and verified. (b) Surface defect test shall be carried out on all the springs after coiling and heat treatment. (c) Surface cleaning shall be checked prior to painting and check for thickness of painting shall be carried out. Condenser Air Evacuation System For Main Turbine Condenser And Drive Turbine Condenser	
1.04.01	Pumps (a) Vacuum pump shafts shall be subjected to ultrasonic test. After finish machining, shaft shall be subjected to magnetic particle examination/dye penetration test. (b) Pump casings and impellers shall be subjected to magnetic particle/dye penetration test. Finished pump rotor shall be subjected to dynamic balancing. (c) Pump casings shall be subjected to hydraulic test at 1.5 times the shut off pressure or twice the maximum operating pressure, whichever is higher. (d) Each pump shall be tested at supplier's works at full speed and load conditions to demonstrate successful operation and performance in accordance with the design requirements. (e) Supplier shall demonstrate by carrying out visual cavitation test that pump will be operating under all operating condition including blank off condition without cavitation.	
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	(f) REFER RELEVANT CLAUSES OF THE SPECIFICATION FOR OTHER ITEMS SUCH AS HEAT EXCHANGERS, FILTERS, PIPING, VALVES, ETC. IN THIS SYSTEM. 1.04.02 The complete package shall be subjected to hydraulic pressure and leakage test and shop tested to check interlocks and functional requirements. The one complete unit shall also be subjected to demonstrate successful operation and performance testing, with saturated air conditions at condenser design vacuum point as well as vacuum pump design point with total minimum three points. The test should be conducted with the respective motors to be supplied. The test shall include check for vibration and noise level. 1.05.00 FEED WATER HEATERS, DRAIN COOLERS, GLAND STEAM CONDENSER, HEAT EXCHANGERS & PRESSURE VESSELS/ STORAGE TANKS 1.05.01 All raw materials used shall have co-related mill test certificate meeting mandatory and supplementary checks of material specification. 1.05.02 Material for Tube plates shall be ultrasonically tested. Finished plates shall be subjected to suitable NDT. For clad plates, bonding shall be checked by UT. Vendor shall furnish their practice regarding manufacturing & NDT for supply of clad plates for Employer's review. Drilled Tube plates shall be checked for ovality of holes, ligaments, surface finish etc. 1.05.03 Dished ends shall be subjected to 100% MPI and RT/UT on welded joints. Knuckle portion shall be checked by MPI for surface defects and thinning shall be checked by UT. 1.05.04 Butt Welded / Full penetration joints shall be checked by suitable RT / UT. Fillet welds shall be checked by MPI / DPT. 1.05.05 Tubes shall be tested as per the relevant codes / specification / standards. 1.05.06 Before tubes expansion in the tube sheets, the mock-up test for expansions shall be carried out, in case not done earlier. Torque setting of expander shall be based on mock up tests. Joints shall be checked for tube thinning. 1.05.07 Completed assemblies shall be pressure tested with working-fluid/ hydraulically/ pneumatically. The heat exchangers shall be tested on both tube side and shell side. After hydro test, the heat exchangers shall be suitably dried and nitrogen capped. Atmospheric tanks shall be tested for leakage by water fill test for at least 12 hrs. 1.06.00 PIPING, BELLOWS AND THERMAL INSULATION FOR TURBINE & AUX SYSTEMS		
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1.06.01	Piping and Fittings (a) All raw materials used shall have co-related mill test certificate meeting mandatory and supplementary checks (as required to meet statutory requirement and elsewhere asked in the specification) of material specification. (b) All pipe lengths shall be subjected to 100% ultrasonic examination or hydraulic tests and UT/RT on longitudinal welds at the tube mill. (c) All mother pipes used for fittings shall be subjected to a hydraulic test or an ultrasonic test at the tube mill. Raw material of all forged fittings shall be ultrasonically tested. Forged fittings shall be ultrasonically tested. (d) Welded and cast fittings, if any, shall be subjected to suitable NDT as per applicable standards. However, as a minimum 100% RT shall be carried out on all alloy steel fittings and on carbon steel fittings for use above 71 bar design conditions. (e) The edge preparation for shop and site welds shall be checked by MPI/LPI however edge preparation in stainless steel alloy/ steel shall be subjected to a Dye penetrant check. (f) Thickness of pipe bends shall be checked by ultrasonic or other acceptable methods on sample basis for high pressure applications. Outer surface of bends shall be subjected to magnetic particle examination / LPI. (g) Non-destructive examination of welds shall be carried out after post weld heat treatment, if any. (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 (except for oil piping). Further statutory requirement, wherever applicable shall also be complied with. (1) Temperature > 400⁰C And / Or pressure exceeding 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds. (ii) 100% MPE. (2) Temperature > 175⁰C up to 400⁰C AND / OR pressure exceeding 17 bar and up to 71 bar. (i) 100% RT / UT on butt welds and full penetration branch welds for pipe dia more than 100 NB.		
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1.06.02	(ii) 10% RT / UT on butt welds and full penetration branch welds for pipe dia up to 100 NB. (iii) 100% MPE. (3) Wherever SR/PWHT is envisaged, above NDTs shall be after SR/PWHT. (4) For all other pipes not covered above (except oil piping), shall be subjected 100% MPE / DPT in case of under ground pipes and 10% MPE/DPT in case of piping above the ground. Further, 10% of butt welds of underground piping shall be subjected to RT. (5) Hardness survey of welds shall be carried out on alloy steel/stainless steel piping. (100% Hardness survey of welds on P91, X20 & X22 material grade pipings). (6) For welds in P91, X20 & X22 materials, only induction type of heating shall be deployed for heat treatment. (i) Oil piping shall be subjected to following NDT. (1) Butt welds of Oil piping shall be subjected to 10% RT and 10% DP Test. For Jacking oil lines 100% RT & 100% DPT shall be carried out on butt welds. (2) Fillet welds with load transfer shall be subjected to 100% MPE/DPT and fillet welds without load transfer shall be subjected to 10% MPE/DPT. (j) Rubber lined pipes shall be hydraulically tested before rubber lining. All rubber lining is to be subjected to following tests as per IS-4682 part-I or acceptable equivalent: (1) Adhesion test (2) Check for resistance to bleeding (3) Measurement of thickness (4) Shore hardness test (5) Visual examination and spark test at 5 KV/mm of thickness. Metallic Expansion Bellows (a) Hydraulic pressure test shall be carried out on each pipe and expansion bellow.		
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1.06.03	(b) Longitudinal butt weld on bellow shall be subjected to suitable NDT examination before forming, and after forming MPE / DP test shall be carried out. (c) All welds shall be subjected to 100% magnetic particle/dye penetrant check and butt welds shall be subjected to 100% radiographic testing. (d) All the bellows subjected to vacuum service shall be subjected to vacuum test. (e) The bellows shall be subjected to movement test to establish suitability to perform satisfactorily in site conditions. During this test spring rate shall also be measured. (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.			
	Rubber Expansion Joint (a) Rubber compound test slab after vulcanising shall be tested for tensile strength, elongation and shore hardness. Tests on rubber compound shall also include hydro stability test as per ASTM D-3137 and ozone resistance test as per ASTM D- 380. (b) Fabric strength of synthetic fibre for reinforcement shall be checked, and test for rubber to fabric adhesion as per IS: 3400/ASTM D- 413, rubber to metal adhesion as per IS 3100/ASTM D-429 shall be carried out. (c) All expansion joints in assembled condition shall be subjected to vacuum test at 730 mm Hg below atmospheric pressure under conditions to ensure its suitability to withstand deflection in each axial transverse and longitudinal direction. Duration of test shall be of minimum 10 minutes. (d) All bare bellows shall be subjected to hydraulic pressure test in normal condition at 1.5 times the design pressure for duration of 30 minutes. Additionally, all bare bellows shall be subjected to deflection tests under pressure, pressure being raised from zero to the design value in regular steps and deflection measured at each step.			
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1.06.04	(e)	All expansion joints in assembled condition along with control rod assembly shall be subjected to deflection test under design pressure. The details of test procedure shall be subjected to approval by Project Manager.		
	(f)	Either during the hydraulic test or during the vacuum test, change in circumference at the top position of the arch shall not exceed 1.5% of measured circumference at normal position.		
	(g)	Twenty Four (24) hours after the above tests, the permanent set (variation in dimensions with respect to its original dimension) shall be measured and recorded. The permanent set shall not be more than 0.5%.		
	(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.		
1.06.05	THERMAL INSULATION			
1.06.05	(a)	For mineral wool insulation, testing shall be carried out as per relevant standard.		
	(b)	For sprayed mineral wool, testing shall be carried out as per relevant standard.		
	(c)	Thermal conductivity (k value) shall generally be measured in line with relevant standard.		
	Hangers and Supports			
1.07.00	(a)	Forged components such as clevis, turnbuckle, eye- bolts, coupling etc. will be subjected to material testing, hardness, MPE, proof load test etc.		
	(b)	Dampers with viscous fluids will be checked for viscosity of liquid used, damping resistance of the damper, stiffness of the damper etc.		
	(c)	Springs used for variable constant load and spring hangers shall be checked for chemical, mechanical and spring rate tests.		
	(d)	Complete variable and constant load spring cage will be subjected to performance test and load/deflection test. Calibration of spring cages shall be done at shop.		
1.07.00	VALVES			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:		SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES
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CLAUSE NO.	QUALITY ASSURANCE																					
1.07.01	Inspection and testing requirements for valves other than extraction line valves and butterfly valves shall be as follows:- (a) Pressure retaining parts of valves shall be subjected to NDT as per Table 1. (b) Bar stock/forging above 40mm diameter for valve trim shall be subjected to UT. (c) Hardened/stellitted valve disc and seat are to be subjected to LPI and hardness check (on test sample). (d) Colour matching of valve disc/plug and seat shall be carried out to ensure contact. (e) Hydraulic pressure test and seat leak test shall be carried out as per ANSI 16.34. (f) Air seat leak test shall be carried out as per applicable Standards/Codes. (g) Functional testing shall be carried out on each valve to check the following as per the approved valve data sheet: (1) Smooth operation (2) Valve travel, closing and opening time. (3) Current drawn by actuators.. (h) Springs for safety valves shall be tested with suitable NDT and for spring rate. (i) Safety and safety relief valves shall be tested for performance. TABLE-1 NDT REQUIREMENTS FOR PRESSURE RETAINING COMPONENTS OF VALVES <table><tr><th>Valve size NB in mm</th><th>ANSI Class upto 300</th><th>ANSI Class above 300 upto 600</th><th>ANSI Class above 600 upto 900</th><th>ANSI Class 900 & above & below 4500</th></tr><tr><td>Less than 50</td><td>Visual</td><td>Visual</td><td>Visual</td><td>MPI</td></tr><tr><td>50 & above but below 100</td><td>Visual</td><td>Visual</td><td>MPI</td><td>MPI & RT (on 10% of valves on 100% area)</td></tr><tr><td>100 & above but</td><td>Visual</td><td>MPI</td><td>MPI & RT (on 10% of</td><td>MPI & RT (on 100% area)</td></tr></table>	Valve size NB in mm	ANSI Class upto 300	ANSI Class above 300 upto 600	ANSI Class above 600 upto 900	ANSI Class 900 & above & below 4500	Less than 50	Visual	Visual	Visual	MPI	50 & above but below 100	Visual	Visual	MPI	MPI & RT (on 10% of valves on 100% area)	100 & above but	Visual	MPI	MPI & RT (on 10% of	MPI & RT (on 100% area)	
Valve size NB in mm	ANSI Class upto 300	ANSI Class above 300 upto 600	ANSI Class above 600 upto 900	ANSI Class 900 & above & below 4500																		
Less than 50	Visual	Visual	Visual	MPI																		
50 & above but below 100	Visual	Visual	MPI	MPI & RT (on 10% of valves on 100% area)																		
100 & above but	Visual	MPI	MPI & RT (on 10% of	MPI & RT (on 100% area)																		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 21 of 26																		

CLAUSE NO.	QUALITY ASSURANCE 				
	less than 300			valves on change of section & weld ends)	
	300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT (on 100% area)
1.07.02	Note: (i) For body and bonnet forgings UT with MPI may be adopted in place of RT. For austenitic steel MPI may be replaced by LPI. (ii) Weld Edge Preparation shall be subjected to MPI/LPI				
	Extraction Line Valves (a) Surface crack examination and hardness check (on test sample) shall be carried out on all hard faced/stellited surfaces, if any. (b) As a minimum requirement of castings for all valves on cold reheat and extraction lines shall be subjected to 100% MPI on all areas and RT on Butt Weld ends and change of Section. For forgings minimum requirement shall be 100% UT and 100% MPI. (c) Bar stock for valves stem shall be subjected to UT. Finish machined valve stem shall be subjected to magnetic particle examination/dye penetration test. (d) Wall thickness measurement by ultrasonic for critical and highly stressed zones of the casting/forging shall be carried out. (e) Colour matching of the valve disc and seat to ensure required contact area shall be carried out. (f) Hydraulic pressure tests shall be carried out on each valve to check body and bonnet strength. Seat leakage and back seat leakage test (wherever applicable) shall be carried out. Air seat leakage test shall also be carried out. Minimum test requirements of pressure shall be as per ANSI B 16.34. (g) Functional testing shall be carried out on each valve to check for freedom of movement, adherence to clearance, opening/ closing etc.				
1.07.03	Butterfly valves (a) Valve disc shall be checked for surface and sub-surface defects by magnetic particle examination.				
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE			TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:		SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES Page 22 of 26

CLAUSE NO.	QUALITY ASSURANCE 			
	(b) Stubs and driving shafts shall be tested for internal defects by ultrasonic method. (c) Dye penetration test shall be carried out on shafts, seat rings etc. (d) Test samples for rubber seal shall be subjected to tensile and hardness test for vulcanising and after ageing. Hydraulic stability test and ozone crack resistance tests also be carried out. (e) Valve shall be subjected to hydraulic pressure test for body and air seat leakage tests as per AWWA-C504/IS 13095. (f) Proof of design tests for valves and actuator shall be carried out as per AWWA-C504/IS 13095. In case the test has already been carried out on previous supplies, the contractor may submit the test certification of same for approval of Project Manager. (g) After complete assembly each valve with actuator will be subjected to performance test by opening and closing the valve from fully closed to fully open position and the reverse, under no flow for at least 25 cycles to check. (1) Smooth uninterrupted movement of valve. (2) Closing and opening time. (3) Current drawn by actuator. (4) Operation of tripping switch and position indicator. (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. 1.08.00 MISC. ITEMS / EQUIPMENTS 1.08.01 FILTERS / STRAINERS (a) Filters / strainers shall be tested as per the requirements of relevant codes / standards. (b) Filters / strainer shall be performance tested for pressure drop, flow, particle size. If performance test is earlier established, then records shall be reviewed.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 23 of 26	

CLAUSE NO.	QUALITY ASSURANCE			
1.08.02	BLOWERS/ EXHAUSTERS (a) Rotors shall be dynamically balanced. Leakage tests (if applicable) shall be carried out. (b) Performance tests including noise and vibration tests shall be carried out as per relevant standards / codes.			
1.08.03	LP CHEMICAL DOSING SYSTEM (a) Pumps of chemical doing system shall be performance tested as per relevant international codes. (b) In case of diaphragm type of pumps, the life cycle test shall be done on pumps. If this test is already conducted for same model in earlier projects of NTPC, then TCs for same shall be reviewed. (c) Dosing skid shall be subjected to leakage test and functional test.			
1.09.00	Electrical and Control & Instrumentation: Refer Electrical and Control & Instrumentation Sections of QA&I specification.			
1.10.00	SITE TEST: Quality requirements for site activities shall be as a minimum, those specified for corresponding shop activities.			
1.10.01	Hydraulic Test of Pressure Parts: On completion of erection of pressure parts of each steam turbine generator, the unit with its fittings and mountings in position coming under purview of IBR shall be subjected to hydraulic test pressure in accordance with requirement of Indian Boiler Regulations. Water used for hydraulic test shall be made alkaline by addition of suitable chemical. After the test, all parts shall be drained and suitably preserved.			
1.10.02	Condenser Assembly- Water Cooled (If Offered): (a) If the condenser sections calls for site assembly, care shall be taken in assembly of sections and correctness of alignment and fit up shall be checked. Site welding shall be carried out as per the procedure approved by the Project Manager. (b) All weld seams shall be subjected to DPT/MPI. At least 10% of butt welds shall be subjected to radiographic examination.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 24 of 26

CLAUSE NO.	QUALITY ASSURANCE 		
1.10.03	(c) All welds between condenser neck and LP turbine shall be subjected to 100% radiographic and magnetic particle examination. (d) Condenser tubes shall be visually examined for dents, mechanical damages or any other defects prior to insertion. Both tube ends shall be thoroughly cleaned to a length of 100mm to remove oil, grease etc. and shall be checked for freedom from burrs prior to insertion. (e) Tube expansion shall be carried out by electronic automatic torque control expanding unit, which shall be calibrated before use. Tube wall thinning and length of expansion shall be controlled and recorded. (f) Hydrostatic testing of condenser steam space shall be carried out after connecting all the pipes with the condenser along with condenser vacuum systems by filling the steam space with water 300mm above final joint of condenser exhaust neck to the turbine. The level of hydraulic test shall be selected such that all the field welding joints are covered in the test. Any leakage detected shall be rectified immediately. (g) Condenser water boxes shall be tested hydraulically at a minimum test pressure of 1.3 times the design pressure. Condenser Assembly-Air Cooled (If Offered): (a) If the condenser sections calls for site assembly, care shall be taken in assembly of sections and correctness of alignment and fit up shall be checked. Site welding shall be carried out as per the procedure approved by the Project Manager. (b) All weld seams shall be subjected to DPT/MPI. At least 10% of butt welds shall be subjected to radiographic examination. (c) All welds between condenser hot box and LP turbine shall be subjected to 100% radiographic and magnetic particle examination. (d) Condenser tube bundles shall be visually examined for dents, mechanical damages or any other defects prior to insertion. Both tube ends shall be thoroughly cleaned to a length of 100mm to remove oil, grease etc. and shall be checked for freedom from burrs prior to insertion. (e) Water Fill test / Hydrostatic testing / pneumatic test as applicable for condenser hot box space, tube bundle with header and associated parts of ACC shall be carried out after connecting all the pipes along with condenser vacuum systems such that all the		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 25 of 26

CLAUSE NO.	QUALITY ASSURANCE 			
1.10.04	field welding joints are covered in the test. Any leakage detected shall be rectified immediately. (f) Performance test (including flow, pressure, noise, vibration and alignment etc.) of Fan/Compressor as applicable shall be tested at site. TURBINE ASSEMBLY Bidder shall clearly indicate the extent of assembly to be carried out at site. Accordingly, bidder shall submit elaborate erection and assembly inspection programme of turbine for Employer's approval.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-8 STEAM TURBINE & INTEGRAL AUXILIARIES	Page 26 of 26	

SUB-SECTION–E-09

CONDENSER ONLINE TUBE CLEANING SYSTEM

CLAUSE NO.	QUALITY ASSURANCE			
1.00.00	CONDENSER ON LOAD TUBE CLEANING SYSTEM/DEBRIS FILTER FOR MAIN TURBINE CONDENSER AND DRIVE TURBINE CONDENSER (IF OFFERED)			
1.01.00	General Requirements Refer QA & I portion of General Technical conditions of technical specification.			
1.01.01	Ball Recirculation Pump (a) All rotating parts shall be dynamically balanced. (b) Pump casing shall be subjected to hydraulic test at 1.5 times the shut off head or twice the maximum working pressure whichever is higher. (c) Complete pump assembly shall be subjected to shop performance test at supplier's works.			
1.01.02	Ball Sorter / Fabricated Body (housing) (a) In the case of fabricated design, all butt welds shall be subjected to 10% radiographic/ultrasonic examination. All welds shall be examined by 10% magnetic particle testing method to ensure freedom from surface and sub-surface defects. (b) Body shall be subjected to hydraulic pressure test at 1.5 times the design pressure. (c) Performance test shall be carried out on ball sorter assembly.			
1.01.03	Strainer (a) Strainer mesh shall be checked for chemical composition and mesh size. (b) Strainer body shall be subjected to hydraulic pressure test at 1.5 times the design pressure. (c) Strainer assembly shall be checked for its function.			
1.01.04	The complete system and the individual equipment shall be subjected to performance testing at Site to demonstrate successful operation and performance to meet the design conditions. The tests shall also include hydraulic test, function test, check for interlocks and sequential operation. Site test shall also include test to establish pressure drop across the strainer section, proper functioning of DELTA-P system.			
1.01.05	Piping and Fittings Piping and fabricated fittings shall be subjected to following NDT.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-9 COLTCS	Page 1 of 2

CLAUSE NO.	QUALITY ASSURANCE			
	(a) Butt welds of piping shall be subjected to 10% RT and 10% DP Test. Butt welds of Segmental flanges shall be checked by 100% RT and DPT. (b) Fillet welds with load transfer shall be subjected to 100% MPE/DPT and fillet welds without load transfer shall be subjected to 10% MPE/DPT. Wrought/ forged fittings shall be tested as per relevant code/ specification/ standard.			
1.01.06	Coating / lining			
1.01.07	Coating shall be checked for DFT and adhesion. Further, Contractor shall furnish his practice for testing of coating to ensure the uniformity and freedom from pinholes.			
1.01.08	Rubber lined items shall be hydraulically tested before rubber lining. All rubber lining is to be subjected to following tests as per IS-4682 part-I or acceptable equivalent:			
	(a) Adhesion test (b) Check for resistance to bleeding (c) Measurement of thickness (d) Shore hardness test (e) Visual examination and spark test at 5 kv/mm of thickness.			
1.01.09	VALVES			
	Conventional gate/ globe/ check/ ball valves shall be tested as per relevant standard.			
1.02.00	ELECTRICAL AND CONTROL & INSTRUMENTATION: Refer Electrical and Control & Instrumentation Sections of QA&I specification.			
	SITE TEST: Quality requirements for site activities shall be as a minimum, those specified for corresponding shop activities.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-9 COLTCS	Page 2 of 2

SUB-SECTION–E-10

CONDENSATE EXTRACTION PUMPS

CONDENSATE EXTRACTION PUMP

1.00.00 CONDENSATE EXTRACTION PUMPS

INPROCESS TESTS													FINAL TESTS				
Tests Item/ Description	Chemical Analysis	Mechanical Prop.	Heat Treatment	Run out	U.T.	R.T.	D.P.T.	M.P.I.	Balancing	Hyd. Test	Inclusion Rating	Pressure Drop	Performance Test	NPSH Test	Vibration	Noise	Strip Down Test
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Pump Casing	Y	Y ^①	-	-	-	-	Y	-	-	Y	-	-					
Suction Bell	Y	Y ^①	-	-	-	-	Y	-	-	-	-	-					
Shaft	Y	Y ^①	Y	Y	Y	-	Y ^⑨	Y ^⑨	-	-	Y	-					
Impeller	Y	Y ^①	Y	-	-	-	Y	-	Y	-	-	-					
Rotor	-	-	-	Y	-	-	-	-	-	-	-	-					
Fabricated Items	Y	Y ^①	-	-	-	Y ^②	Y	-	-	Y ^③	-	-					
Strainer																	
a) Body	Y	Y	-	-	-	-	Y*	-	-	Y	-	-					
b) Assembly	-	-	-	-	-	-	-	-	-	-	-	Y**					
CEP													Y ^④	Y ^⑤	Y ^⑥	Y ^⑦	Y ^⑧
Elect Items													Tests as per relevant portion of specification				

- ① Chemical/ Mechanical shall be one per heat/HT batch.
- ② 10% Random on Butt Welds
- ③ ☐ Pressure Containing Parts.
- ④ ☐ Performance Test on each Condensate Extraction Pump to determine the characteristic curve (Head, Capacity, Efficiency & Power) at Design Speed and to ensure Compliance with design requirements specified in the specification. Measurements shall be carried out at 0%, 25%, 50%, 65%, 80%, 100% and 125% of design flow with cold water.
- ⑤ 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.
- ⑥ Vibration on all Condensate Extraction Pumps shall be measured in transverse, Horizontal and Vertical Direction at all measuring points.
- ⑦ Noise Level on each Condensate Extraction pump shall be measured at a distance of 1.5 meter above floor level in elevation and 1 mtr horizontally from the nearest surface of the equipment as per HIS. The measurement shall be taken at six points around the equipment for each flow condition.
- ⑧ One Condensate Extraction Pump shall be dismantled for visual inspection after completion of performance test and NPSH Test. For other Pumps strip down test shall be conducted only in case abnormal performance such as Excessive Vibration, High noise, high bearing temperature etc. is observed during performance test.
- (9) DPT / MPI shall be carried out on Shaft.

CONDENSATE EXTRACTION PUMPS

Notes:

- 1) Quantum of In-Process Checks/ Tests is 100% until & unless specified otherwise.
- 2) Shop tests shall be conducted with softest Quality Water.
- 3) Bidder shall furnish details of proposed test procedures including test lay out, type and level of accuracy of instruments, sample calculation etc.
- 4) Tests shall be done in accordance with latest edition of Hydraulic Institute standard.
- 5) Tested Pump parameters shall be within following tolerances.
 At design head : + 10% of design capacity
 At design capacity: + 5% of design head (Under 152.4 meter)
 +3 % of design head (for 152.4meter and above)
- * In case of fabricated construction.
- ** One per type and size.
 Results must show no minus tolerance with regard to flow and head.
 No minus tolerance on efficiency or positive tolerance on power input at motor terminals shall be allowed.

SUB-SECTION–E-11

POWER CYCLE HEATERS & DEAERATOR

CLAUSE NO.

QUALITY ASSURANCE



POWER CYCLE HEATERS & DE-AERATOR

1.00.00 DEAERATORS:

Components / Activity		Tests/ Checks	Chemical Analysis	Mech. Properties	Impact	Hardness	Flattening	Flaring	UT	RT	MPI	DPT	Eddy Current	Air Leak Test	SR	HT	Hydraulic	Pneumatic	Dimensions	WPS/PQR/WQR/App. Performance test	Mock up Test
1	Shell & Dished End		Y	Y	Y				Y(a)		Y(g)				Y(a)				Y(e)		
2	Fabrication/ Welding														Y				Y		
a)	Edge Preparation/ Fillet Weld										Y(b)	Y(b)									
b)	Butt Joints/ Branch Welding								Y(c)	Y(c)	Y	Y			Y				Y(d)	Y	
3	Complete Deaerator																Y		Y		
4	Safety & Safety Relief Valve & other valves		Y	Y					Y(f)	Y(f)	Y(f)	Y(f)					Y		Y(h)		

2.00.00

HEATERS:

Tests/ Checks Components / Activity		Chemical Analysis	Mech. Properties	Impact	Hardness	Flattening	Flaring	UT	RT	MPI	DPT	Eddy Current	Air Leak Test	SR	HT	Hydraulic	Pneumatic	Dimension	WPS/PQR/WQR/App. Performance test	Mock up Test
1	Tube Sheet																			Y
	a Forging	Y	Y					Y		Y					Y			Y ⁽ⁱ⁾		
	b Plates	Y	Y	Y				Y			Y							Y ⁽ⁱ⁾		
	c Cladding							Y			Y			Y				Y ⁽ⁱ⁾		
2	Shell Plates	Y	Y	Y				Y												
3	Feed Nozzle Manhole forging	Y	Y			Y ^(k)		Y ^(l)				Y ^(k)		Y ⁽ⁱ⁾				Y		
4	Welding / Fabrication																			
	a Weld Edge Preparation									Y ^(b)	Y ^(b)									
	b Back Chipping									Y ^(b)	Y ^(b)									
	c Weld Joints																			
	(i) Butt							Y ^(c)	Y ^(c)	Y	Y				Y			Y	Y	
	(ii) Fillet									Y	Y				Y			Y	Y	
	(iii) Nozzle / Branch							Y ^(c)	Y ^(c)	Y	Y				Y			Y	Y	
	(iv) Tube to tube sheet										Y		Y			Y				
5	Dished End & Hemi Head	Y	Y	Y				Y ^(a)		Y ^(b)	Y ^(b)			Y				Y ^(e)		
6	Tubes	Y	Y			Y ^(q)	Y ^(q)					Y			Y ⁽ⁿ⁾	Y		Y		
7	Tube expansion in tube sheet																	Y ^(o)		
8	Complete Heater															Y ^(p)		Y		

3.00.00 REMARKS FOR DEAERATORS AND HEATERS:

(a) After forming of plates. For dished end and Hemi head. (b) DPT may be used as an alternate to MPI. (c) UT/RT to be decided according to configuration/accessibility. (d) (i) For plates (ii) For welding (iii) For wall thickness (e) Including wall thickness (f) (i) 100% RT/UT shall be carried out on bodies, bonnets, nozzle and stem of valves of HP heater. (ii) 100% DPT/MPI on machined surfaces of valve body, bonnet, stem, disc & springs. (g) Outer surface (Dished end Knuckle Portion)	(h) Including– Seat leakage – Relieving Capacity-popping test at set and blow down pressure (i) Include ovality of holes, surface finish and size of holes. (j) For cladding bond and cladding thickness during bond check and after drilling (k) For feed nozzle (pipes) (l) For forgings (n) After bending also (o) Dimension to include wall thinning (p) Both tube and shell side. After Hydro test drying and nitrogen filling to be done. (q) As per the code. For HP Heaters & Gland steam coolers the statutory requirements (if applicable) to be ensured as per IBR latest regulations and the certificates in original to be furnished as per IBR regulations.

Note :

- (1) Sampling plan shall be as per relevant Governing/plant standard and shall be subject to mutual agreement during MQP finalization.
- (2) Chem./Mech. shall be One/ per heat or HT batch.

SUB-SECTION–E-12

BOILER FEED PUMP

1.00.00

BOILER FEED PUMPS

BOILER FEED PUMP

INPROCESS TESTS															
Tests Item/ Description	Chemical Analysis	Mechanical Prop.	Heat Treatment	Run out	U.T.	R.T.	D.P.T.	M.P.I.	Balancing	F.A.T.T.	Hyd. Test	Inclusion Rating	Pr. Drop	Dimensions	Remarks
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	
(A) BFP + BOOSTER PUMP															
i.) Barrel Casing	Y	Y ^①	Y	-	Y	-	-	Y	-	-	Y	-	-	-	① Chemical/ Mechanical shall be one per heat/HT batch # On BFP Impeller as per ASTM 446 Level 2 *** In case of Fabricated Construction ② One per type and size. + Type of NDE & quantum of check shall be as per relevant code & pressure class ++ Include body & seat leakage test and functional test Note: Quantum of Checks/ Tests is 100% untill & unless specified otherwise.
ii.) Discharge Branch	Y	Y ^①	Y	-	Y	-	-	Y	-	-	Y	-	-	-	
iii.) Casing Cover	Y	Y ^①	Y	-	Y	-	-	Y	-	-	Y	-	-	-	
iv.) Suction Branch	Y	Y ^①	Y	-	-	-	Y	-	-	-	Y	-	-	-	
v.) Diffuser	Y	Y ^①	Y	-	-	-	Y	-	-	-	-	-	-	-	
vi.) Ring Section	Y	Y ^①	Y	-	Y	-	Y	-	-	-	-	-	-	-	
vii.) Impeller	Y	Y ^①	Y	-	-	Y#	Y	-	Y	-	-	-	-	-	
viii.) Shaft	Y	Y ^①	Y	-	Y	-	Y	Y	-	-	-	Y	-	Y	
ix.) Rotor	-	-	-	Y	-	-	-	-	Y	-	-	-	-	-	
(B) STRAINER															
i.) Body	Y	Y	-	-	-	-	Y***	-	-	-	Y	-	-	-	
ii.) Assembly	-	-	-	-	-	-	-	-	-	-	-	-	Y ^②	-	
(C) Gear Box AND Hydraulic coupling															
i.) Gear	Y	Y ^①	Y	-	Y	-	Y ⁹	Y ⁹	-	-	-	-	-	-	
ii.) Pinions	Y	Y ^①	Y	-	Y	-	Y ⁹	Y ⁹	-	-	-	-	-	-	
iii.) Shaft	Y	Y ^①	Y	-	Y	-	Y ⁹	Y ⁹	-	-	-	-	-	-	
iv.) Casing	Y	Y ^①	-	-	-	-	-	-	-	-	Y	-	-	-	
v.) Wheels	Y	Y ^①	Y	-	Y	-	Y ⁹	Y ⁹	-	-	-	-	-	-	
vi.) Assembled Rotating Component	-	-	-	-	-	-	-	-	Y	-	-	-	-	Y	
(D) RECIRCULATION VALVE	Y	Y ^①	Y	-	Y+	-	Y+	Y+	-	-	Y++	-	-	Y	

FINAL TESTS												
Tests Item/ Description	Performance Test	NPSH Test	Vibration	Noise	Pressure Pulsation	Axial thrust	Dry Running	Visual Cavitation	Strip Down Test	Mech. Run test	Other Tests	REMARKS
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	
BFP	① Y	② Y	③(a) Y	③(b) Y	③(c) Y	③(c) Y	④ Y	⑤ Y	⑥ Y	Y	Y	
Booster Pump	① Y	② Y	③(a) Y	③(b) Y	-	-	④ Y	-	⑥ Y	-	Y	
Gear Box	⑦ Y	-	Y	Y	-	-	-	-	-	⑧ Y		
HYD Coupling	-	-	-	-	-	-	-	-	-	⑧ Y	Y	
Drive turbine	Tests as per relevant portion of specification including Note-6											

- 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.
- (b) Performance Test on each Booster Pump to determine the characteristic curve (Head, Capacity, Efficiency & Power) at Design Speed and to ensure Compliance with design requirements specified in the specification. Measurements shall be carried out at 0%, 25%, 50%, 65%, 80%, 100% and 125% of design flow with cold water.
- ② 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.
- ③ (a) Vibration on all Boiler Feed Pumps and Booster Pumps shall be measured in transverse, Horizontal and Vertical Direction at all measuring points.
- (b) Noise Level on each Boiler Feed Pump and Booster Pump shall be measured at a distance of 1.5 meter above floor level in elevation and 1 mtr horizontally from the nearest surface of the equipment as per HIS. The measurement shall be taken at six points around the equipment for each flow condition.
- (c) Pressure Pulsation and Axial Thrust Measurement shall be carried out on one Boiler Feed Pump at all measuring points. Pressure Pulsation shall be measured at suction as well as at discharge in the operating range.
- ④ Dry running withstand capability shall be demonstrated and established on one Boiler Feed Pump and its corresponding booster pump. Feed pump shall be capable of

accepting complete loss of water and must be capable of being shut down in a controlled manner and brought down to rest after being tripped from design condition with simultaneous closure of suction valve. To demonstrate the capability during shop testing, suction valve actuation should be fast in order to ensure operation during vapour phase. Pump shall then be restarted and bring it back to design condition.

- ⑤ Visual Cavitation Test on one first stage production impeller of Boiler Feed Pump shall be carried out to demonstrate absence of Cavitation at Design Speed in Cold Water. The test will establish the cavitation characteristic of one production first stage impeller to confirm that the cavity length under dynamically scaled site conditions corresponding to design point will not exceed an agreed size. This test shall be carried out at 25%, 50%, 65%, 80%, 100% and 125% of Design Flow
- ⑥ Complete Strip Down of Boiler Feed Pump which under goes Performance Test, NPSH Test, Dry Run Test, etc. shall be done in order to check problems like Internal Rubbing Damage, Excessive Wear etc. One Booster Pump shall be dismantled for visual inspection after completion of performance test and NPSH Test. For other Pumps strip down test shall be conducted only in case abnormal performance such as Excessive Vibration, High noise, high bearing temperature etc. is observed during performance test.
- ⑦ Full load full speed/back to back locked rotor torque test for one gearbox.
- ⑧ Smooth operation, vibration, noise and temperature rise check on all equipment.
- ⑨ BFP + Booster Pump , Gear Box AND Hydraulic coupling (In Process Tests): DPT /MPI shall be carried out on Gear, Pinion, Shaft & Wheel.

Note:

- 1) Shop tests shall be conducted with soften Quality Water.
- 2) Bidder shall furnish details of proposed test procedures including test lay out, type and level of accuracy of instruments, sample calculation etc.
- 3) Tests shall be done in accordance with latest edition of Hydraulic Institute Standard, USA.
- 4) Tested Pump parameters shall be within following tolerances.

At design head: + 10% of design capacity

At design capacity : + 5% of design head (Under 152.4meter)

+ 3% of design head (for 152.4 meter and above)

Results must show no minus tolerance with regard to flow and head.

No minus tolerance on efficiency or positive tolerance on power input at motor terminals shall be allowed.

- 5) It is preferred to carry out performance, NPSH(R) and Dry Running tests of the Boiler Feed Pump at design speed. However, in case of any constraint of manufacturer to carry out the above tests at design speed, the testing of pump at reduced speed as per HIS guidelines may be proposed to Owner for review and approval.
- 6) No Load Mechanical Run Test shall be carried out as per API-612.
In case MRT is not the standard practice of the bidder, the following tests are to be carried out at shop to establish that the Drive Turbine is in compliance with the design:

- a) Run out checking of the complete Rotor before & after over speed test.
- b) High Speed Balancing at rated speed of the complete rotor.
- c) Over speed Test as per manufacturer's proven practice, however the minimum over speed shall be 1% more than that of tripping value of the drive turbine.
- d) The vibrations measured during high speed balancing and over speed shall be within the range of operating values as per manufacturer's standard.
- e) The bladed rotor shall be run continuously at the maximum continuous speed for duration as per manufacturer's standard.
- f) Visual inspection of the Bladed Rotor after over speeding for any abnormality.
- g) Verification of radial & axial clearances between moving parts (Bladed Rotor) and stationary parts (Casing) by actual placement of Rotor in the Casing.

SUB-SECTION– E-13

RAW WATER SYSTEM

RAW WATER PIPING

PIPES, FITTINGS, BENDS, VALVES, COATING-WRAPPING, STRAINERS EXPANSION, JOINTS, TANKS, FASTENERS, LINING ETC.

	Tests/Check Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y ^a	Y ^b			Y ¹			Y			Y	
2	Diaphragm Valves	Y ^a				Y ⁵			Y		Y ⁶		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y ⁷		
	Body	Y ^a	Y ^b										
	Disc	Y ^a	Y ^b										
	Shaft	Y ^a	Y	Y ^c									
3B	Fabricated Butterfly Valves	REFER NOTE 14											
4	Gate/ Globe/Swing Check / Ball Valves	Y ^a	Y ^b	Y ^c		Y ⁵	Y	Y	Y	Y	Y ⁸		
5	Dual Plate Check Valves	Y ^a	Y ^b	Y ^c		Y	Y	Y	Y	Y	Y ⁴		
6	Rolled & Welded Pipes and Mitre Bends	Y ^a	Y ³		Y	Y ³			Y		Y ^{3&15}	Y	
7	Coating & Wrapping of Pipes	Y ²									Y ²		
8	Tanks & Vessels	Y ^a	Y ^b		Y	Y			Y		Y ¹⁶		
9	Strainers	Y ^a	Y ^b		Y #	Y					Y ¹¹		#For Fabricated Strainer
10	Rubber Expansion Joints	Y ^a				Y ¹²		Y	Y		Y ¹³		
11	Internal Lining of Pipes	Y ^a							Y		Y ⁹		
12	Site Welding		Y ¹⁰		Y	Y							
NOTES (MEANING OF SUPERSSCRIPTS)													
a	One per heat/heat treatment batch/lot.												
b	On machined surfaces only for castings and on butt welds.												
c	For shaft/spindles > or = 40 mm												
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.												
2	Spark Test, Adhesion Test and Material Test for primer and enameled & Coal Tar Tapes as per AWWA-C-203-91/ IS-10221 & IS 15337 as applicable.												
3	Followings are the testing requirements for fabrication of pipes at site												
	TESTS	QUANTUM OF CHECKS											
	WPS, PQR, Welder Qualification Test	100% Welders and WPS shall be qualified as per ASME- section IX											
	DPT on root run	100% for pipes up to 1200 mm diameter											
	DPT after back gauging	100% for pipes above 1200 mm diameter											
	RT / UT by (TOFD/PAUT) Technique	5% (100% of T Joints)											

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	DPT on finished butt weld joints	10%
	Hydraulic Test	100%, 1.5 times the design pressure or 2 times the working-pressure whichever is higher.
4	Dry Cycle Test on Dual Plate Check valve spring for one lakh Cycles shall be carried out as a type test. If Dry Cycle test carried out earlier for same material & diameter, Test report shall be reviewed.	
5	Seat Leakage Test for Actuator Operated Valves, shall be done with by closing the valves with actuator.	
6	Tests on rubber parts shall be conducted per batch of rubber mix for tensile, Elongation, hardness, adhesion, spark test, bleed resistance test. In addition, type test for 50,000 cycles of each type of diaphragm shall also be conducted.	
7	Hydraulic Test of Body, Seat and disc-strength shall be carried out in accordance with governing design standard in presence of owner / owner's representatives. Actuator operated valves shall be checked for Seat Leakage by closing the valves with actuator. For Proof of Design Test refer respective chapters of engineering portion in the technical specification.	
8	Blue matching, wear travel for gates, valves, pneumatic seat leakage, and reduced pressure test for check valves shall be done as per relevant standard. Maximum allowable vacuum loss is 0.5 mm of Hg abs. for valves to be tested for vacuum operation for internal pressure 25 mm of Hg abs. for a period of 15 minutes. Fire safe test for ball valve shall be done wherever specified. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives. Valves shall be offered for hydro test in unpainted condition.	
9	Tensile, Elongation, Hardness, Specific Gravity, Lining Thickness, Humidity Check, Pipe temperature check, Adhesion Test and Holiday Detection Test etc as per applicable standard shall be done for all lining material and application.	
10	10% of welds (Root and finished welds) shall be subjected to DPT. (100% DPT for compressed air line and boiler & deaerator fill line.).	
11	Pressure drop across the strainer for each type and size as a special test shall be carried out. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives.	
12	During hydraulic and vacuum tests at 25mm Hg abs in 3 positions, the change in the circumference of arch should not be more than 1.5%. 24 hrs after the test permanent set in dimension should not exceed 0.5%.	
13	Tests on rubber for tensile, elongation, hardness, hydraulic stability check as per ASTM D 471, ozone resistance test as per ASTM D 1149/IS 3400 Part 20 aging test and adhesion strength of rubber to fabric, rubber to metal adhesion shall be carried out.	
14	In addition of all tests as indicated for Cast Butterfly valve being applicable for fabricated butterfly valves, following test shall be done for Fabricated Butterfly Valve: a. UT as per ASTM A-435/IS 11630 & IS 4225 on plate material for body and disc shall be carried out for plate thickness 25mm and above. b. 100% RT and DPT as per ASTM, Section-VIII, Division-I, on butt joints of body and disc. 10% DPT on other welds shall be done. c. Post weld heat treatment as per ASME, Section-VIII, Division-I on butt joints of body and disc. d. Welders and WPS shall be qualified as per ASME- section IX	
15	Maximum number of segments in segmental flanges shall be four (04) only. All butt weld joints in the segmental flanges shall be examined by RT/UT. Segmental flanges exceeding 37.5 mm thickness shall be stress relieved as per norms of ASME Section VIII after welding.	
16	For pressure vessel welds RT shall be done as per design code requirements.	

All Valves shall be offered for inspection in unpainted condition.

No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.

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RAW WATER SYSTEM EQUIPMENT

Tests/Check Items / Components		Material Test	DPT/MPI	Ultrasonic test	RT	Balancing	Hydraulic / Water Fill test	Pneumatic Test	Assembly/ fit up	Dimensions	Functional/operational Test	Performance Test	Other Test	All Test as per relevant Std/ Approved Data Sheets	Remarks
A.	VT PUMPS & CENTRIFUGAL PUMPS (HORIZONTAL / VERTICAL), SUMP PUMPS, SUBMERSIBLE PUMPS, DRAINAGE PUMP								Y ¹	Y		Y ²			
1	Shaft	Y ^a	Y ^b	Y ^c		Y				Y					
2	Impeller	Y ^a	Y ^b		Y ³	Y							Y ^d		
3	Suction Bell / Bowl Castings/ Inserts	Y ^a	Y ^b				Y			Y			Y ⁶		
4	Discharge Head / Column Pipes / Distance Piece/Base Plate	Y ^a	Y ^b	Y ^c	Y ⁴		Y		Y						
5	Companion Flanges	Y ^a	Y ^b	Y ^c	Y ⁵				Y						
5	Thrust Bearing (Tilting Pad type)	Y ^a	Y	Y					Y	Y				Y	
B.	RE JOINTS	Y ^a					Y ¹⁰		Y	Y			Y ¹¹		
C.	CRANES & HOISTS	REFER BELOW FOR QA CHECKS ON EOT CRANES AND HOISTS													
E.	VENTILATION FANS									Y		Y		Y	
1)	Hub/Blades/Casing /Impeller	Y	Y			Y									
2)	Shaft	Y ^a	Y	Y ^c											
3)	Pre/Fine Filters												Y ¹⁴		

Notes:

a	One per Heat/ Heat Treatment Batch/ Lot.
b	On machined surfaces only for Castings / Forgings and on Welds of Fabricated Components.
c	For Shaft diameter. ≥ 50 mm and for plate thickness ≥ 25 mm

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d	Inter Grannular Corrosion (IGC) Test shall be carried out on SS Castings.
1	Trial assembly of all Vertical Turbine Pump components with Column Pipes, Discharge Head, and Motor Stool shall be carried at shop.
2	Performance testing of Pumps shall be carried out at shop, as per HIS standard to determine Head & Flow Characteristics.
3	In case of pump impellers, Radiographic Examination shall be conducted as per ASTM E186/446 with Severity Level 2 for Gas porosity, Level 3 for Sand, Slag and Shrinkage. Cracks, Inserts and Mottling are not acceptable. Radiographic Examination should cover Vanes, Vane Junctions, Full Radial depth of Hub & other accessible areas of the rest of the Impeller.
4	Random 10% RT to be conducted on butt welds for Thk ≥ 10 mm & ≤ 25 mm and 100% RT to be conducted on butt welds for Thk > 25 mm (RT may be replaced by Ultrasonic Test due to constraint if any.) Stress relieving shall be carried out as per norms of ASME Section VIII.
5	Segmental Flanges exceeding 37.5 mm thickness shall be stress relieved after welding. All butt weld joints in segmental flange shall be examined by Radiographic Test. (RT may be replaced by Ultrasonic Test due to constraint if any.) Maximum number of segments shall be 4 only.
6	No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.
7	Hydraulic Test of Body, Seat and Disc strength shall be carried out in accordance with latest edition of AWWA C-504. Actuator operated Valves shall be checked for Seat Leakage by closing the Valve with Job Actuator. Seat Leakage test shall be carried out in both directions.
8	For Proof of Design Test refer respective chapters of engineering portion in the technical specification.
9	For Butterfly Valves of Fabricated construction (Sizes 600mm and above), butt Welds of thickness 20mm & above shall be subjected to 100% Radiography and Components shall undergo stress relieving.
10	During Hydraulic & Vacuum test at 30 mm Hg absolute in 3 different positions, the change in Circumference of the Arch should not be more than 1.5%. Permanent Set, after 24 hours of the test, should not exceed 0.5% of Arch.
11	Tests on Rubber for Tensile, Elongation, Hardness, Hydraulic Stability as per ASTM D-471, Ozone Resistance test as per ASTM D-1149, Aging test, Adhesion strength of Rubber to Fabric and Rubber to Metal shall be carried out.
14	Type / Routine tests as per requirements of BS-6540/ ASHRAE-52-76 for Dust arrestance shall be carried out.

EOT CRANES AND HOIST

1.00.00 HOOKS

All Tests including Proof Load Test as per relevant IS shall be carried out. MPI / DPT shall be done after proof load test.

2.00.00 STEEL CASTINGS

DPT on machined surface shall be carried out.

3.00.00 GIRDERS, END CARRIAGE, CRAB, GEAR BOX AND ROPE DRUM

UT shall be carried out on plates of thickness 25 mm and above as per ASTM A 435
NDT requirements on weldments shall be as follows

i.	Butt Welds in Tension	100% RT & 100% DPT
ii.	Butt Welds in Compression	10% RT & 100% DPT
iii.	Butt Welds in Rope Drum	100% RT & 100% DPT
iv.	Fillet Welds	10% DPT

4.00.00 FORGINGS (Wheels, Gears, Pinions, Axles, Hooks, & Hooks Trunion)

All forgings greater than or equal to 50 mm diameter or thickness shall be subjected to ultrasonic testing (UT).

DPT / MPI shall be carried out after hard-facing and machining.

Hardness and Case depth shall be measured

5.00.00 WIRE ROPES

Wire ropes shall be tested as per relevant standard.

6.00.00 REDUCTION GEARS

Reduction Gears shall be tested for reduction ratio, backlash and contact pattern.

Gear box shall be subjected to No – load run test for 4 hours to check for oil leakage, temperature rise, noise and vibration.

7.00.00 Chemical and Mechanical test of all components as per relevant material specification shall be carried out.

8.00.00 COMPLETE CRANE

The crane shall be completely assembled at shop for final testing.

All tests as per IS 3177 shall be carried out at shop.

9.00.00 HOISTS

All Electric Hoist shall be tested as per IS 3938 and chain pulley blocks shall be tested as per IS 3832.

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LAYING/ERECTION OF PIPES

(1) Followings are the Quality Assurance Requirements for laying of 3 LPE Coated MS Pipes

A RECEIPT OF ITEMS AT SITE

Check for completeness of supply and visual check for damage of followings after receipt at site:

- i. 3 LPE Coated MS Pipes, fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.
- ii. Welding electrodes, filler rods & wires, gases like oxygen, acetylene, argon, carbon di-oxide, propane etc.
- iii. X-ray & gamma ray equipment, dye penetrants, RT films,
- iv. Epoxy Primer, Paint, Heat Shrinkable Sleeve, Coating and wrapping material

B STORAGE

Check for proper storage of following items as per manufacturer recommendations / storage guideline

- i. 3 LPE Coated MS Pipes, fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.
- ii. Welding electrodes, filler rods & wires, gases like oxygen, acetylene, argon, carbon di-oxide, propane etc.
- iii. X-ray & gamma ray equipment, dye penetrants, RT films.
- iv. Epoxy Primer, Paint, Heat Shrinkable Sleeve, Coating and wrapping material

C Following checks shall be carried out during Laying of 3LPE Pipes

- i. Ensure proper alignment & fit up
- ii. Ensure correct joining of pipes
- iii. Ensure installation of supports (as applicable)
- iv. Hydraulic Test of section and complete pipeline as per Engg technical specification requirements.

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D JOINING OF 3 LPE COATED MS PIPES AT SITE BY WELDING

Following checks shall be carried out during joining of 3 LPE coated MS pipes at site by welding

- i. Dimensional conformity
- ii. Tolerance OD/ Ovality
- iii. Ensure proper alignment of pipes, Edge preparation and joint fit up
- iv. Ensure Tack weld by qualified welder and provision of internal bracing to keep in proper shape
- v. WPS, PQR & WPQ (welder performance qualification) tests prior to welding
- vi. Check for surface defects after welding (visual)
- vii. 100% DPT on root run/ after back gauging/ grinding of butt weld as applicable
- viii. 10% DPT on fillet weld
- ix. 10% DPT on finished butt welds
- x. 5% RT/ 5% UT by TOFD/PAUT techniques on those butt weld joints which can be 100% hydro tested.
- xi. 100% RT / 100% UT by TOFD/PAUT technique of the butt weld joints of pipeline shall be carried out which cannot be Hydro tested.

E WRAPPING & COATING OF HEAT SHRINKABLE SLEEVE, PROCEDURE QUALIFICATION TEST

Following checks shall be carried out during Procedure Qualification Test (PQT) of application (wrapping and coating) of Heat Shrinkable Sleeve as well as during regular work (Wrapping & Coating) of Heat Shrinkable Sleeve after PQT

- i. Before start of work, ensure followings
 - a. Use of correct raw material i.e. epoxy primer, wrap around heat shrinkable sleeve of NTPC acceptable make & grade.

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- b. The applicator agency deployed for the work shall have adequate experience and approved by NTPC.

- c. All the butt weld joints shall have acceptable NDT (RT/UT & DPT) and Hydraulic test records.
 - ii. Ensure proper cleaning and Surface preparation of butt weld joints & adjoining pipe surface as per approved procedure complying with relevant clauses of Specification.
 - iii. Finished Surface - Visual Examination, Measurement of Surface Roughness, Profile, dust contamination
 - iv. Ensure compliance of correct time interval between blasts cleaned ready pipe & coating.
 - v. Ensure use of correct size of Wrap around heat shrinkable sleeve on each joint
 - vi. Ensure adequate pre – heating of pipe
 - vii. Ensure application of correct epoxy primer (check make, grade, date of manufacturing, date of expiry) immediately after preheating
 - viii. Visual Examination & Wet film thickness measurement after epoxy primer coat
 - ix. Ensure application of wrap around heat shrinkable sleeve entirely around the pipe when the epoxy is still wet.
 - x. Ensure proper heat duration / temperature during application of heat on wrap around heat shrinkable sleeve
 - xi. Finished coat
 - a. Visual examination,
 - b. Measurement of coat thickness (on pipe body and on weld bead),
 - c. Holiday Test
 - d. Peel – off test
 - e. Overlap Test

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(2) Followings are the Quality Assurance Requirements for laying/erection of MS Pipes

A RECEIPT OF ITEMS AT SITE

Check for completeness of supply and visual check for damage of followings after receipt at site:

- i. MS Pipes, fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.
- ii. Welding electrodes, filler rods & wires, gases like oxygen, acetylene, argon, carbon di-oxide, propane etc.
- iii. X-ray & gamma ray equipment, dye penetrants, RT films, Epoxy Primer, Paint, Coating and wrapping material

B STORAGE

Check for proper storage of following items as per manufacturer recommendations / storage guideline

- i. MS Pipes, fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.
- ii. Welding electrodes, filler rods & wires, gases like oxygen, acetylene, argon, carbon di-oxide, propane etc.
- iii. X-ray & gamma ray equipment, dye penetrants, RT films.
- iv. Epoxy Primer, Paint, Coating and wrapping material

C Following checks shall be carried out during Laying of MS Pipes

- i. Ensure proper alignment & fit up
- ii. Ensure correct joining of pipes
- iii. Ensure installation of supports (as applicable)

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- iv. Hydraulic Test of section and complete pipeline as per Engg technical specification requirements.

D JOINING OF MS PIPES AT SITE BY WELDING

Following checks shall be carried out during joining of MS pipes at site by welding

- i. Dimensional conformity
- ii. Tolerance OD/ Ovality
- iii. Ensure proper alignment of pipes, Edge preparation and joint fit up
- iv. Ensure Tack weld by qualified welder and provision of internal bracing to keep in proper shape
- v. WPS, PQR & WPQ (welder performance qualification) tests prior to welding
- vi. Check for surface defects after welding (visual)
- vii. 100% DPT on root run/ after back gauging/ grinding of butt weld as applicable.
- viii. 10% DPT on fillet weld
- ix. 10% DPT on finished butt welds
- x. 5% RT/ 5% UT by TOFD/PAUT techniques on those butt weld joints which can be 100% hydro tested.
- xi. 100% RT / 100% UT by TOFD/PAUT technique of the butt weld joints of pipeline shall be carried out which cannot be Hydro tested.

E CHECKS ON PAINTING OF OVERGROUND MS PIPES

- i. Before start of work, ensure followings

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- a. Use of correct raw material i.e. primer, paint of NTPC acceptable make & grade.
- b. All the butt weld joints shall have acceptable NDT (RT/UT & DPT) and Hydraulic test records.
- ii. Ensure proper cleaning and Surface preparation of butt weld joints & complete pipe surface as per approved procedure complying to relevant clauses of Specification.
- iii. Finished Surface - Visual Examination, Measurement of Surface Roughness, Profile, dust contamination
- iv. Ensure compliance of correct time interval between blast cleaned ready pipe & coating / painting
- v. Ensure application of correct primer, paint (check make, grade, date of manufacturing, date of expiry)
- xii. Visual Examination & Wet film thickness measurement after primer coat, paint coats
- xiii. Finished coat
 - a. Visual examination,
 - b. Measurement of coat thickness (on pipe body and on weld bead),

(3) Followings are the Quality Assurance Requirements for laying of DI pipes

A RECEIPT OF ITEMS AT SITE

Check for completeness of supply and visual check for damage of followings after receipt at site:

DI Pipes, DI Pipes fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.

B STORAGE

Check for proper storage of following items as per manufacturer recommendations / storage manual

DI Pipes, DI Pipes fittings, flanges, couplings, bolts and nuts, fasteners, plugs, sleeves etc.

C LAYING OF DI PIPES

Following checks shall be carried out during Laying of DI Pipes

- v. Ensure proper alignment & fit up
- vi. Ensure correct joining of pipes
- vii. Ensure installation of supports (as applicable)

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- viii. Hydraulic Test of section and complete pipeline as per Engg technical specification requirements.

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SUB-SECTION–E-14

PT PLANT, LETP, DM PLANT, CW TREATMENT AND CLO2 SYSTEM

CLAUSE NO

QUALITY ASSURANCE



Test/Check Items / Components	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks

COMMON ITEMS:											LEGENDS: Applicable tests are identified by 'Y'. Y ^a : One per Heat / Heat Treatment batch / Lot. Y ^b : On machined surfaces only. Also 100% on Butt Welds & 10% on Fillet Welds. Y ^c : UT shall be done for shafts with Dia 50 mm or above & Plates of Thickness 25 mm or above. Y ^d :Dynamic Balancing per IS: 21940, Grade 6.3 minimum shall be conducted for rotating assy. Y ¹ : As per Pump governing standard. Tolerences as per HIS, USA. Y ² : Random 10% RT to be conducted on butt welds for Thk ≥10 mm. Y ³ : Seat Leakage Test for actuator operated valves shall be done by operating the valve with job actuator. Y ⁴ : Tests on Rubber Diaphragms shall be conducted per batch of Rubber mix for Tensile, Elongation, Hardness, Thickness, Bleed Resistance. In addition, Type Test for 50,000 cycles for each type of diaphragm shall also be conducted.
1. Horizontal Centrifugal Pumps											
1.1. Casing	Y ^a		Y ^b	Y	Y		Y	Y ¹	Y		
1.2. Impeller	Y ^a		Y ^b	Y						Y ^d	
1.3. Shaft	Y ^a		Y	Y						Y ^c	
2. Vertical Pumps											
2.1. Casing	Y ^a		Y ^b	Y		Y		Y ¹	Y		
2.2. Impeller	Y ^a		Y ^b	Y						Y ^d	
2.3. Shaft	Y ^a		Y	Y						Y ^c	
2.4. Fabricated Parts	Y ^a	Y	Y ^b	Y	Y ²	Y					
3. Dosing/ Metering Pumps											
	Y ^a			Y		Y	Y ¹	Y			
4. Gate/ Globe/ Check Valves											
	Y ^a		Y ^b	Y		Y	Y	Y	Y	Y ³ , Y ⁶	
5. Dual Plate Check Valves											
	Y ^a		Y ^b	Y		Y	Y	Y	Y	Y ⁶ , Y ¹²	
6. Diaphragm Valves											
	Y ^a			Y		Y		Y	Y	Y ⁴ , Y ³	
7. Butterfly Valves (Low Pr.)											
				Y	Y		Y	Y	Y	Y ³	
7.1 Body & Disc (Cast	Y ^a		Y ^b		Y						
7.2 Body and Disc (Fabricated)	Y ^a	Y	Y ^b		Y				Y	Y ²	

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Test/Check Items / Components	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks

7.3 Shaft	Y ^a		Y ^b		Y					Y ^c	Y⁶ : Blue Matching, Wear Travel for Gate Valves and reduced pressure test for check valves shall be conducted as per relevant standards. Y⁷ : Heat Treatment of the Tank/Vessel shall be done per fabrication code requirement. Welded dished ends shall be stress relieved. Dished ends manufactured by cold working shall also be stress relieved as per the requirement of code. Y⁸ : RT as per fabrication code requirements. However, dished ends welds, if manufactured by using welded plates shall be subjected to 100% RT. Y⁹ : Rubber Lining Mix shall be subjected to Bleed Resistance Test on mould sample. Adhesion Test, Spark Test and Hardness Test for the Rubber lined jobs shall also be conducted. Y¹⁰ : Gear Boxes shall be checked for smooth No Load Operation at shop to verify noise and vibration levels. Gear Ratio and Kerosene Leak Test shall also be conducted. Y¹¹ : One Fan of each type & size shall be routine performance tested as per
8. Plug/ Ball Valves (Low Pr.)	Y ^a		Y ^b	Y	Y		Y	Y	Y	Y ³	
9. Blowers/ Compressors	Y ^a		Y ^b	Y	Y			Y	Y	Y ^c , Y ^d	
10. Tanks/ Pressure Vessels	Y ^a	Y	Y ^b	Y	Y	Y ⁸	Y		Y	Y ⁷	
11. Rubber Lining	Y ^a				Y				Y	Y ⁹	
12. Strainers	Y ^a	Y	Y ^b	Y	Y		Y		Y		
13. Pipe & Pipe Fittings	Y ^a	Y	Y		Y	Y ⁸	Y		Y		
14. Agitators /Flash Mixer/ Flocculator	Y ^a	Y	Y ^b	Y	Y			Y		Y ¹⁰	
15. Ventilation/Exhaust Fan	Y ^a		Y ^b	Y	Y			Y ¹ 1	Y	Y ^c , Y ^d	
16. Hoists & Cranes	Y ^a	Y	Y ^b	Y	Y	Y ⁸		Y	Y		
17. Wrapping & Coatig Material	Y				Y				Y		
18. Package/ Split AC	Y							Y	Y	Y ¹⁴	
PT & LET PLANT:											
1. Clariflocculator / Reactor Clarifier / Plate or Tube Settler	Y ^a	Y	Y ^b	Y	Y				Y	Y ¹⁰	

CLAUSE NO

QUALITY ASSURANCE



Test/Check Items / Components	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks

2. Pressure / Vacuum Relief valve / Pressure Regulating Valve	Y ^a			Y	Y		Y	Y	Y		corresponding code for air flow, static pressure, total pressure, speed, efficiency, power consumption, noise & temperature rise. Also all Fans shall be subjected to run test of 4 hours during which noise, vibration, temperature rise and current drawn shall be measured. Y¹² :Dry cycle test on valve spring for 1, 00,000 cycles shall be carried out as type test, if not carried out earlier, for the similar MOC, size and type of spring. Y¹³ :Test as per approved supplier practice. Y¹⁴ : Electronic leak test for condenser & evaporator unit. Note: 1.The complete Piping system along with valves & fittings shall be hydraulically tested at 1.5 times design pressure or 2 times working pressure whichever is higher after erection at site. 2. In case of items other than those identified above, the quality requirements shall be decided based on system design requirements.
DM PLANT											
1. Resins / Activated Carbon									Y		
2. Filter Membrane					Y				Y		
3. RO Pressure tube	Y ^a				Y		Y		Y		

CLAUSE NO		QUALITY ASSURANCE											
Test/Check	Items / Components	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks	

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SUB-SECTION–E-15

EQUIPMENT COOLING WATER SYSTEM

CLAUSE NO.		QUALITY ASSURANCE												
EQUIPMENT COOLING WATER SYSTEM														
TEST / CHECKS		Material Test	WPS/PQR/Welder Qualification	DPT/MPI	Assembly Fit Up	Visual & Dimensional Check	UT	RT	Hydraulic / Water Fill	Balancing	Type Test	Performance Test	Other Test	
ITEM / COMPONENTS														
A	PLATE TYPE HEAT EXCHANGER		Y	Y ³	Y	Y			Y					
A.1	Heat Transfer Plates	Y ¹		Y ²		Y							Y ⁷	
A.2	Gaskets	Y				Y								
A.3	Cover Plates (Front & Rear)	Y ¹				Y	Y ⁵							
A.4	Tie Rods	Y ¹		Y ⁴			Y ⁶							
B	HORIZONTAL CENTRIFUGAL PUMP				Y	Y						Y ¹⁰		
B.1	Casing	Y ¹		Y ⁴		Y			Y ⁸					
B.2	Impeller	Y ¹		Y ⁴		Y				Y ⁹				
B.3	Shaft	Y ¹		Y		Y	Y ⁶			Y ⁹				
NOTES														
1 One per heat / HT batch														
2 DP Test shall be conducted for 10% of the lot of HT plates. However, in case of any defect, entire lot shall be tested and only defect free plates shall be accepted.														
3 100% DP Test shall be conducted on butt welds and 10% DPT on fillet weld after final run.														
4 100% DPT shall be carried out on machined surfaces.														
5 UT shall be done on plates with thickness >40 mm and for pressure parts plates 25 mm or above.														
6 UT shall be done on shaft / tie rod with diameter 40 mm or above.														
7 After pressing each HT plate shall be subjected to either of the following tests, as per Manufacturer Practice a) Light Box Test b) Vacuum Test c) Air Chamber Test														
8 All pressure retaining parts shall be hydrostatically tested at 200% of pump rated head or 150% of shut – off head, whichever is higher, for at least 30 minutes. No leakage is allowed.														
9 Static and Dynamic Balancing shall be carried out on complete rotor assembly.														
10 All pumps shall be tested at rated speed, for head, flow capacity, efficiency and power consumption for the entire operating range i.e. from shut off head to maximum flow. A minimum of 7 readings shall be taken to plot the curve, with one reading at design flow. Testing standard shall be HIS (Hydraulic Institute Standard) of USA. Performance test shall be carried out with contract motor, wherever Liquidated Damages are to be ascertained based on performance test at shop.														
11. For pipes, fittings, valves & RE joints refer QA chapters of LP Piping.														
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE				TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC.NO.:				SUB-SECTION –E-15 EQUIPMENT COOLING WATER SYSTEM (Mech)				Page 1 of 1		

SUB-SECTION–E-16

EOT CRANES AND HOISTS

CLAUSE NO.	QUALITY ASSURANCE	
	Shop Test for T.G.Hall EOT Cranes, Other Cranes & Hoist 1.0 HOOKS 1.01 ALL TESTS INCLUDING PROOF LOAD TEST AS PER RELEVANT IS/BS/DIN SHALL BE CARRIED OUT. 1.02 MPI/DPT SHALL BE CARRIED OUT AFTER PROOF LOAD TEST. 2.0 STEEL CASTING 2.01 DPT ON MACHINED SURFACE SHALL BE CARRIED OUT. 3.0 GIRDERS, END CARRIAGE, CRAB, GEAR BOX AND ROPE DRUM 3.01 THE PLATES OF THICKNESS 25MM AND ABOVE SHALL BE ULTRASONICALLY TESTED. 3.02 NDT REQUIREMENTS ON WELDMENTS SHALL BE AS FOLLOWS: a) BUTT WELDS IN TENSION:- 100% RT AND 100% DPT b) BUTT WELDS IN COMPRESSION:- 10% RT AND 100% DPT c) BUTT WELDS IN ROPE DRUM:- 100% RT AND 100% DPT d) FILLET WELDS:- RANDOM 10% DPT 4.0 FORGING (WHEEL, GEARS, PINIONS, AXLE, HOOKS & HOOK TRUNION) 4.01 ALL FORGINGS GREATER THAN OR EQUAL TO 50 MM DIAMETER OR THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TESTING. 4.02 DPT/MPI SHALL BE DONE AFTER HARDFACING AND MACHINING. 5.0 WIRE ROPE SHALL BE TESTED AS PER RELEVANT STANDARD. 6.0 REDUCTION GEARS SHALL BE TESTED FOR REDUCTION RATIO, BACKLASH & CONTACT PATTERN. GEAR BOX SHALL BE SUBJECTED TO NO-LOAD RUN TEST TO CHECK FOR OIL LEAKAGE, TEMPERATURE RISE, NOISE AND VIBRATION. 7.0 THE CRANES SHALL BE COMPLETELY ASSEMBLED AT SHOP FOR FINAL TESTING. ALL TESTS FOR DIMENSION, DEFLECTION, LOAD, OVERLOAD, HOISTING MOTION, CROSS TRAVEL ETC. AS PER IS-3177 SHALL BE CARRIED OUT AT SHOP. 8.0 ALL ELECTRIC HOISTS SHALL BE TESTED AS PER IS-3938 AND CHAIN PULLEY BLOCKS SHALL BE TESTED AS PER IS-3832. 9.0 <u>LIFTING BEAM:</u> 9.01 THE PLATES OF THICKNESS 25MM AND ABOVE SHALL BE ULTRASONICALLY TESTED.	
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI	E-16 TURBINE HALL EOT CRANE, OTHER CRANES & HOISTS
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CLAUSE NO.	QUALITY ASSURANCE			
9.02	NDT REQUIREMENTS ON WELDMENTS SHALL BE AS FOLLOWS: e) BUTT WELDS IN TENSION:- 100% RT AND 100% DPT f) BUTT WELDS IN COMPRESSION:- 10% RT AND 100% DPT g) FILLET WELDS:- RANDOM 10% DPT			
9.03	ALL FORGINGS GREATER THAN OR EQUAL TO 50 MM DIAMETER OR THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TESTING.			
9.04	DPT/MPI SHALL BE DONE AFTER MACHINING.			
9.05	Lifting Beam will be subjected to overload testing at @1.25 X SWL of Lifting Beam at manufacturer works.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI	E-16 TURBINE HALL EOT CRANE, OTHER CRANES & HOISTS	Page 2 of 2	

SUB-SECTION–E-17

AIR CONDITIONING & VENTILATION SYSTEM

CLAUSE NO.	QUALITY ASSURANCE	एनटीपीसी NTPC		
	AIR CONDITIONINGAND VENTILATION SYSTEM 1.00.00 CHILLING UNIT 1.01.00 Refrigerant Compressor (Screw/Scroll) 1.01.01 Hydraulic/Pneumatic test of castings of casings shall be carried out. No leakage shall be permitted. 1.01.02 DPT of screw, impeller, shaft, vanes, casing etc. after machining shall be carried out. 1.01.03 All rotating parts of screw and centrifugal compressor shall be dynamically balanced to ISO 1940 Gr. 6.3/IS 21940. 1.01.04 Leak tightness & vacuum check for chilling units / compressor in assembled condition shall be carried out. No leakage shall be permitted. 1.01.05 Performance test of assembled compressor and Chiller assembly shall be done to check for following : i) No load air run (free run) test of all types of compressor to check FAD (Free air delivery), Noise, Vibration & Temp. rise of bearing & body. ii) Functional run test for Chiller assembly shall be carried out. 1.02.00 CONDENSER & EVAPORATOR 1.02.01 DPT shall be carried out on welds if applicable. 1.02.02 10% RT of butt weld joint on shell shall be carried out if applicable. 1.02.03 Dimensional check including tube hole dia, ligament, pitch etc. shall be carried out. 1.02.04 Mock-up test of tubes to tube sheet expansion shall be carried out.In case such test is already carried out for similar tube/tube sheet thickness and materials, records for the same shall be furnished for NTPC review. 1.02.05 Hydraulic/Pneumatic test of Shell Side and Tube Side of condenser and evaporator as applicable shall be carried out. 'No leakage' shall be permitted. 2.00.00 AIR HANDLING UNIT 2.01.00 For Fans refer tests as mentioned at 4.00.00 2.02.00 One per type of assembled AHU (AHU casing and fan assembly) shall be subjected to free run test. Noise, Vibration and Temp. Rise of bearing shall be measured during run test. 2.01.00 All cooling coil shall be pneumatically tested and no leakage shall be permitted. 3.00.00 CENTRIFUGAL PUMP 3.01.00 UT on pump shaft (dia equal to or above 40 mm) and MPI/DPT on pump shaft and impeller after machining shall be carried out. 3.02.00 All rotating components of the pumps shall be dynamically balanced to ISO-1940 Gr. 6.3/IS 21940. 3.03.00 A standard hydrostatic test shall be conducted on the pump casing with water at 1.5 times the shut off pressure on the head characteristics curve or twice the rated pressure whichever is higher, for a minimum duration of 30 minutes. 3.04.00 Standard Running Test			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-17 AC AND VENTILATION SYSTEM(MECH)	Page 1 of 3	

CLAUSE NO.	QUALITY ASSURANCE	एनटीपीसी NTPC	
	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. Pump shall be given running test over the entire operating range covering from the shut-off head to the maximum flow. The duration of test shall be minimum one (1) hr. A minimum of seven readings approximately equidistant shall be taken for plotting the curves with one point at design flow. Testing of pumps shall be in accordance with stipulations of Hydraulic Institute Standard (HIS) and/or as per applicable Indian Standard or equivalent. Acceptance norms shall be as per approved datasheet & HIS standard and/or as per applicable Indian Standard or equivalent only. ii) Noise and vibration shall be measured at shop for reference purpose only. iii) Pumps shall be subjected to strip down examination visually to check for mechanical damages after testing at shop in case abnormal noise level and/or excessive vibration are observed during the shop test. iv) NPSH test shall be conducted with water as the medium, if required as per approved data sheets.		
4.00.00	FANS:		
4.01.00	20% DPT of welding on fan hub, blades, casing and impeller as applicable shall be carried out.		
4.02.00	DPT of fan shafts shall be carried out after machining.		
4.03.00	UT of fan shafts (dia equal to or above 40mm) shall be carried out.		
4.04.00	Rotating components of all fans shall be dynamically balanced to ISO-1940 Gr. 6.3/IS 21490		
4.05.00	All Fans shall be subjected to run test for 4 hrs. or till temperature stabilization is reached. Vibration, Noise level, Temp. rise and current drawn shall be measured during the run test.		
4.06.0	One fan of each type and size will be performance tested as per corresponding BIS code/AMCA for Air flow, Static Pressure, Speed, Efficiency, Power Consumption, Noise, Vibration and Temp. Rise.		
5.00.00	LOW PRESSURE AIR DISTRIBUTION SYSTEM		
5.01.00	Functional test for fire damper along with solenoid shall be done.		
5.02.00	Prototype tests report of fire damper (duly approved/accepted by ENGG) for each type and size as per UL-555 for fire rating shall be furnished.		
5.03.00	Site Test- After completion, all ducting system shall be checked/tested for air leakages/tightness (smoke test) at site.		
6.00.00	INSULATION:		
6.01.00	Insulation material shall be tested for all mandatory tests only as per relevant code/standard.		
6.02.00	Resin bonded mineral wool/Glass wool: Thermal conductivity tests (for thermal insulation only) shall be done the same density of material as applicable as per IS:3346 or equivalent standard//Engg spec.		
6.03.00	XLPE/Nitrile Rubber: Thermal conductivity tests (for thermal insulation only) shall be done as per relevant code for the same density and thickness of material and validity of test shall be as per relevant standard/Engg spec.		
7.00.00	COOLING TOWER		
7.01.00	UT of fan shaft and drive shaft (dia equal to or above 40mm) shall be carried out.		
7.02.00	DPT of fan hub and shafts shall be carried out after machining.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-17 AC AND VENTILATION SYSTEM(MECH) Page 2 of 3

CLAUSE NO.	QUALITY ASSURANCE
7.03.00	Color of fills shall be as per approved data sheet.
7.04.00	Fan assembly shall be statically/dynamically balanced.
7.05.00	Cooling Towers being supplied to site in assembled condition shall be subjected to run test at shop to measure FAD, Noise & Vibration. For Cooling Towers being supplied in knocked-down condition, these tests shall be done at site
8.00.00	AIR FILTERS: Pre/Fine filters shall be tested for initial and final pressure drop Vs flow, efficiency and average synthetic dust weight arrestance as per the requirement of BS 6540/ASHARE-52-76/EN779. HEPA (Absolute) filters shall be tested as per applicable code.
9.00.00	PIPES & FITTINGS:
9.01.00	All pipes and fittings shall be tested as per applicable codes / standard.
9.02.00	Site test- Pipes shall be tested at site hydraulically/pneumatically as per application requirement
10.00.00	VALVES & SPECIALTIES
10.01.00	Visual and dimensional check of valves as per relevant codes and approved drawing.
10.02.0	All the water line valves shall be hydraulically tested for body, seat and back seat (wherever provided) as per the relevant standard to which these valves are supplied irrespective of the working pressure for which these valves are selected. Check valves shall also be tested for leak tightness test at 25% of the specified seat test pressure.
10.03.0	Refrigerant line valves shall be pneumatically tested for body and seat leakage test.
10.04.00	Valves shall be offered for hydro test and pneumatic test in unpainted condition.
10.05.0	Functional check of the valves for smooth opening and closing shall be done.
10.06.0	Performance test to check pressure drop Vs flow shall be carried out for one valve of each type, size and rating for 'Balancing Valve'/Globe Valves with orifice.
11.00.00	SPLIT, CASSETTE, WINDOW, PRECISION/PACKAGED AC (PAC) & CONDENSING UNITS
11.01.00	Split/Cassette/ Window AC/PAC will be accepted on the basis of Manufacturer Standard Guarantee and Warrantee certificate.
11.02.00	PAC/Condensing unit: Each Unit shall be subjected to production routine Test as per relevant standard.
11.03.00	Capacity, noise level and vibration of PAC/ Condensing unit shall be demonstrated as per relevant standard on one unit of each type and rating.
12.00.00	Air Washer and Unitary Air Filter (UAF)
12.01.00	Random 10% DPT on weld joints shall be carried out.
12.02.00	Hydraulic test of pressure parts at 1.5 times the design or 2 times of working pressure whichever is higher. Pressure and water fill test of tanks shall be carried out.
12.03.00	Trial assembly of Air washer/UAF for one of each size shall be done in shop.
12.04.00	Performance test to check pressure drop Vs flow shall be carried out for one Nozzle of each type, size and rating.
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SUB-SECTION–E-18

LIMESTONE AND GYPSUM HANDLING SYSTEM

CLAUSE NO.	QUALITY ASSURANCE 		
	Lime & Gypsum Handling (Mechanical) 1.01.0 For following Items, Coal Handling Package (Mechanical) Specification shall be referred.: I] Brakes and Clamps. II] Monorails and Hoists III] Belt Conveyor System IV] Idlers V] Belting VI] Belt Vulcanizing Machine VII] Pulleys VIII] Pull Chord & Belt Sway Switches IX] Zero Speed Switch, Under Belt Switch and Chute Blockage Switch X] Drive Equipment's 1] Gear Boxes 2] Flexible Coupling 3] Fluid Coupling XI] Dust Control & Miscellaneous Systems (Dust Suppression & Dry Fog Dust Suppression System). XII] Pumps. XIII] Valves & Specialties. XIV] Pipes and Fittings. XV] Air Compressor. XVI] Air Receiver. XVII] Belt Scales. XVIII] Package Air Conditioner. XIX] Steel Structure. XX] In-Line Magnetic Separators. XXI] Metal Detector 1.02.00 Hoppers & Liners 1.02.01 Rack & Pinion Gates/Flap Gates/Rod Gates a) MPI/DP test shall be conducted on rack and pinion / rod / weld joint b) Functional checks on the gates shall be carried out along with respective actuator, if applicable. 1.03.00 Storage Silo 1.03.01 All material shall be tested for Chemical & Mechanical properties as per relevant standard. MPI/DP test on welding shall be carried out. Fit up assembly checks shall be carried out at shop for all dispatchable segments 1.03.02 Bag Filters: Leakage test shall be carried out for pressure parts. Pulsing and sequential test on bag filter shall be done. 1.04.0 Dust Extraction and Ventilation System		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION-E-18 LHP,GHP	Page 1 of 4

CLAUSE NO.	QUALITY ASSURANCE			
1.04.01	Fan (a) All materials should be of tested quality and test certificates should be provided. (b) Dynamic balancing of the fan impellers to be carried out. (c) Shop run test shall be conducted on all centrifugal fans including check for noise and vibration level. (d) Performance test shall be conducted on one fan of each type at shop for capacity, pressure, efficiency and power consumption.			
1.04.02	Valves and Specialties Refer 1.01.0 above			
1.04.03	Pipes and Fittings Refer 1.01.0 above			
1.05.00	Crushers The details of the checks to be carried out for various components are to be submitted by the Contractor for Owner’s approval. However, some indicative checks on different items are given below which should necessarily form part of the Quality Assurance Plan to be agreed with the Owner. (a) All plates equal to or above 25mm thickness shall be ultrasonically tested. (b) Shaft forgings and suspension bars to be checked for ultrasonic testing in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification. (c) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT. ii) Fillet Welds - 10% MPI/DPT. (d) Crusher rotor to be dynamically balanced. Procedure to be submitted for approval. (e) No-load trial run test to be carried out at shop to check for speed (RPM), temperature rise, noise level and vibration.			
1.06.0	Mobile Trippers (a) Shaft and wheel forgings – Ultrasonic test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification shall be conducted. (b) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT. ii) Fillet Welds - 10% MPI/DPT. (c) Shop trial run test shall be carried out and shall include check for noise level and vibration.			
1.07.00	Sampling Units (a) Free carriage and cutter movement, speed of cutter and dust door closing and sealing shall be tested for samplers. (b) “No load test” shall be carried out for crushers.			
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:		SUB-SECTION-E-18 LHP,GHP
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CLAUSE NO.	QUALITY ASSURANCE			
1.08.00	Bucket Elevator			
1.08.01	All plates equal to or above 25 mm thickness shall be ultrasonically tested.			
1.08.02	Castings and forgings, forged/rolled bar/section shall be subjected to ultrasonically test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.			
1.08.03	Machined and hard-faced surface of casting/forging and other hardened, stellited parts shall be subjected to DPT/MPI in addition to check for case depth, hardness as applicable for chain/sprocket/gear reducer/rollers/wheel/pan etc.			
1.08.04	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.			
1.08.05	For other items like drive system, motor, pulley, belt etc relevant portion of specification shall be applicable.			
1.09.00	Elevators (Rack and Pinion Type)			
	The details of the checks to be carried out in the various equipments are to be submitted by the contractor for owner's approval. However, some indicative checks on different items are given below which should necessarily form part of the quality assurance plan to be agreed with the owner.			
1.09.01	All forgings shall be subjected to ultrasonic test to ensure free from internal defects in addition to check for chemical and mechanical properties.			
1.09.02	10% of the welds selected at random shall be subject to DP test.			
1.09.03	All forged components shall be subjected to DPI/MPI after machining.			
1.09.04	Gear Reducer shall be checked for gear ratio, backlash, contact pattern. No load shop trial run shall be conducted on gear boxes to check for oil leakage, temperature rise, noise and vibration.			
1.09.05	Buffer springs shall be subjected to load test as per relevant specifications. Material certificates for springs shall also be furnished.			
1.09.06	All components prior to assembly shall be checked for dimensions.			
1.09.07	Function test of Elevator assembly shall be carried out.			
1.09.08	All electrical equipments shall be of proven quality.			
1.09.09	Galvanized components/parts shall be checked for weight of Zn coating, thickness of coating, uniformity of coating and adhesion test and visual examination as per IS 2633 and IS 2629.			
1.10.00	Paddle feeder			
1.10.01	Shaft and wheel forgings – Chemical, Mechanical, Hardness and Ultrasonic Test shall be conducted.			
1.10.02	Following minimum NDT on Weld Joint shall be carried out (a) Butt Welds - 10% UT/RT & 100% MPI/DPT			
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1.10.03	(b) Fillet Welds - 10% MPI/DPT Shop trial run shall be conducted to check for movement and RPM of Paddle wheel & Travel wheel, function of P/F in locked rotor condition, noise and vibration etc.		
1.11.00	Vibrating Screen Feeders/Vibrating Feeder (a) Shaft forgings to be checked for ultrasonic testing in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification (b) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT. ii) Fillet Welds - 10% MPI/DPT. (c) Shop trial run test shall be conducted to checks for speed (RPM), amplitude (stroke), temperature rise and noise level.		
1.12.00	Apron Feeder/Surface Feeder/Box Feeder		
1.12.01	All plates equal to or above 25 mm thickness shall be ultrasonically tested.		
1.12.02	Castings and forgings, forged/rolled bar/section shall be subjected to ultrasonically test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.		
1.12.03	Machined and hard-faced surface of casting/forging and other hardened, stellited parts shall be subjected to DPT/MPI in addition to check for case depth, hardness as applicable for chain/sprocket/gear reducer/rollers/wheel/pan etc.		
1.12.04	Suitable check for lifetime sealing of rollers for protection from dust and water shall be done.		
1.12.05	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.		
1.12.06	For other items like drive system, motor, pulley, belt relevant portion of specification shall be applicable		
1.12.07	No load trial run test shall be carried out at shop on completely assembled apron feeder to check for trouble free operation, temperature rise, Noise & vibration.		
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SUB-SECTION–E-19

ASH HANDLING PLANT

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1.01.00	BOTTOM ASH HOPPERS
1.01.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. MPI/DPI tests as applicable shall be done on welds to ensure freedom from defects. RT shall be done on load bearing weld/weld under tension as per relevant codes and standard
1.01.02	Fit up assembly checks shall be carried out at shop for at least critical segments of bottom ash hopper before dispatch to site.
1.02.00	BA HOPPER DISCHARGE GATES
1.02.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard
1.02.02	Barrel/ casing of Hydraulic/pneumatic Cylinder shall be hydro tested. UT at proof machined condition (for dia/thickness ≥ 50 mm) shall be done on shafts. Assembled cylinders shall be tested for port leakage
1.02.03	MPI/DPT shall be carried out on welds of BA hopper discharge gates
1.02.04	Functional checks of the BD hopper discharge gate along with actuator shall be carried out to check for smooth opening and closing.
1.03.00	CLINKER GRINDER/ASH CRUSHER
1.03.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Grinding rolls/elements shall be checked for hardness at manufacturer's works.
1.03.02	UT at proof machined condition (for dia/thickness ≥ 50 mm) and MPI/DPT after machining shall be done on shafts. MPI/DPT shall be carried out on welds
1.03.03	No load run test for minimum 2 hours continuous operation of clinker grinder shall be done to ensure trouble free operation.
1.04.00	DRY BOTTOM ASH HANDLING SYSTEM
1.04.01	Specialised equipments for dry bottom ash handling system shall be tested as per manufacturer's standard practice and relevant material standard.
1.04.02	Fabricated items, valves and welding checks shall be done as per QA tables and relevant section of technical specification.
1.05.00	ACI FITTINGS AND BASALT LINED PIPES & FITTINGS
1.05.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard.
1.05.02	Basalt liners shall be tested for chemical and mechanical properties. Basalt liners shall be examined visually for detection of cracks and defects. Level difference between two basalt liner shall be minimum. No loose piece is allowed.
1.05.03	DPT of welds shall be carried out on root and finished welds of fabricated fittings.
1.05.04	Fittings shall be hydraulically tested as at twice the operating pressure or 1.5 times the design pressure whichever is higher for 30 min duration.
1.06.00	FLUSHING BOXES & TROUGH TYPE EXPANSION JOINTS
1.06.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. MPI/DP tests shall be done on welds to ensure freedom from defects. Water fill test on assembly shall be carried out.
1.07.00	GEAR BOX
1.07.01	In addition to checks for physical, chemical, hardness, microstructure as per relevant standard, the shaft and gear/pinion forgings shall be subjected to ultrasonic testing.
1.07.02	MPI to be carried out on Gears/Pinions after machining. Case depth, hardness and MPI after hard-facing shall be checked to ensure freedom from defects.
1.07.03	Gear boxes shall be checked for reduction ratio, backlash and contact pattern. No load shop trial run to be conducted on gear boxes to check for oil leakage, temperature rise, noise level and vibration.
1.08.00	METALLIC EXPANSION JOINTS
1.08.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Leak test shall be carried out 1.1 times design pressure in case of vacuum application.

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1.08.02	DPT shall be carried out on welds before and after forming to check cracks. Spring rate shall also be measured.
1.08.03	Proof of design test shall be carried out on one of the expansion joint as per (EJMA) relevant standards. In case the bidder have already carried out the same on the expansion joint of the type and rating being offered, the test certificate shall be submitted for review.
1.09.00	FLY ASH BRANCH SEGREGATION VALVES , FLY ASH FEED VALVES, VACUUM BRAKER, AIR INTAKE VALVE AND KNIFE GATE VALVE FOR HOPPER ISOLATION
1.09.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Functional checks of the valves for smooth opening and closing shall also be done. Valves shall also be tested for allowable leakage rate, as applicable. Actuator operated valves shall be tested alongwith actuators
1.10.00	AIR LOCK/PUMP TANK
1.10.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Air lock/pump tanks shall be tested hydraulically for 1.5 times the design pressure or 2 times working pressure, whichever is higher, for 30 min duration at manufacturer's works. NDT on welds shall be as per requirement of design code/standard.
1.11.00	BAG FILTERS
1.11.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Leakage test shall be carried out for casing and other pressure parts. Pulsing and sequential test on bag filter shall be done.
1.12.00	HCSD SILO, DRY FLY ASH STORAGE SILO, DRY BOTTOM ASH STORAGE SILO, BUFFER HOPPER, BA OVERFLOW TANK AND SETTLING/SURGE TANK
1.12.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. MPI/DP test on welding shall be carried out. Fit up assembly checks shall be carried out at shop for all despatchable segments.
1.13.00	ASH SLURRY SUMP ISOLATION PLUG VALVES, SUMP/TRENCH LINERS AND TRENCH JETTING/AGITATING NOZZLES
1.13.01	All material shall be tested for chemical and mechanical properties as per relevant standard. Sump/Trench Liners and Nozzle Tip shall be checked for hardness.
1.13.02	Sump isolation Plug valves shall be water-fill tested
1.14.00	FLUID COUPLING:
1.14.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. Static and dynamic balancing shall be carried out for all rotating parts. Check for leak tightness of the coupling shall be carried out
1.14.02	Functional test on fusible plug for each type of coupling shall be conducted at shop. All couplings to be run tested at shop.
1.14.03	Check for temperature rise, torque speed, torque slip characteristics and over speed test on one coupling of each size and type during load test (preferably at Full load) at shop.
1.15.00	SLURRY DISPOSAL LINE VALVES (AT DYKE END)
1.15.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. All valves shall be hydraulically tested for body and seat leakage test at shop.
1.16.00	ELECTRIC HOIST & OVERHEAD TRAVELLING CRANE:REFER QA CHAPTERS OF CRANES AND HOIST
1.17.00	PACKAGE AIR CONDITIONER:
1.17.01	Each Unit shall be subjected to production routine Test excluding performance test carried out as per relevant standard. Performance test of PAC shall be carried out as per relevant standard on one unit of each type and rating at site to production
1.18.00	For items/components like pipes, valves, pumps, compressors, specialties etc refer table below

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S N	Tests/Checks Items / Components	Material Test	WPS/ WQS/PQR	DPT/MPI	Ultrasonic Test	Radiographic Test	PWHT	Assembly / Fit up	Dimensions	Hydraulic	Pneumatic Test	Balancing	Functional/operational Test	Performance Test	Other Tests	All Tests as per relevant Std
1	Pipes & Fittings	Y ^a							Y	Y ²⁰						Y
2	Diaphragm Valves	Y ^a							Y	Y ⁵			Y		Y ⁶	Y
3a	Cast Butterfly Valves (Low Pressure)	Y ^a		Y ³	Y ^b			Y	Y	Y ⁵			Y		Y ⁷	Y
3b	Fabricated Butterfly Valves (Low Pressure)	Y ^a	Y	Y ³	Y ^{12a}	Y ^{12b}	Y ^{12c}	Y	Y	Y ⁵			Y		Y ⁷	Y
4	Gate/ Globe/ Check Valves	Y ^a		Y ³	Y ^b			Y	Y	Y ⁵	Y		Y		Y ⁸	Y
5	Dual Plate Check Valves	Y ^a		Y ³	Y ^b			Y	Y	Y ⁵	Y		Y		Y ⁴	Y
6	Plug / Ball Valves	Y ^a		Y ³	Y ^b			Y	Y	Y ⁵	Y		Y			Y
7	Rolled & Welded Pipes / Mitre fittings	Y ^a	Y	Y ³		Y ¹			Y	Y ²⁰						
8	Coating & Wrapping of Pipes	Y ^a							Y							Y ²
9	Strainers	Y ^a		Y ³					Y	Y ²⁰					Y ⁹	
10	Rubber Expansion Joints	Y ^a						Y	Y	Y ¹⁰					Y ¹¹	
11	Site Welding		Y	Y ³		Y ¹				Y ²⁰						
12	Submersible Pump	Y ^a							Y	Y ¹⁷		Y		Y		Y
13	Horizontal Centrifugal Pumps/ Sump Pumps/ Sludge Pumps/ HCSD Pumps	Y ^a		Y ³	Y ^b			Y	Y	Y ¹⁷		Y		Y ¹⁶	Y ¹⁵	Y
14	Compressors/ Blowers / vacuum Pumps	Y ^a		Y ³	Y ^b			Y	Y	Y ²⁰		Y		Y ¹⁸	Y ¹⁹	Y
15	Atmospheric Storage Tanks/Mixing Tanks	Y ^a	Y	Y ³				Y	Y	Y ²⁰					Y ¹³	Y
16	Pressure vessels & Heat exchangers	Y ^a	Y	Y ³		Y ²¹	Y ²²	Y	Y	Y ²⁰					Y ²³	Y
17	Air Drying Plant	Y ^a	Y	Y ³		Y ²¹	Y ²²	Y	Y	Y ²⁰	Y		Y		Y ²⁴	
18	Mixers	Y ^a		Y ³	Y ^b			Y	Y				Y		Y ²⁵	
19	Fans	Y ^a		Y ³	Y ^b			Y	Y			Y		Y	Y ¹⁴	Y
	NOTES															
a	One per heat/heat treatment batch/lot.															
b	For shaft/spindles/forgings diameter $\square$ 50 mm															

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1	Weld Joints not subjected to hydraulic test shall be subjected to 100% RT.
2	Tests for primer and enamel / Coal Tar Tapes as per AWWA-C-203 / IS 15557
3	On machined surfaces of castings/shaft/spindles/forgings. DPT/MPI on root run (after back gouging/chipping – as applicable) for 100% and on finish butt & fillet welds for 10%.
4	Dry Cycle Test on Dual Plate Check valve spring for one lakh (10 ⁵) Cycles shall be carried out as a type test.
5	Valves shall be tested for Body, seat & back seat leakage as applicable. Hydraulic test pressure shall be as per relevant standard. & shall be done as per relevant standard. Seat Leakage Test for Actuator Operated Valves, shall be done with by closing the valves with actuator. Valves shall be offered for hydro test in unpainted condition
6	Tests on rubber diaphragm such as hardness, bleed resistance test, rubber to fabric bond, flex test & type test for 50,000 cycles shall be carried out.
7	In addition to Body & seat hydrotest, disc-strength shall be carried out as per relevant standard
8	Blue matching for metal-seated valves, Wear travel for gate valves, pneumatic seat leakage test & reduced pressure test for check valves shall be done as per relevant standard. Maximum allowable vacuum loss is 0.5 mm of Hg absolute for valves to be tested for vacuum operation for internal pressure 25 mm of Hg absolute for a period of 15 minutes
9	Pressure drop across the strainer for each type and size as a special test shall be carried out
10	During hydraulic and vacuum tests in 3 positions, the change in the circumference of arch should not be more than 1.5%. 24 hrs after the test permanent set in dimension should not exceed 0.5%.
11	Tests on rubber for tensile, elongation, hardness, hydraulic stability check as per ASTM D 471, ozone resistance test as per ASTM D 1149, ageing test and adhesion strength of rubber to fabric & rubber to metal shall be carried out.
12	a) For fabricated butterfly valves: UT as per ASTM A-435 on plates for body and disc shall be carried out. b) 100% RT as per ASTM, Section-VIII, Division-I, on butt joints of body and disc c) Post Weld Heat Treatment (PWHT) as per ASME, Section-VIII, Division-I on butt joints of body and disc of thickness above 30mm shall be carried out.
13	Rubber Lining Mix shall be subjected to Bleed Resistance Test on mould sample. Adhesion Test, Spark Test and Hardness Test for the Rubber lined jobs shall also be conducted.
14	All fans shall be subjected to run test and Vibration, noise, temperature rise, and current drawn shall be measured during the run test. Performance test of one fan of each type and size shall be carried out as per applicable standard for air flow, static pressure, speed, Efficiency, power consumption.
15	In case of diaphragm/plunger, only proven material shall be used and certificate in this regard shall be submitted for review.
16	All pumps to be performance tested as per Hydraulic Institute Standard/Relevant standard. Performance test to include check for noise, vibration level and bearing temperature rise. NPSH test shall be carried out for HCSD pumps and other pumps, if applicable.
17	Pumps shall be tested at 200% of pump rated head or at 150% of pump shut-off head whichever is higher for 30 min duration. For Ash slurry pumps the Rated/shut off head for each slurry pump shall be taken after adding the rated/shut off head for all the pumps coming in a series. The testing for each pump shall be done at the above pressure.
18	Performance testing of each compressor/ Blower / Vacuum Pump shall be carried out at shop as per BS-1571/ IS: 5456 /ISO 1217/ Pneurop 6612/ equivalent as applicable. Noise & vibration shall also be measured during performance testing.
19	For Compressors capacity control and operation of safety valves shall be checked during inspection at shop
20	Pressure retaining parts shall be hydraulic tested. Hydraulic test pressure shall be as per applicable std / 1.5 x design pressure or 2 x working pressure whichever is higher for 30 minutes duration. Atmospheric tanks shall be water fill tested
21	RT on weld joints shall be as per respective code requirements. Heat Treatment of the Tank/Vessel shall be done as per fabrication code requirement.
22	Dished ends shall be stress relieved as per relevant code. However, dished ends welds (if manufactured by using welded plates) shall be subjected to 100% RT and stress relieved.
23	Tube to tube sheet joints of heat exchanger shall be subject to mock up test. Coolers/heat exchanger shall be hydro tested on tube side and shell side
24	Refrigerant compressors shall be tested as per relevant std and certification from manufacturer for the same shall be submitted. Due point measurement & function of auto drain trap shall also be carried out.
25	Concentricity/ centering & Axial Run out Shall also be measured

SUB-SECTION–E-20

COAL HANDLING PLANT & BIOMASS HANDLING PLANT

CLAUSE NO.	QUALITY ASSURANCE			
	Coal Handling Plant (Mechanical)			
1.01.00	Brakes and Clamps			
1.01.01	Final testing of brakes shall include load, HV/IR & heat run tests.			
1.02.00	Monorails and Hoists			
1.02.01	All electric hoist shall be tested as per IS 3938 and chain pulley block shall be tested as per IS 3832.			
1.03.00	Chute			
1.03.01	Flap Gates			
	a) MPI/DP test shall be conducted on rack and pinion / rod / weld joint			
	b) Functional checks on the gates shall be carried out along with respective actuator, if applicable.			
1.04.00	Belt Conveyor System			
	The details of the checks to be carried out in the various equipments are to be submitted by the Contractor for Owner's approval. However, some indicative checks on different items are given below which should necessarily form a part of the Quality Assurance Plan to be agreed with the Owner.			
1.04.01	Idlers			
	a) Check for run out and free movement shall be carried out on idlers. Run out shall be restricted as per IS:8598			
	b) Test for dust proofness, water proofness and dynamic friction factor of the Idlers shall be conducted at shop. The detailed procedures for the same shall be submitted for review and approval.			
1.04.02	Belting			
	(a) Rubber cover of finished belt shall be checked for tensile strength and elongation at break before and after ageing. Rubber cover shall also be checked for abrasion, tear strength and hardness.			
	(b) For finished belts, checks for elongation at 10% nominal tensile strength, tensile and elongation at break in longitudinal (warp) direction and tensile in transverse (weft) direction shall be carried out.			
	(c) Adhesion test between ply to ply and cover to ply shall be carried out.			
	(d) Trough-ability test and Test for fire resistance shall be carried out.			
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1.04.03	(e)	Test for procedure qualification for belt vulcanizing joint (at site) shall be done. Procedure for belt vulcanizing joint shall be discussed and finalized during FQP finalization.		
	(f)	There will be a limitation on the no. of repairs allowed on the belts. Following will be the acceptance norm for the cover repairs.		
	i)	The maximum size of a repair shall be limited to a size equivalent to one fifth the belt width. No single dimension shall exceed one fifth (1/5) of belt width.		
	ii)	Small local repair by dough filling of size 25mm x 25mm to a limited extent shall not be counted of repairs. However, in case of cluster of repairs, same shall be counted as a patch repair.		
	iii)	The maximum number of patch repair shall not exceed 5 per 100 mts. However, the total number of patch and dough filling repairs shall not exceed 10 per 100 meters.		
	(g)	In addition to above, Steel Cord belt shall also be tested for following.		
	i.	Cord dia and breaking strength		
	ii.	Finished belt shall be tested for cord pull-out strength before and after ageing, peeling resistance.		
	iii.	Dynamic cord pull out test		
	iv.	Cord dia, pitch and number of cords		
(h)	In no case shall the cover thickness or the width of belt be less than that given in specification.			
(i)	For testing purpose, belt sample shall be taken from anywhere of the belt roll length offered			
1.04.03	Belt Vulcanizing Machine			
1.04.04	a)	Check for tensile strength shall be carried out on a sample vulcanized belt joint for each type of belt in shop. However, if such test has been done earlier, the report for same shall be submitted for verification.		
	b)	Complete assembly shall be tested at shop for temp. and pressure developed		
	Pulleys			
	a)	In addition to chemical, mechanical, hardness, microstructure as per applicable material specification, pulleys shaft forgings shall be subjected to ultrasonic testing.		
	b)	100% MPI/DPT on all welds shall be conducted and 10% RT/UT on butt welds shall be conducted.		
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1.04.05	c) Static balancing of pulleys shall be carried out after rubber lagging.			
	d) Checks on rubber lagging to include abrasion loss, shore hardness test, peel-off strength test and physical properties. Peel-off strength shall be 10 Kg/Cm, Abrasion loss shall be less than 250 cubic mm when tested as per DIN 53516.			
1.04.05	Pull Chord & Belt Sway Switches			
1.04.06	a. Acceptance tests			
	i) Over all dimension and functional test.			
	ii) HV & IR test			
	iii) Degree of protection test report.			
	Zero Speed Switch, Under Belt Switch and Chute Blockage Switch			
1.04.06	a Acceptance test			
	i) Burn in test at 50 degree C for 48 hours shall be done for electronic switches.			
	ii) Over all dimension and functional test shall be carried out.			
	iii) HV & IR			
	iv) Degree of protection test			
1.05.00	Drive Equipment:			
1.05.01	Gear Boxes:			
1.05.02	(a) In addition to checks for physical, chemical, hardness, microstructure as per relevant standard, the shaft and gear/pinion forgings shall be subjected to ultrasonic testing.			
	(b) MPI to be carried out on Gears/Pinions after machining. Case depth, hardness and MPI after hard-facing shall be checked to ensure freedom from defects.			
	(c) Gear reducer shall be checked for reduction ratio, backlash and contact pattern. No load shop trial run to be conducted on gear boxes to check for oil leakage, temperature rise, noise level and vibration.			
	Flexible Coupling			
	(a) Ultrasonic testing shall be conducted on forgings for gear sleeve and gear hub, if gear coupling is provided.			
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1.05.03	(b)	MPI shall be carried out after machining to ensure freedom from cracks.			
	Fluid Coupling				
	(a)	Dynamic balancing shall be carried out for the rotating parts.			
	(b)	Check for leak tightness of the coupling shall be carried out.			
	(c)	Functional test on fusible plug for each type of coupling shall be conducted at shop.			
1.06.00	(d)	All couplings to be run tested at shop on no load			
	(e)	Check for temperature rise, torque-speed, torque-slip characteristics and over speed test shall be included during performance test of one coupling of each type preferably at full load.			
	Dust Control & Miscellaneous Systems (Dust Suppression & Dry Fog Dust Suppression System)				
	The details of the checks to be carried out on the various equipments are to be submitted by the Contractor for Owners approval. However some indicative checks on different items are given below which should necessarily form a part of the Quality Assurance Plan to be agreed with by the Owner.				
	1.06.01	Pumps			
(a)		All materials should be of tested quality and test certificates to be provided.			
(b)		DPT of machined shaft and impeller shall be done.			
(c)		Shaft forgings to be also subjected to ultrasonic testing.			
(d)		Impellers to be dynamically balanced to ISO 1940 Gr.6.3			
1.06.02	(e)	All pressure parts shall be hydraulically tested at 150% of the shut-off head or 200% of rated head, whichever is higher for 30 minutes. No leakage is allowed.			
	(f)	All pumps to be performance tested as per Hydraulic Institute Standard/Indian Standard. Performance test to include check for noise, vibration level and temperature rise.			
	Valves & Specialties				
	(a)	Valves and Specialties shall be tested as per relevant standards / codes.			
	(b)	Seat Leakage and hydraulic test to be carried out as per relevant standards / codes.			
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1.06.03	Pipes and Fittings			
	Pipes and fittings shall be tested as per relevant standards / codes.			
1.06.04	Air Compressor			
	a) All pressure parts shall be hydraulically tested at not less than 150% of design pressure for duration of 30 minutes prior to painting. b) All other parts including inter-connecting piping shall be hydraulically tested wherever possible, as per relevant codes. c) Ultrasonic testing shall be carried out on all forgings and rotor for dia 50mm and above. MPI/DPT shall be done on machined area of the components. d) During assembly all clearances and alignments shall also be checked and recorded e) Rotor shall be statically and dynamically balanced f) Performance Test (Shop Test) i. Performance test on the compressor shall be carried out in accordance with ISO:1217/Eq. The test shall also include demonstration of loading and unloading mechanism (Capacity control) and operation of safety valve ii. Vibration and Noise level measurement shall be done during shop performance test.			
1.06.05	Air Receiver			
	a) Each finished vessel shall be hydraulically tested at 150% of the design pressure for a duration of 30 minutes b) NDT on weld joints shall be as per respective code requirements or the minimum as specified below i. 100% DPT on root run of butt welds ii. 100% DPT on all finished butt welds and fillet welds iii. 10% RT on butt welds which shall include all T-Joints			
1.07.00	Ventilation Systems			
1.07.01	Fan			
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	(a) All materials should be of tested quality and test certificates should be provided. (b) Dynamic balancing of the fan impellers to be carried out. (c) Shop run test shall be conducted on all centrifugal fans including check for noise and vibration level. (d) Performance test shall be conducted on one fan of each type at shop for capacity, pressure, efficiency and power consumption.			
1.07.02	Valves and Specialties Refer 1.06.02 above			
1.07.03	Pipes and Fittings Refer 1.06.03 above			
1.08.00	Travelling Trippers & Bunker Sealing Arrangement Mobile Trippers (a) Shaft and wheel forgings – Ultrasonic test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification shall be conducted. (b) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT. ii) Fillet Welds - 10% MPI/DPT. (c) Shop trial run test shall be carried out and shall include check for noise level and vibration.			
1.09.0	Steel Structure			
1.09.01	Only material which has been identified against mill sheet or test certificates shall be used for construction. Check testing shall be carried out in the absence of MTC. Correlation shall be maintained by Manufacturer. All plates above 40mm thickness shall be 100% ultrasonically tested.			
1.09.02	Visual inspection of all welds shall be performed in accordance with AWS D.1.1.			
1.09.03	NDT requirements of structural steel welds shall be as under: a) 100% RT/UT on butt-welds of plate thickness ≥ 32 mm. Edge for field weld shall be examined by MPI for plate thickness ≥ 32mm. b) For Plates of $10\text{ mm} < \text{thickness} < 32\text{ mm}$ - 10% RT On butt welds.			
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1.09.04	c) 10% Ultrasonic testing shall be carried out on full penetration welds (other than butt welds) d) DP Test on Welds: 100% on Root Run & 10% on Final Welds of all butt welds - At random 5% on fillet of built-up plate girders. Girders/columns/Beams etc shall be trial assembled and match marked prior to dispatch. Trial assembly procedure at shop shall be submitted for NTPC review and approval.			
1.10.00	Belt Scales The details of the checks to be carried out in the various equipment's are to be submitted by the Contractor for Employer's approval. However, some indicative checks are given below which should necessarily form a part of the quality assurance plan to be agreed with the Employer.			
1.10.01	Mounting arrangement/Overall dimensional check shall be carried out on the Belt Scales.			
1.10.02	Belt scale shall be calibrated with test weight/test chain in static at works and with test weight for dynamic condition at site.			
1.10.03	All electronic modules shall be subjected to burn in test at 50 Degree C for 48 hours.			
1.10.04	General check for load cell shall be carried out.			
1.10.05	Test report for degree of protection on enclosure shall be furnished.			
1.10.06	Accuracy/performance check shall be demonstrated at site.			
1.11.00	Package Air-Conditioner Each Unit shall be subjected to production routine Test excluding performance test carried out as per relevant standard. Performance test of PAC shall be carried out as per relevant standard on one unit of each type and rating at site.			
1.12.00	Vibrating Grizzly Feeders and Vibrating Feeders (a) Shaft forgings to be checked for ultrasonic testing in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification (b) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT.			
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1.13.00	(c)	ii) Fillet Welds - 10% MPI/DPT.		
		Shop trial run test shall be conducted to checks for speed (RPM), amplitude (stroke), temperature rise and noise level.		
	Crushers (Ring Granulators)			
	The details of the checks to be carried out for various components are to be submitted by the Contractor for Owner's approval. However, some indicative checks on different items are given below which should necessarily form part of the Quality Assurance Plan to be agreed with the Owner.			
	(b)	All plates equal to or above 25mm thickness shall be ultrasonically tested.		
	(c)	Shaft forgings and suspension bars to be checked for ultrasonic testing in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.		
	(d)	Following minimum NDT requirements to be ensured for welds:		
		i) Butt welds - 10% UT/RT and 100% MPI/DPT.		
		ii) Fillet Welds - 10% MPI/DPT.		
	1.14.00	(e)	Crusher rotor to be dynamically balanced. Procedure to be submitted for approval.	
(f)		No-load trial run test to be carried out at shop to check for speed (RPM), temperature rise, noise level and vibration.		
1.15.00	In-Line Magnetic Separators			
	i)	Overall Dimensional, Visual check along with control panel.		
	ii)	HV & IR.		
	iii)	Operation, temperature rise, lifting capacity, force index and gauss strength.		
1.16.00	Metal Detectors			
	i)	Functional test including sensitivity, Burn in test, operation of liquid spray marker, detection of smallest piece of different materials as specified.		
	ii)	Test report for Degree of protection test to be furnished.		
1.16.00	Coal Sampling Units			
	(a)	Free carriage and cutter movement, speed of cutter and dust door closing, and sealing shall be tested for samplers.		
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	(b) “No load test” shall be carried out for crushers.			
1.17.0	Reversible Stacker Cum Reclaimer/Reclaimer			
1.17.01	All plates equal to or above 25mm thickness shall be ultrasonically tested.			
1.17.02	Forgings/Castings for Shaft, Gears/Pinion, Axles, Rail Wheels, Bucket Hub/Teeth/Blade etc., shall be subject to ultrasonic testing in addition to check for chemical, mechanical, hardness and microstructure as per applicable material specification			
1.17.03	MPI/DPT shall be carried out on forgings/casting after machining/hard facing if applicable.			
1.17.04	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.			
1.17.05	Trial assembly of Stacker/Reclaimer, Sub-assemblies shall be carried out at shop. Manufacturer shall furnish detail procedure for various sub assemblies such as wheel bogies, base frame, slew deck, bucket wheel, boom, bucket wheel with shaft and sample bucket etc. for NTPC approval.			
1.18.00	WAGON TIPPLER ALONGWITH SIDE ARM CHARGER			
1.18.01	All plates equal to or above 25 mm thickness shall be ultrasonically tested.			
1.18.02	Casting and forgings/bars (Shafts, Racks, Pinion wheels, Arm etc.) shall be subjected to ultrasonically test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.			
1.18.03	Machined and hard faced surface of casting/forging shall be subjected to DPT/MPI.			
1.18.04	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.			
1.18.05	Trial assembly of various sub-assemblies of Wagon Tippler along with Side Arm Charger shall be carried out in shop. Manufacturer shall furnish detail procedure for the same for NTPC approval.			
1.19.00	APRON FEEDER			
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1.19.01	All plates equal to or above 25 mm thickness shall be ultrasonically tested.			
1.19.02	Castings and forgings, forged/rolled bar/section shall be subjected to ultrasonically test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.			
1.19.03	Machined and hard faced surface of casting/forging and other hardened, stellited parts shall be subjected to DPT/MPI in addition to check for case depth, hardness as applicable for chain/sprocket/gear reducer/rollers/wheel/pan etc.			
1.19.04	Suitable check for life time sealing of rollers for protection from dust and water shall be done			
1.19.05	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.			
1.19.06	For other items like drive system, motor, pulley, belt relevant portion of specification shall be applicable			
1.19.07	No load trial run test shall be carried out at shop on completely assembled apron feeder to check for trouble free operation, temperature rise, Noise & vibration.			
1.20.00	Paddle Feeders			
1.20.01	Shaft and wheel forgings – Chemical, Mechanical, Hardness and Ultrasonic Test shall be conducted.			
1.20.02	Following minimum NDT on Weld Joint shall be carried out (a) Butt Welds - 10% UT/RT & 100% MPI/DPT (b) Fillet Welds - 10% MPI/DPT			
1.20.03	Shop trial run shall be conducted to check for movement and RPM of Paddle wheel & Travel wheel, function of P/F in locked rotor condition, noise and vibration etc.			
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	Bio Mass Handling Plant (Mechanical)			
1.01.00	Brakes and Clamps			
1.01.01	Final testing of brakes shall include load, HV/IR & heat run tests.			
1.02.00	Monorails and Hoists			
1.02.01	All electric hoist shall be tested as per IS 3938 and chain pulley block shall be tested as per IS 3832.			
1.03.00	Chute			
1.03.01	Flap Gates			
	a) MPI/DP test shall be conducted on rack and pinion / rod / weld joint c) Functional checks on the gates shall be carried out along with respective actuator, if applicable.			
2.04.00	Belt Conveyor System			
	The details of the checks to be carried out in the various equipments are to be submitted by the Contractor for Owner’s approval. However, some indicative checks on different items are given below which should necessarily form a part of the Quality Assurance Plan to be agreed with the Owner.			
1.04.01	Idlers			
	c) Check for run out and free movement shall be carried out on idlers. Run out shall be restricted as per IS:8598 d) Test for dust proofness, water proofness and dynamic friction factor of the Idlers shall be conducted at shop. The detailed procedures for the same shall be submitted for review and approval.			
1.04.02	Belting			
	(g) Rubber cover of finished belt shall be checked for tensile strength and elongation at break before and after ageing. Rubber cover shall also be checked for abrasion, tear strength and hardness. (h) For finished belts, checks for elongation at 10% nominal tensile strength, tensile and elongation at break in longitudinal (warp) direction and tensile in transverse (weft) direction shall be carried out.			
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2.04.03	(i) Adhesion test between ply to ply and cover to ply shall be carried out. (j) Trough-ability test and Test for fire resistance shall be carried out. (k) Test for procedure qualification for belt vulcanizing joint (at site) shall be done. Procedure for belt vulcanizing joint shall be discussed and finalized during FQP finalization. (l) There will be a limitation on the no. of repairs allowed on the belts. Following will be the acceptance norm for the cover repairs. iv) The maximum size of a repair shall be limited to a size equivalent to one fifth the belt width. No single dimension shall exceed one fifth (1/5) of belt width. v) Small local repair by dough filling of size 25mm x 25mm to a limited extent shall not be counted of repairs. However, in case of cluster of repairs, same shall be counted as a patch repair. vi) The maximum number of patch repair shall not exceed 5 per 100 mts. However, the total number of patch and dough filling repairs shall not exceed 10 per 100 meters. (g) In addition to above, Steel Cord belt shall also be tested for following. v. Cord dia and breaking strength vi. Finished belt shall be tested for cord pull-out strength before and after ageing, peeling resistance. vii. Dynamic cord pull out test viii. Cord dia, pitch and number of cords (h) In no case shall the cover thickness or the width of belt be less than that given in specification. (i) For testing purpose, belt sample shall be taken from anywhere of the belt roll length offered			
	Belt Vulcanizing Machine c) Check for tensile strength shall be carried out on a sample vulcanized belt joint for each type of belt in shop. However, if such test has been done earlier, the report for same shall be submitted for verification.			
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1.04.04	d)	Complete assembly shall be tested at shop for temp. and pressure developed		
	Pulleys			
	e)	In addition to chemical, mechanical, hardness, microstructure as per applicable material specification, pulleys shaft forgings shall be subjected to ultrasonic testing.		
	f)	100% MPI/DPT on all welds shall be conducted and 10% RT/UT on butt welds shall be conducted.		
	g)	Static balancing of pulleys shall be carried out after rubber lagging.		
1.04.05	h)	Checks on rubber lagging to include abrasion loss, shore hardness test, peel-off strength test and physical properties. Peel-off strength shall be 10 Kg/Cm, Abrasion loss shall be less than 250 cubic mm when tested as per DIN 53516.		
	Pull Chord & Belt Sway Switches			
	a.	Acceptance tests		
	i)	Overall dimension and functional test.		
	ii)	HV & IR test		
1.04.06	iii)	Degree of protection test report.		
	Zero Speed Switch, Under Belt Switch and Chute Blockage Switch			
	a	Acceptance test		
	i)	Burn in test at 50 degree C for 48 hours shall be done for electronic switches.		
	ii)	Overall dimension and functional test shall be carried out.		
1.05.00	iii)	HV & IR		
	iv)	Degree of protection test		
	Drive Equipment:			
1.05.01	Gear Boxes:			
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	(g)	All materials should be of tested quality and test certificates to be provided.		
	(h)	DPT of machined shaft and impeller shall be done.		
	(i)	Shaft forgings to be also subjected to ultrasonic testing.		
	(j)	Impellers to be dynamically balanced to ISO 1940 Gr.6.3		
	(k)	All pressure parts shall be hydraulically tested at 150% of the shut-off head or 200% of rated head, whichever is higher for 30 minutes. No leakage is allowed.		
	(l)	All pumps to be performance tested as per Hydraulic Institute Standard/Indian Standard. Performance test to include check for noise, vibration level and temperature rise.		
	1.06.02	Valves & Specialties		
	(a)	Valves and Specialties shall be tested as per relevant standards / codes.		
	(b)	Seat Leakage and hydraulic test to be carried out as per relevant standards / codes.		
	1.06.03	Pipes and Fittings		
	Pipes and fittings shall be tested as per relevant standards / codes.			
1.06.04	Air Compressor			
	g)	All pressure parts shall be hydraulically tested at not less than 150% of design pressure for duration of 30 minutes prior to painting.		
	h)	All other parts including inter-connecting piping shall be hydraulically tested wherever possible, as per relevant codes.		
	i)	Ultrasonic testing shall be carried out on all forgings and rotor for dia 50mm and above. MPI/DPT shall be done on machined area of the components.		
	j)	During assembly all clearances and alignments shall also be checked and recorded		
	k)	Rotor shall be statically and dynamically balanced		
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1.06.05	l) Performance Test (Shop Test)			
	i. Performance test on the compressor shall be carried out in accordance with ISO:1217/Eq. The test shall also include demonstration of loading and unloading mechanism (Capacity control) and operation of safety valve			
	ii. Vibration and Noise level measurement shall be done during shop performance test.			
	Air Receiver			
	c) Each finished vessel shall be hydraulically tested at 150% of the design pressure for a duration of 30 minutes			
1.07.00	d) NDT on weld joints shall be as per respective code requirements or the minimum as specified below			
	i. 100% DPT on root run of butt welds			
	ii. 100% DPT on all finished butt welds and fillet welds			
	iii. 10% RT on butt welds which shall include all T-Joints			
	Ventilation Systems			
1.07.01	Fan			
1.07.02	(e) All materials should be of tested quality and test certificates should be provided.			
	(f) Dynamic balancing of the fan impellers to be carried out.			
	(g) Shop run test shall be conducted on all centrifugal fans including check for noise and vibration level.			
	(h) Performance test shall be conducted on one fan of each type at shop for capacity, pressure, efficiency and power consumption.			
	Valves and Specialties			
1.07.04	Refer 1.06.02 above			
	Pipes and Fittings			
	Refer 1.06.03 above			
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1.08.00	Travelling Trippers & Bunker Sealing Arrangement Mobile Trippers (a) Shaft and wheel forgings – Ultrasonic test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification shall be conducted. (b) Following minimum NDT requirements to be ensured for welds: i) Butt welds - 10% UT/RT and 100% MPI/DPT. ii) Fillet Welds - 10% MPI/DPT. (c) Shop trial run test shall be carried out and shall include check for noise level and vibration.			
1.10.0	Steel Structure			
1.09.01	Only material which has been identified against mill sheet or test certificates shall be used for construction. Check testing shall be carried out in the absence of MTC. Correlation shall be maintained by Manufacturer. All plates above 40mm thickness shall be 100% ultrasonically tested.			
1.09.02	Visual inspection of all welds shall be performed in accordance with AWS D.1.1.			
1.09.03	NDT requirements of structural steel welds shall be as under: e) 100% RT/UT on butt-welds of plate thickness ≥ 32 mm. Edge for field weld shall be examined by MPI for plate thickness ≥ 32 mm. f) For Plates of $10\text{ mm} < \text{thickness} < 32\text{ mm}$ - 10% RT On butt welds. g) 10% Ultrasonic testing shall be carried out on full penetration welds (other than butt welds) h) DP Test on Welds: • 100% on Root Run & 10% on Final Welds of all butt welds • At random 5% on fillet of built-up plate girders.			
1.09.04	Girders/columns/Beams etc shall be trial assembled and match marked prior to dispatch. Trial assembly procedure at shop shall be submitted for NTPC review and approval.			
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1.10.00	Belt Scales The details of the checks to be carried out in the various equipment's are to be submitted by the Contractor for Employer's approval. However, some indicative checks are given below which should necessarily form a part of the quality assurance plan to be agreed with the Employer.			
1.10.01 Belt	Mounting arrangement/Overall dimensional check shall be carried out on the Scales.			
1.10.02 with	Belt scale shall be calibrated with test weight/test chain in static at works and test weight for dynamic condition at site.			
1.10.03	All electronic modules shall be subjected to burn in test at 50 Degree C for 48 hours.			
1.10.07	General check for load cell shall be carried out.			
1.10.08	Test report for degree of protection on enclosure shall be furnished.			
1.10.09	Accuracy/performance check shall be demonstrated at site.			
1.11.00	Package Air-Conditioner Each Unit shall be subjected to production routine Test excluding performance test carried out as per relevant standard. Performance test of PAC shall be carried out as per relevant standard on one unit of each type and rating at site.			
1.14.00	In-Line Magnetic Separators iv) Overall Dimensional, Visual check along with control panel. v) HV & IR. vi) Operation, temperature rise, lifting capacity, force index and gauss strength.			
1.15.00	Metal Detectors iii) Functional test including sensitivity, Burn in test, operation of liquid spray marker, detection of smallest piece of different materials as specified.			
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1.16.00	iv) Test report for Degree of protection test to be furnished.			
	Sampling Units			
	(c) Free carriage and cutter movement, speed of cutter and dust door closing, and sealing shall be tested for samplers.			
1.19.00	(d) “No load test” shall be carried out for crushers.			
	Feeders			
	1.19.01	Shaft and wheel forgings – Chemical, Mechanical, Hardness and Ultrasonic Test shall be conducted.		
1.19.02	Following minimum NDT on Weld Joint shall be carried out			
1.19.03	(a) Butt Welds - 10% UT/RT & 100% MPI/DPT			
	(b) Fillet Welds - 10% MPI/DPT			
	Shop trial run shall be conducted to check for movement and RPM of Paddle wheel & Travel wheel, function of P/F in locked rotor condition, noise and vibration etc.			
1.21.0	Silo and Hoppers			
1.21.01	All material shall be tested for Chemical & Mechanical properties as per relevant standard. MPI/DP test on welding shall be carried out. Fit up assembly checks shall be carried out at shop for all dispatchable segments.			
1.22.0	Mobile Trippers			
1.23.00	(a) Shaft and wheel forgings – Ultrasonic test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification shall be conducted.			
	(b) Following minimum NDT requirements to be ensured for welds:			
	i) Butt welds - 10% UT/RT and 100% MPI/DPT.			
1.23.01	ii) Fillet Welds - 10% MPI/DPT.			
	(c) Shop trial run test shall be carried out and shall include check for noise level and vibration.			
	Bucket Elevator			
1.23.01	All plates equal to or above 25 mm thickness shall be ultrasonically tested.			
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CLAUSE NO.	QUALITY ASSURANCE			
1.23.02	Castings and forgings, forged/rolled bar/section shall be subjected to ultrasonically test in addition to check for chemical, mechanical, hardness, microstructure etc. as per applicable material specification.			
1.23.03	Machined and hard-faced surface of casting/forging and other hardened, stellited parts shall be subjected to DPT/MPI in addition to check for case depth, hardness as applicable for chain/sprocket/gear reducer/rollers/wheel/pan etc.			
1.23.04	Following minimum NDT requirements shall be followed for welds: i) Butt Welds in Tension- 100% UT/RT and 100% MPI/DPT. ii) Butt Welds in Compression- 10% UT/RT and 10% MPI/DPT. iii) Fillet Welds - 10% MPI/DPT.			
1.23.05	For other items like drive system, motor, pulley, belt etc relevant portion of specification shall be applicable.			
1.24.00	Elevators (Rack and Pinion Type) The details of the checks to be carried out in the various equipments are to be submitted by the contractor for owner’s approval. However, some indicative checks on different items are given below which should necessarily form part of the quality assurance plan to be agreed with the owner.			
1.24.01	All forgings shall be subjected to ultrasonic test to ensure free from internal defects in addition to check for chemical and mechanical properties.			
1.24.02	10% of the welds selected at random shall be subject to DP test.			
1.24.03	All forged components shall be subjected to DPI/MPI after machining.			
1.24.03	Gear Reducer shall be checked for gear ratio, backlash, contact pattern. No load shop trial run shall be conducted on gear boxes to check for oil leakage, temperature rise, noise and vibration.			
1.24.04	Buffer springs shall be subjected to load test as per relevant specifications. Material certificates for springs shall also be furnished.			
1.24.05	All components prior to assembly shall be checked for dimensions.			
1.24.06	Function test of Elevator assembly shall be carried out.			
1.24.07	All electrical equipment’s shall be of proven quality. Galvanized components/parts shall be checked for weight of Zn coating, thickness of coating, uniformity of coating and adhesion test and visual examination as per IS 2633 and IS 2629			
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SUB-SECTION–E-21

COMPRESSED AIR SYSTEM

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1.00.00	<u>AIR COMPRESSOR SYSTEM</u>		
1.01.00	AIR COMPRESSORS: a) All pressure parts shall be hydraulically tested at not less than 150% of design pressure prior to painting and lining, if applicable. The test pressure will be maintained for 30 minutes. b) All other parts including inter-connecting piping shall be hydraulically tested wherever possible, as per relevant codes. c) Ultrasonic testing shall be carried out on all forgings and shafts (if dia.> 40mm). MPI/DP test will be done on machined areas of the above components. d) Rotor shall be statically and dynamically balanced as per relevant standard.		
1.01.01	PERFORMANCE TEST (SHOP TEST) : a) Performance test on the compressors shall be carried out in accordance relevant standard. The test shall also include demonstration of loading and unloading mechanism (Capacity control) and operation of safety valves. b) Power consumption at motor input terminal at rated capacity as well as at fully unloaded condition of all the compressor shall be measured. c) Vibration and noise level measurement will be done during shop performance test. d) Test shall be carried out on all compressors with contract drive motor where power consumption for compressors has been indicated as a guaranteed parameter		
1.02.00	AIR RECEIVER, HEAT EXCHANGERS, MOISTURE SEPERATORS, AIR DRYING PLANT: a) Each finished vessel shall be hydraulically tested to 150% of the design pressure for a duration of 30 minutes. b) NDT on weld joints shall be as per respective code requirements or the minimum as specified below: (i) 100 % DPT on root run of butt welds. (ii) 100% DPT on all finished butt welds and fillet welds (iii) 10% RT on butt welds which shall include all T- joints. c) Tube to Tube sheet joint of the heat exchangers shall be subject to Mock-up test as per the relevant standards. d) Reactivation blowers shall be tested for FAD, temp. rise noise & vibration. Rotating parts shall be dynamically balanced. e) Completely assembled ADP shall be pneumatically tested at design pressure for a duration of 5 minutes. Functional and sequential operation testing of the completely assembled ADP shall be demonstrated at shop. Other accessories shall be tested as per relevant code and sections. Dew point measurement shall be done.		
FOR E.O.T. CRANE REFER QA CHAPTER EOT CRANES AND HOISTS, FOR PIPES, FITTINGS, VALVES & RE JOINTS REFER QA CHAPTERS OF LP PIPING.			
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SUB-SECTION–E-22

CW PUMP

Tests/Check		Material Test	DPT/MPI	Ultrasonic test	RT	Balancing	Hydraulic / Water Fill test	Pneumatic Test	Assembly/ fit up	Dimensions	Functional/operational Test	Performance Test	Other Test	All Test as per relevant Std/ Approved Data Sheets	Remarks
Items / Components															
A.	CW PUMPS, VT PUMPS & CENTRIFUGAL PUMPS (HORIZONTAL / VERTICAL), SUMP PUMPS, SUBMERSIBLE PUMPS, DRAINAGE PUMP								Y ¹	Y		Y ²			
1	Shaft	Y ^a	Y ^b	Y ^c		Y				Y					
2	Impeller	Y ^a	Y ^b		Y ³	Y							Y ^d		
3	Suction Bell / Bowl Castings/ Inserts	Y ^a	Y ^b				Y			Y			Y ⁶		
4	Discharge Head / Column Pipes / Distance Piece/Base Plate	Y ^a	Y ^b	Y ^c	Y ⁴		Y		Y						
5	Companion Flanges	Y ^a	Y ^b	Y ^c	Y ⁵				Y						
5	Thrust Bearing (Tilting Pad type)	Y ^a	Y	Y					Y	Y				Y	
B.	BUTTERFLY VALVES						Y ⁷		Y	Y	Y		Y ⁸	Y	
1	Body & Disc (Cast)	Y ^a	Y ^b												
2	Body & Disc (fabricated)	Y ^a	Y ^b	Y ^c									Y ⁹		
3	Shaft	Y ^a	Y ^b	Y ^c											
4	EH Actuators	Y ^a	Y				Y	Y	Y		Y				
C.	RE JOINTS	Y ^a					Y ¹⁰		Y	Y			Y ¹¹		
D.	R & W PIPES	Y ^a	REFER NOTE 13												
E.	CRANES & HOISTS	REFER BELOW FOR QA CHECKS ON EOT CRANES AND HOISTS													

F.	VENTILATION FANS									Y		Y		Y	
1)	Hub/Blades/Casing /Impeller	Y	Y			Y									
2)	Shaft	Y ^a	Y	Y ^c											
3)	Pre/Fine Filters												Y ¹⁴		
H.	GATE, GLOBE, CHECK VALVES, PIPINGS, & SPECIALITIES	Y ^a	Y ^b	Y ^c			Y ¹⁵		Y	Y	Y	Y	Y ¹⁵	Y	

Notes:

a	One per Heat/ Heat Treatment Batch/ Lot.
b	On machined surfaces only for Castings / Forgings and on Welds of Fabricated Components.
c	For Shaft diameter. ≥ 50 mm and for plate thickness ≥ 25 mm
d	Inter Grannular Corrosion (IGC) Test shall be carried out on SS Castings.
1	Trial assembly of all Vertical Turbine Pump components with Column Pipes, Discharge Head, and Motor Stool shall be carried at shop.
2	Performance testing of Pumps shall be carried out at shop, as per HIS standard to determine Head & Flow Characteristics.
3	In case of CW pump impellers, Radiographic Examination shall be conducted as per ASTM E186/446 with Severity Level 2 for Gas porosity, Level 3 for Sand, Slag and Shrinkage. Cracks, Inserts and Mottling are not acceptable. Radiographic Examination should cover Vanes, Vane Junctions, Full Radial depth of Hub & other accessible areas of the rest of the Impeller.
4	Random 10% RT to be conducted on butt welds for Thk ≥ 10 mm & ≤ 25 mm and 100% RT to be conducted on butt welds for Thk > 25 mm (RT may be replaced by Ultrasonic Test due to constraint if any.) Stress relieving shall be carried out as per norms of ASME Section VIII.
5	Segmental Flanges exceeding 37.5 mm thickness shall be stress relieved after welding. All butt weld joints in segmental flange shall be examined by Radiographic Test. (RT may be replaced by Ultrasonic Test due to constraint if any.) Maximum number of segments shall be 4 only.
6	No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.
7	Hydraulic Test of Body, Seat and Disc strength shall be carried out in accordance with latest edition of AWWA C-504. Actuator operated Valves shall be checked for Seat Leakage by closing the Valve with Job Actuator. Seat Leakage test shall be carried out in both directions.
8	For Proof of Design Test refer respective chapters of engineering portion in the technical specification.
9	For Butterfly Valves of Fabricated construction (Sizes 600mm and above), butt Welds of thickness 20mm & above shall be subjected to 100% Radiography and Components shall undergo stress relieving.

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10	During Hydraulic & Vacuum test at 30 mm Hg absolute in 3 different positions, the change in Circumference of the Arch should not be more than 1.5%. Permanent Set, after 24 hours of the test, should not exceed 0.5% of Arch.	
11	Tests on Rubber for Tensile, Elongation, Hardness, Hydraulic Stability as per ASTM D-471, Ozone Resistance test as per IS:3400 Part 20, Aging test, Adhesion strength of Rubber to Fabric and Rubber to Metal shall be carried out.	
12	Smooth operation and Leakage test shall be carried out at site.	
13	Followings are the testing requirements for fabrication of pipes at site	
	Tests	Quantum of Check
	WPS, PQR, Welder Qualification Test	100%
	DPT on root run	100% for pipes up to 1200 mm diameter
	DPT after back gauging	100% for pipes above 1200 mm diameter
	RT/ UT by TOFD Technique/PAUT	5%
	DPT on finished butt weld joints	10%
	Hydraulic Test	100%, 1.5 times the design pressure or 2 times the working pressure which ever is higher.
	Note:- After erection, the complete piping system shall be tested at 1.5 times, the design pressure or two times the maximum working pressure whichever greater. No leakage/seepage is acceptable. Butt weld joints which would not be hydro-tested shall be subjected to 100% RT test/ 100% UT by TOFD /PAUT Technique.	
14	Type / Routine tests as per requirements of BS-6540/ ASHRAE-52-76 for Dust arrestance shall be carried out.	
15	a. All pipes and fittings shall be tested as per applicable code. b. All strainers shall be subjected to Hydraulic pressure test for leakage. c. All valves shall be hydraulically tested for body, seat and back-seat (if applicable) as per relevant standard. Check valves shall also be tested for leak tightness test at 25% of the specified seat test pressure. d. Valves shall be offered for hydro test in unpainted condition. e. Functional checks of the valves for smooth opening and closing shall also be done. f. Anti-corrosive protection shall be tested as per applicable code.	

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EOT CRANES AND HOIST

1.00.00 HOOKS

All Tests including Proof Load Test as per relevant IS shall be carried out. MPI / DPT shall be done after proof load test.

2.00.00 STEEL CASTINGS

DPT on machined surface shall be carried out.

3.00.00 GIRDERS, END CARRIAGE, CRAB, GEAR BOX AND ROPE DRUM

UT shall be carried out on plates of thickness 25 mm and above as per ASTM A 435 /IS:11630 & IS: 4225

NDT requirements on weldments shall be as follows

i.	Butt Welds in Tension	100% RT & 100% DPT
ii.	Butt Welds in Compression	10% RT & 100% DPT
iii.	Butt Welds in Rope Drum	100% RT & 100% DPT
iv.	Fillet Welds	10% DPT

4.00.00 FORGINGS (Wheels, Gears, Pinions, Axles, Hooks, & Hooks Trunion)

All forgings greater than or equal to 50 mm diameter or thickness shall be subjected to ultrasonic testing (UT).

DPT / MPI shall be carried out after hard-facing and machining. Hardness and Case depth shall be measured

5.00.00 WIRE ROPES

Wire ropes shall be tested as per relevant standard.

6.00.00 REDUCTION GEARS

Reduction Gears shall be tested for reduction ratio, backlash and contact pattern. Gear box shall be subjected to No – load run test for 4 hours to check for oil leakage, temperature rise, noise and vibration.

7.00.00 Chemical and Mechanical test of all components as per relevant material specification shall be carried out.

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8.00.00 COMPLETE CRANE

The crane shall be completely assembled at shop for final testing. All tests as per IS 3177 shall be carried out at shop.

9.00.00 HOISTS

All Electric Hoist shall be tested as per IS 3938 and chain pulley blocks shall be tested as per IS 3832.

SUB-SECTION–E-23

COOLING TOWER

COOLING TOWERS(IDCT)

SN	TESTS/CHECK	Material Test	WPS/PQR/Welder Qualification	Ultrasonic test	DPT/MPI	Balancing	Assembly Fit up	Dimension	RT	Hydraulic / Water Fill	Test as per relevant Std/ Approved Data Sheets	Other Tests
	ITEMS / COMPONENTS											
1	GEAR BOX						Y ¹	Y				Y ²
1.1	Shaft and gear blanks	Y ^a		Y	Y ^b							
1.2	Gear Box Casing	Y ^a								Y		
2	FAN ASSEMBLY					Y	Y	Y				Y ³
2.1	Fan hub	Y ^a	Y		Y ^b				Y ⁴			Y ³
2.2	Fan blades	Y ^a						Y				Y ³
3A	DRIVE SHAFT (SS) FOR FAN	Y ^a	Y	Y	Y ^b	Y		Y				
3B	CARBON FIBER DRIVE SHAFT	SEE NOTE - 15										
4	PVC FILL & DRIFT ELIMINATOR	Y ⁵					Y	Y			Y	Y ⁶
5	GATE/ GLOBE/ CHECK VALVES	Y ^a			Y ^b		Y			Y	Y	Y ⁸
6	BUTTERFLY VALVES				Y		Y	Y		Y	Y	Y ⁹
6.1	Body (Cast) , Disc (Cast)	Y ^a			Y ^b			Y				
6.2	Body & Disc both fabricated	Y ^a	Y	Y	Y ^b			Y	Y ¹⁰			
6.3	Shaft	Y ^a		Y ^c	Y ^b			Y				
7	ROLLED & WELDED PIPES.	Y ^a	REFER NOTE – 11 FOR ALL CHECKS									
8	WRAPPING & COATING OF PIPES	Y ¹²						Y			Y	Y
9	HOISTS & CHAIN PULLEY BLOCKS	Y ^a	Y		Y		Y	Y			Y	Y ¹³
10	VENTILATION FANS	Y ^a	Y	Y ^c	Y ^b	Y	Y	Y			Y	Y ¹⁴
11	FRP STRUCTURE											
11.1	Fibre Glass- Pultruded Structural Products	See Note- 16 & 18										
11.2	Fiber Glass- Reinforced Plastic Panels	See Note 17 & 18										
11.3	Fiber Glass- Reinforced Pipes	The FRP pipes shall conform to CTI-154										

COOLING TOWERS(IDCT)

	Legend/ Notes:	
a.	One per Heat/Heat Treatment batch/Lot	
b.	On machined surfaces only of castings and forgings. Also 100% after root run/ back gauging for butt welds and 10% after final butt welds and fillet welds.	
c.	UT shall be done for shafts with Diameter 50 mm or above & Plates of Thickness 25 mm or above.	
1.	Blue Matching and Backlash of the gears shall be checked.	
2.	No load run test for 4 hours to check noise, vibration, oil leakage and temperature rise.	
3.	Proof load test, moment weight test on blades, blade track variation & tip clearances shall be checked. Galvanizing tests as per relevant IS.	
4.	10% RT on Butt welds of Fan Hub only (in case fabricated).	
5.	PVC material shall meet the requirements of CTI Bulletin STD-136. However impact test may be done as per ASTM-D-256 and Flammability test may be done as per ASTM-D-635 with extinguishing type PVC. Density & VICAT softening temperature tests shall also be conducted.	
6.	UV exposure shall be carried out on samples, at reputed third party laboratories as per ASTM -G26 method- C/standard specified in engineering portion of the specification for cooling tower. Impact test before and after UV exposure shall be conducted as per ASTM D-256.	
7.	--NA---	
8.	Blue matching, Wear travel for Gate valves & reduced pressure test for Check valves shall be conducted as per relevant standards.	
9.	For POD of Butterfly Valves refer respective engineering section of the technical specification.	
10.	In case of fabricated construction of Butterfly Valves and companion flanges, UT on Plates of Thickness 20 mm or above for body and disc, and RT on 100% Butt welds shall also be carried out. Welders and WPS shall be qualified as per ASME section -IX. Stress relieving after complete welding shall be carried out as per ASME Section - IX	
11.	Tests	Quantum of Check
	WPS, PQR, Welder Qualification Test	100%
	DPT on root run	100% on pipes up to 1200 mm diameter
	DPT after back gauging	100% on pipes above 1200 mm diameter
	RT/ UT by TOFD Technique/PAUT	5% (covering 100% of `T'-joints)
	DPT on finished welds	10%
	Hydraulic Test	100%, Test pressure = 1.5 times the design pressure or 2 times the working pressure whichever is higher.
	Note:- After erection, the complete piping system shall be tested at 1.5 times, the design pressure or two times the maximum working pressure whichever greater. No leakage/seepage is acceptable. Butt weld joints which would not be hydro-tested shall be subjected to 100% RT test/ 100% UT by TOFD /PAUT Technique.	
12.	Spark test, adhesion test and material tests for primer & enamel and coal tar tapes as per AWWA-C-203.	

COOLING TOWERS(IDCT)

13.	Ropes shall meet relevant Code requirements. All motions & safety features shall be tested at Works. Full load & 25% overload test shall also be conducted at works. At site, Full load test shall be conducted with all motions and safety features.
14.	One Fan of each type & size will be performance tested as per corresponding Code, for Air Flow, Static pressure, Total pressure, Speed, Efficiency, Power Consumption, Noise, and Vibration & Temperature rise. Also, all fans shall be subjected to run test of 4 hours during which Noise, Vibration, Temperature rise & current drawn shall be measured.
15.	In case of Carbon Fiber Shaft, following checks are applicable - Manufacturer Test Certificate for Carbon Fiber and Resin - Dimensional Check, Run out Test and Dynamic Balancing Test on Finished Shaft - Torsional Test on Drive Shaft Assembly along with flange as a type test to verify the factor of safety. - Type test for bonding strength at joint between shaft & shaft flange. In case of proven design, test reports of the previous test conducted shall be reviewed. - UV test for demonstrating the compliance with respect to requirement of UV ray stabilization. Acceptance criteria of the above tests shall be mutually discussed during pre-award discussions based on proven practices of the manufacturer or relevant standards as available
16.	The physical and mechanical properties of FRP pultruded sections as specified in CTI- Standard 137 shall be tested. Fire retardant property as specified shall be tested.
17.	The physical properties of FRP Panels as specified in CTI- Standard 131 shall be tested.
18.	The UV test on identified samples of FRP Pultruded Sections, FRP Panels and FRP Pipes shall be carried out.

SUB-SECTION–E-24

FIRE PROTECTION SYSTEM

CLAUSE NO.	TECHNICAL REQUIREMENTS
1.00.00	FIRE DETECTION & PROTECTION SYSTEM
9.01.00	HYDRANT SYSTEM: Shop Tests
1..01	Hydrant Valve: - All valves shall be hydro tested for body and seat. - Capacity test / flow test shall be done as per relevant standard.
1..02	Water Monitor, Hoses, Branch Pipes, Couplings and Nozzles: All tests including hydraulic test shall be done as per relevant Indian / International standard.
1..03	For Pumps, Diesel Engine, refer the requirements are indicated separately.
9.01.00	HIGH / MEDIUM VELOCITY WATER SPRAY & SPRINKLER SYSTEM: Shop Tests
1..01	For Pipes, Fittings, Valves and specialties, requirements are indicated separately.
1..02	Deluge Valves, Alarm Valves and Spray Sprinkler Nozzles - All valves shall be hydro tested for body and seat. - Performance test / functional test of 'Deluge Valves', 'Alarm Valves' and 'Spray Nozzles' shall be carried out.
1..03	Detectors: All 'Detectors' shall be tested as per relevant Indian / International Standards. Detectors shall also meet the requirements of UL / FM / LPC/VDS etc.
9.01.00	HORIZONTAL CENTRIFUGAL PUMP:
1..01	SHOP TESTS - UT on Pump Shaft ($\geq 50\text{mm}$ dia) and MPI / DPT on Pump Shaft and Impeller shall be carried out. - All rotating components of the pumps shall be statically and dynamically balanced as per IS: 21940 Gr. 6.3 or better. - Hydraulic test shall be conducted on pump casing with water at 1.5 times the shut off pressure or twice the rated pressure whichever is higher for a minimum duration of 30 minutes. - Performance test and Standard Running test: - All the pumps shall be tested in the manufacturer's works for capacity, efficiency, head and brake horsepower. Pump shall be
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CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC	
	given running test over the entire operating range covering the shut off head to the maximum flow. The duration of test shall be minimum one hour. A minimum of five readings approximately equidistant shall be taken for plotting the curves with one point at design flow. Testing of pump shall be in accordance with stipulations oh Hydraulic Institute Standard (HIS) and / or as per applicable Indian Standard or equivalent. Tolerance of parameters shall be as per HIS. (2.) The test shall be conducted at the rated speed preferably with the type tested contract drive motor being furnished. However, in case of any limitation test bed motor duly calibrated can also be used. (3.) Noise and vibration shall be measured. (4.) Pumps shall be subjected to strip down examination visually to check for mechanical damages after testing at shop in case abnormal noise level / vibration performance are observed during the shop test.		
9.01.00	COMPRESSION IGNITION DIESEL ENGINE		
1..01	Shop Tests:		
	a) All pressure parts shall be subjected to hydraulic pressure tests at 1.5 times the design pressure.		
	b) All Diesel engine shall be performance tests as per relevant IS / equivalent code.		
1..02	Performance Test :		
	Performance test of diesel engine shall be carried out as per BS-5514 to determine the rated power and specific fuel consumption and governor’s function.		
	Performance test of engine in shop shall be done with actual job accessories for minimum four hours (three hours for full load and one hour for over load at 110% of full load). All the engine parameters like RPM, inlet airs temp and pressure, water inlet and outlet temp. And pressure, lub. Oil pressure, fuel consumption, ambient condition shall be measured and recorded for every half an hour. No positive tolerance shall be allowed on the specific fuel consumption (contractor to specify in the offer.)		
9.01.00	STORAGE VESSELS: Shop Test		
1..01	Atmospheric Tank		
	(a.) All weld joints shall be DP Tested and complete tanks shall be water fill tested.		
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CLAUSE NO.	TECHNICAL REQUIREMENTS						
1.06.00 1.06.01	(b.) All atmospheric storage tanks fabricated and erected at site shall be subjected to all tests (Hydro, NDT, and Vacuum) according to design code as applicable.						
	PIPING, VALVE AND SPECIALITIES						
	SHOP TESTS						
	(a.) All pipes and fittings shall be tested as per applicable code.						
	(b.) DPT of pipe welds (in case of rolled and welded pipes only) shall be carried out for root and finished welds.						
	(c.) All strainers shall be subjected to hydraulic pressure test for leakage and Pressure drop v/s Flow for each type and size.						
	(d.) All valves shall be hydraulically tested for body, seat and back seat (if applicable) as per relevant standard. Check valves shall also be tested for leak tightness test at 25% of the specified seat test pressure.						
	(e.) Valves shall be offered for hydro test in unpainted condition.						
	(f.) Functional checks of the valves for smooth opening and closing shall also be done.						
	(g.) Anti-corrosive protection shall be tested as per applicable code.						
1.07.00 1.07.01	PORTABLE & MOBILE FIRE EXTINGUISHERS						
	SHOP TEST						
	(a.) All fire extinguishers shall be tested as per relevant standard.						
1.08.00	(b.) Performance / function test shall be carried out on sampling basis as per relevant code / standard.						
	EOT Crane						
	a) Chain pulley Blocks shall be tested as per IS: 3832.						
	b) Electrical wire rope hoists shall be tested as per IS : 3938						
	c) Following NDT requirements shall be met:						
				(i) 100% RT of Butt welds in tension and 10% RT of butt welds in compression.			
				(ii) DP at random on all weldments.			
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CLAUSE NO.	TECHNICAL REQUIREMENTS		
1.09.00	c) Deflection, load, overload & travel check on EOT crane assembly shall be carried out as per IS: 3177. SITE TESTS: a) Fire Extinguishers: A performance demonstration test at site of five (5) percent or one (1) number, whichever is higher, of each type and capacity of the extinguisher shall be carried out by the contractor. All consumables and replaceable items require for the contractor without any extra cost to employer would supply this test would be supplied by the Contractor without any extra cost to employer. b) Piping Protection: (1.) Thickness, Holiday by spark test, Adhesion test shall be carried out as per relevant standard. (2.) Complete piping shall be Hydro pressure tested, at 1.5 X DP or 2 X MWP whichever is higher, before protection. (c.) Welding of Pipes: (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). (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.		
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SUB-SECTION–E-25

CONDENSATE POLISHING PLANT

Condensate Polishing Plant											
Items / Components	Test/Check										
	Material Test										
	WPS/PQR/Welder										
	DPT/MPI										
	Assembly Fit up										
	Dimension										
	RT										
	Hydraulic test / Pneumatic test / Vacuum test										
	Performance Test										
	Test as per relevant Std / Appd. Data Sheets										
Other Tests											
Remarks											

COMMON ITEMS:											
1. Horizontal Centrifugal Pumps				Y	Y			Y ¹	Y		LEGENDS: Applicable tests are identified by 'Y'. Y ^a : One per Heat / Heat Treatment batch / Lot. Y ^b : On machined surfaces only. Also 100% on Butt Welds & 10% on Fillet Welds. Y ^c : UT shall be done for shafts with Dia 50 mm or above & Plates of Thickness 25 mm or above. Y ^d :Dynamic Balancing per IS: 21940, Grade 6.3 minimum shall be conducted for rotating assy. Y ¹ : As per Pump governing standard. Tolerances as per HIS, USA. Y ² : Random 10% RT to be conducted on butt welds for Thk $\geq$ 10 mm. Y ³ : Seat Leakage Test for actuator operated valves shall be done by operating the valve with job actuator. Y ⁴ : Tests on Rubber Diaphragms shall be conducted per batch of Rubber mix for Tensile, Elongation, Hardness, Thickness, Bleed Resistance. In addition, Type Test for 50,000 cycles for each type of diaphragm shall also be conducted.
1.1. Casing	Y ^a		Y ^b		Y		Y				
1.2. Impeller	Y ^a		Y ^b		Y					Y ^d	
1.3. Shaft	Y ^a		Y		Y					Y ^c	
2. Vertical Pumps				Y	Y			Y ¹	Y		
2.1. Casing	Y ^a		Y ^b		Y		Y				
2.2. Impeller	Y ^a		Y ^b		Y					Y ^d	
2.3. Shaft	Y ^a		Y		Y					Y ^c	
2.4. Fabricated Parts	Y ^a	Y	Y ^b		Y	Y ²	Y				
3. Dosing/ Metering Pumps	Y ^a				Y		Y	Y ¹	Y		
4. Gate/ Globe/ Check Valves	Y ^a		Y ^b		Y		Y	Y	Y	Y ³ , Y ⁶	
5. Dual Plate Check Valves	Y ^a		Y ^b		Y		Y	Y	Y	Y ⁶ , Y ¹²	
6. Diaphragm Valves	Y ^a				Y		Y		Y	Y ⁴ , Y ³	
7. Butterfly Valves				Y	Y		Y	Y	Y	Y ³	
7.1 Body & Disc (Cast	Y ^a		Y ^b		Y						

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Condensate Polishing Plant											
Items / Components	Test/Check										
	Material Test										
	WPS/PQR/Welder										
	DPT/MPI										
	Assembly Fit up										
	Dimension										
	RT										
	Hydraulic test / Pneumatic test / Vacuum test										
	Performance Test										
	Test as per relevant Std / Appd. Data Sheets										
Other Tests											
	Remarks										

7.2 Body and Disc (Fabricated)	Y ^a	Y	Y ^b		Y				Y	Y ²	Y⁶ : Blue Matching, Wear Travel for Gate Valves and reduced pressure test for check valves shall be conducted as per relevant standards. Y⁷ : Heat Treatment of the Tank/Vessel shall be done per fabrication code requirement. Welded dished ends shall be stress relieved. Dished ends manufactured by cold working shall also be stress relieved as per the requirement of code. Y⁸ : RT as per fabrication code requirements. However, dished ends welds, if manufactured by using welded plates shall be subjected to 100% RT.
7.3 Shaft	Y ^a		Y ^b		Y					Y ^c	
8. Plug/ Ball Valves	Y ^a		Y ^b	Y	Y		Y	Y	Y	Y ³	
9. Blowers/ Compressors	Y ^a		Y ^b	Y	Y			Y	Y	Y ^{c, Y^d}	
10. Tanks/ Pressure Vessels	Y ^a	Y	Y ^b	Y	Y	Y ⁸	Y		Y	Y ⁷	
11. Rubber Lining	Y ^a				Y				Y	Y ⁹	
12. Strainers	Y ^a	Y	Y ^b	Y	Y		Y		Y		
13. Pipe & Pipe Fittings	Y ^a	Y	Y		Y	Y ⁸	Y		Y		
14. Agitators /Flash Mixer/ Flocculator	Y ^a	Y	Y ^b	Y	Y			Y		Y ¹⁰	
15. Ventilation/Exhaust Fan	Y ^a		Y ^b	Y	Y			Y ¹ ₁	Y	Y ^{c, Y^d}	
16. Hoists & Cranes	Y ^a	Y	Y ^b	Y	Y	Y ⁸		Y	Y		
17. Package/ Split AC	Y							Y	Y	Y ¹³	

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Condensate Polishing Plant											
Items / Components	Test/Check										
	Material Test										
	WPS/PQR/Welder										
	DPT/MPI										
	Assembly Fit up										
	Dimension										
	RT										
	Hydraulic test / Pneumatic test / Vacuum test										
	Performance Test										
	Test as per relevant Std / Appd. Data Sheets										
Other Tests											
Remarks											

18. Resins / Activated Carbon									Y		Y⁹ :Rubber Lining Mix shall be subjected to Bleed Resistance Test on mould sample. Adhesion Test, Spark Test and Hardness Test for the Rubber lined jobs shall also be conducted. Y¹⁰ :Gear Boxes shall be checked for smooth No Load Operation at shop to verify noise and vibration levels. Gear Ratio and Kerosene Leak Test shall also be conducted. Y¹¹ :One Fan of each type & size shall be routine performance tested as per corresponding code for air flow, static pressure, total pressure, speed, efficiency, power consumption, noise & temperature rise. Also all Fans shall be subjected to run test of 4 hours during which noise, vibration, temperature rise and current drawn shall be measured. Y¹² :Dry cycle test on valve spring for 1, 00,000 cycles shall be carried out as type test, if not carried out earlier, for the similar MOC, size and type of spring. Y¹³ : Electronic leak test for condenser & evaporator unit. Note: 1.The complete Piping system along with valves & fittings shall be hydraulically tested at 1.5 times design pressure or 2 times working pressure whichever is higher after erection at site. 2. In case of items other than those identified above, the quality requirements shall be decided based on system design requirements.

SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)			TECHNICAL SPECIFICATIONS SECTION VI, PART - B				SUB-SECTION- CONDENSATE POLISHING PLANT			
EPC PACKAGE			Bid Doc. No.:							

Condensate Polishing Plant										
Items / Components	Test/Check									
	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests
										Remarks

SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- CONDENSATE POLISHING PLANT	Page 4 of 4

SUB-SECTION–E-26

MILL REJECT HANDLING SYSTEM

CLAUSE NO.	QUALITY ASSURANCE	एनटीपीसी NTPC	
1.00.00	PNEUMATIC CONVEYING SYSTEM		
1.01.00	PIPING, VALVES, STRAINERS AND FITTINGS (a) All pipes and fittings shall be tested as per applicable code. (b) All valves shall be hydraulically tested for body, seat and back seat (if applicable) as per relevant Standard. Check valves shall also be tested for leak tightness test at 25% of the specified seat test pressure. Valves shall be offered in unpainted condition only. (c) Functional checks of the valves for smooth opening and closing shall also be done. (d) Strainer body shall be hydraulically tested. One of each type and size of Strainer shall be tested for Pressure drop v/s flow rate, if not tested earlier.		
1.02.00	PRESSURE AND STORAGE VESSELS: (a) Atmospheric Tank (i) All weld joints shall be DP tested and complete tanks shall be water fill tested. (ii) All atmospheric storage tanks fabricated and erected at site shall be subjected to all tests (Hydro, NDT and Vacuum) according to design code as applicable. (b) Pressure Vessel (1) NDT on weld joint shall be as per respective code requirements or the minimum as specified as below: (i) 100% DPT on root run of butt weld, nozzle welds and finished fillet welds. (ii) 100% DPT on all finished butt welds (iii) 10% RT (covering all 'T'/cross joints) of butt welds (2) Butt Welds of dished ends shall be stress relieved and subjected to 100% RT. (3) Each finished vessels shall be hydraulically tested to 150% of the design pressure for a duration of 30 minutes.		
1.03.00	PACKAGE AIR COMPRESSOR In addition to Hydraulic tests of pressure parts, performance test of the compressor shall be done for FAD, pressure, power consumption, as per relevant code. Noise and vibration shall also be measure.		
1.04.00	BAG FILTERS:		
1.04.01	Leakage test shall be carried out for casing and other pressure parts		
1.04.02	Pulsing and sequential test on bag filter cages shall be done.		
1.05.00	MONORAIL HOIST/CHAIN PULLEY BLOCKS:		
1.05.01	Chain pulley blocks shall be tested as per IS:3832		
1.05.02	UT & MPI/DPT shall be done on gear blank, pinion shaft, axles.		
1.05.03	Proof Load Test on hooks shall be carried out followed by DPT.		
1.05.04	100% Radiography on weld joints under tension and 10% radiography on compression butt joints followed by 100% DPT shall be done for rope drum, girder, end carriage etc.		
1.05.05	Complete hoists shall be tested for load and overload test as per IS:3938		
1.06.00	VENTILATION SYSTEM:		
1.06.01	Shop Run Test for all Centrifugal Fans to check noise, temp. rise & vibration.		
1.06.02	Performance test on one fan of each type for capacity, pressure, efficiency and power consumption.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-26 MILL REJECT HANDLING SYSTEM(MECH) Page 1 of 1

SUB-SECTION–E-27

FUEL OIL HANDLING SYSTEM

CLAUSE NO.	QUALITY ASSURANCE 		
	<u>TANKS AND VESSELS</u> 1. Material Tests (Chemical Analysis, Mechanical Tests & other tests) as per applicable material standard of all components (plates, forgings etc) 2. Only Qualified welders as per approved WPS and PQR shall be deployed for fabrication of tanks. 3. Dimensional checks, during in-process and final inspection, shall be carried out for alignments, circularity, verticality, orientation of connections, slope of bottom plate etc. 4. NDT on weld joints shall be done as per relevant / applicable standard. However, minimum requirement of NDT, as given below, shall be complied: a. 100% DPT on root run (butt welds / back-gouged welds). b. 100% DPT on all finished welds. c. 10% RT on butt-welded seams (which shall cover all 'T' / Cross-joints) as per design code / Standard. 5. All tanks shall be subjected to hydraulic test to 150 % of the Design pressure for a duration of 30 minutes. Other tests, (as per relevant design standard), given below shall be applicable as per relevant code/standard.: a. Vacuum test for bottom plate seam testing and annular plate. b. Air / vacuum test for roof testing. <u>FUEL OIL PUMPS/DRAIN OIL PUMP/WATER PUMP</u> 1. Material Tests (Chemical Analysis, Mechanical Tests & other tests) as per applicable material standard of all components (plates, forgings etc) 2. All forged / rolled bars (for pump rotors / screws) shall be subjected to Ultrasonic Test (for diameter $\geq$ 40mm) at proof machine condition and DPT / MPI after finish machining. 3. Rotating parts i.e. Screws / Rotors, Impellers (other than single screw pump) shall be statically and dynamically balanced as per requirements of code ISO: 1940 Gr. 6.3/IS 21940 or better. 4. The machined surfaces of castings shall be subjected to DP Test.		
SIPAT STAGE-III EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC.NO.:	SUB-SECTION-E-27 FUEL OIL HANDLING SYSTEM(MECHANICAL)	PAGE 1 OF 2

CLAUSE NO.	QUALITY ASSURANCE	एनटीपीसी NTPC	
	5. Pump casing shall be hydraulically tested at a pressure 150% of specified shut off head or 2 times working pressure (whichever is higher) for leak tightness for a duration of 30 minutes. 6. All pumps shall be performance tested as per relevant / applicable code/standard. <u>PIPING, VALVES, STRAINERS AND FITTINGS:</u> FOR PIPES, VALVES, FITTINGS AND SPECIALITIES REFER QA CHAPTER OF LP PIPING. <u>INSULATION</u> 1. Rockwool/Mineral Wool/Glass Wool shall be tested as per relevant standard. However, Thermal Conductivity type test shall be carried out minimum once in a year as per relevant code/standard. 2. Lagging/Cladding shall be tested as per relevant Standard to meet data sheet requirements. <u>MONORAIL HOISTS</u> FOR HOISTS REFER QA CHAPTER “EOT CRANES AND HOISTS”, <u>FLEX HOSES</u> Tests such as Adhesion property before and after aging and swelling, tensile, elongation at break for rubber and vacuum test, pressure test, burst/proof pressure test, dimension of finished hose shall be carried out as per relevant code/standard.		
SIPAT STAGE-III EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC.NO.:	SUB-SECTION-E-27 FUIL OIL HANDLING SYSTEM(MECHANICAL)	PAGE 2 OF 2

SUB-SECTION–E-28

GENERATOR AND AUXILIARIES

CLAUSE NO.

QUALITY ASSURANCE

GENERATORS & AUXILIARIES.**PROCESS CHECK FOR STATIC PARTS GENERATOR / EXCITOR**

ITEM/ COMPONENTS /PROCESS	Visual & dimension	Chem. Prop. (raw material)	Heat treatment	Mech. Prop. (raw material as applicable)	Impact. (raw material)	Hydraulic test	Pneumatic test	RT/UT (10% for butt weld)	MP/DPT (All welds of trunnion & base plate, sample on other)	Relative permeability *	Ferrite content	DIN 43760, IS 2848, 7358	DIN 48124
Sheet and Fabrication	Y	Y	Y	Y	Y	Y1	Y1	Y	Y				
-END shield													
-Stator casing	Y	Y	Y	Y	Y	Y1	Y1	Y	Y				
-Bushing boxes	Y	Y	Y	Y	Y	Y1	Y1	Y	Y				
-Terminal plates	Y	Y	Y	Y	Y	Y1	Y1		Y				
-Manhole and covers	Y	Y	Y	Y	Y	Y1	Y1		Y				
-Trunnions	Y	Y	Y	Y	Y			Y	Y				
Core bar	Y	Y		Y									
Press ring	Y	Y		Y					Y				
Core bolt (insulated)	Y	Y		Y				Y	Y				
Gaskets	Y			Y									
Bearing and Hydrogen Seals	Y	Y		Y				Y2					
Terminal Bushing													Y
RTD/ Thermocouple												Y	
Additional checks for										Y			
-Nonmagnetic Components													
-Nonmagnetic Components welding											Y		

Y-Test applicable, Y1-For Hydrogen cooled machine, Y2-UT on Babbitt for bearing, * - As per OEM standard practice.

Note:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. All generators shall be assembled at works and shall be tested to verify/ensure design and workman ship in accordance with IEC-34, VDE 0530, IEEE 115, IEEE 43. The manufacturer shall submit detailed test procedure which clearly specify test set up, instruments to be used, acceptance norms (wherever applicable) recording of different parameter, interval of recording, precautions etc.
3. Cooler, control panel and other auxiliaries (as applicable) to be suitably tested as per tests covered in the specification.
4. Test requirements of primary water system, seal oil system and Hydrogen cooling system shall be as per tests specified for similar items under respective tables covered in this section.

**GENERATORS & AUXILIARIES
PROCESS CHECK FOR CORE GENERATOR/EXCITOR**

TESTS ITEM/ COMPONENTS / PROCESS	Specific loss before and after ageing	Magnetization	Anisotropy of losses	Stacking factor	Burr level	chem., elect., viscosity cure time, solid content, dielectric properties	Dimension & surface (uniformity of varnish coat)	Spot weld check
Core lamination	Y	Y	Y	Y			Y	
After punching Insulated core Laminations					Y		Y	
Check for varnish						Y		
Ventilation Stamping								Y
Core assembly							Y	
TESTS ITEM/ COMPONENTS / PROCESS	Process check including Heating & pressure application	Insulation test of insulated core tension bolt & core bar	Functional check of ventilation ducts	Hot spot at rated flux density by infra-red camera & ELCID *	Location of temp. detectors	Iron loss at rated flux density		
CORE assembly (additional Checks for Generator)	Y	Y	Y	Y	Y	Y		

Y-Test applicable

*** In case of any constraint of manufacturer to carry out the test at rated flux, testing at reduced flux as per manufacturer guidelines to be proposed to Owner for review & approval.**

**GENERATORS & AUXILIARIES
PROCESS CHECK FOR CORE GENERATOR/EXCITOR**

ITEM/ COMPONENTS / PROCESS	Winding copper and connecting bus bars	Insulated conductor	Insulation material	Manufacturing Winding bar & phase bar	Winding laying	Water supply hoses	Winding support ring	Connection between bars	wound stator
TESTS									
Support arrangement					Y	Y			
Type test reports for similar type of bars for heating cycle test, thermal stability test @				Y					
Slot wedge tightness & radial movement									Y
Thermal shock test Baroscopic Examination of brazed water box				Y1					
Inter strand Insulation test				Y				Y2	
Dielectric test at elevated and room temp.		Y							
Vibration fatigue *						Y			
Magnetic permeability of metallic parts						Y			
Reactance of stator winding									Y
Corona protection resistance				Y					
Partial Discharge test				Y#					
Tan delta and delta, tan delta Up to 1.2 un				Y					Y
Check on RTD + location winding					Y				
Helium leak test & PR. test				Y		Y			
Flow test				Y1					Y1
Process check				Y	Y				
X-Ray of Water box				Y1					
Brazing procedure				Y				Y	
Physical prop.			Y				Y		
Electric test			Y	Y	Y				
Dimension/visual		Y	Y	Y	Y	Y	Y		
Dielectric test		Y		Y	Y	Y			
Flexibility of bending temp.		Y							
Insulation adhesion		Y							
Eddy current & pr. Test	Y1								
Metallography prop.	Y								
Resistivity/Resistance	Y								
Chem. prop (sample)	Y		Y			Y	Y		
Mech. prop (sample)	Y		Y			Y			

Y - Test Applicable, Y1- Applicable for hollow conductor, * As per manufacturer established practice, Y2: Not applicable for connection between bars through contact-sleeve (lug), Y#: OEM practice shall be followed, @: Type test reports for similar type of bars for heating cycle test, thermal stability test, and voltage endurance test manufactured from same works from which bars are to be sourced is acceptable if conducted within 5 years of bid opening.

GENERATORS & AUXILIARIES
PROCESS CHECK FOR ROTOR AND ASSEMBLY (GENERATOR/EXCITOR)

TESTS ITEM/ COMPONENTS / PROCESS	Rep. sample tensile stress	Rep. sample 0.2 limit	Rep. sample elongation	Hardness on Sample	Impact check on sample	Rep. sample Chem. prop.	NDTT, FATT (as applicable)	Process check including heat treatment (as applicable)	Ultrasonic test/RT (at suppliers work and after preliminary machining)	Sulphur Prints Check (Depending on proneness)	Flux carrying capacity / Magnetic prop *	Boroscopic Examination
Rotor forging & slip ring shaft	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rotor end retaining ring, locking ring & Slip ring forgings, diode wheel	Y	Y	Y		Y	Y		Y	Y			
Rotor wedges, damper Wedges.	Y		Y			Y		Y	Y			
Rotor winding copper CC-bolts & D-leads	Y		Y			Y		Y				
Rotor slot boxes/ insulating material						Y						
Coil manufacture												
Rotor winding								Y				
Winding connection studs & assembly												
Complete rotor								Y				
Test on completed rotor at various speed up to rated speed												
Test on completed rotor before & after over speed												
Fan hubs/blades						Y		Y	Y			
GENERATOR assembly												
Diode wheel Assembly												
Permanent magnet					Y						Y	
EXCITER assembly												

Y- Test Applicable

* Not applicable for slip ring shaft of SEE

GENERATORS & AUXILIARIES
PROCESS CHECK FOR ROTOR AND ASSEMBLY (GENERATOR/EXCITOR)

TESTS ITEM/ COMPONENTS /PROCESS	MPI/DP/NDT test	Visual/Dimension/Cleanlines	Adhesion, thickness of Coat on silver plating If applicable	Electrical conductivity and Oxygen content	Mech. test on sample	Electrical test (Σ)	Resistance measurement	Vent hole blockage	Helium leak test for Hydrogen cooled M/C	Inter turn test	Dielectric test
Rotor forging & slip ring shaft	Y	Y									
Rotor end retaining ring & cover, locking ring & Slip ring forgings, diode wheel	Y		Y								
Rotor winding copper, rotor wedges, damper Wedges, CC-bolts & D-leads	Y		Y	Y1		Y					
Rotor slot boxes/ insulating material					Y	Y					
Coil manufacture		Y									
Rotor winding	Y	Y				Y		Y		Y	Y
Winding connection studs & assembly	Y				Y				Y		Y
Complete rotor							Y				Y
Test on completed rotor at various speed up to rated speed										Y	Y
Test on completed rotor before & after overspeed		Y					Y			Y	Y
Fan hubs/blades	Y	Y									
GENERATOR assembly		Y									
Diode wheel Assembly		Y									
Permanent magnet		Y			Y						
EXCITOR assembly		Y									

Y-Test Applicable , Y1: Oxygen content applicable for Rotor winding copper & D Lead,
 Σ NOTE- Dielectric test & conductivity test etc. as applicable

GENERATORS & AUXILIARIES**PROCESS CHECK FOR ROTOR AND ASSEMBLY (GENERATOR/EXCITOR)**

ITEM/ COMPONENTS /PROCESS	Insulation Resistance	PI	Radial run out/alignment	Impedance measurement/ RSO (repetitive surge oscillograph)	Dynamic balancing ISO 5406, 2372, 1940	Over speed test (120%) for 2 minute	Axial run out	Metallography examination *	Torque on joint bolts	Fitting and locking of Balancing weights	Brazer and brazing procedure
Rotor forging & slip ring shaft								Y			
Rotor end retaining ring & cover, locking ring & Slip ring forgings, diode wheel											
CC-bolts									Y		
Rotor slot boxes/ insulating material											
Coil manufacture											Y
Rotor winding											Y
Winding connection studs & assembly	Y										
Complete rotor	Y		Y	Y	Y	Y			Y		
Test on completed rotor at various speed up to rated speed				Y							
Test on completed rotor before & after overspeed	Y		Y	Y							
Fan hubs/blades										Y	
GENERATOR assembly	Y	Y	Y				Y		Y	Y	Y
Diode wheel Assembly			Y				Y		Y	Y	
Permanent magnet											
EXCITOR assembly			Y						Y	Y	

Y-Test applicable * - As per OEM standard practice.

GENERATORS & AUXILIARIES

ADDITIONAL CHECK FOR EXCITOR

ITEM/ COMPONENTS /PROCESS	TESTS	Routine Test as per applicable std	As per IEC-76 / Applicable std	Pole parallelism & polarity	Mech. chem. & Magnetic prop.(as applicable)	Functional check	Insulation resistance	IEEE/ANSI-C37.18 Or IEC 60947-2	As per applicable standards	As per specification	Dimensional and visual
Fuse diode & filter Circuit		Y									Y
Aux. Transformer (if applicable)			Y								
Carbon brush holder & housing					Y	Y				Y	Y
Cable										Y	
PMG & Exciter stator				Y	Y		Y				
Bandaging wire					Y						
Field discharge resistor						Y					
Bearing, exciter armature field, axis coil, RTD							Y				
Excitation Transformer			Y								
Thyristors										Y	
Field breaker						Y		Y			
Bus duct AC/DC									Y		
Voltage Regulator										Y	
Carbon brush					Y	Y				Y	Y

Y - Test applicable

GENERATOR AND AUXILIARIES**FINAL ACCEPTANCE TEST GENERATOR/EXCITOR**

ITEM/ COMPONENTS /PROCESS	TESTS	Works run test on generator to be conducted on first unit of each rating per contract to establish the performance characteristics / designated attributes	On total winding/phase at interval of 0.2 U _n for generator	Condition after dismantling (after works run test)	Works test on brush less exciter	PMG works test	Full load for PMG & converter assembly	Converter assembly for SEE	Static excitation system
Partial Discharge		Y							
Visual and dimension		Y							
Vibration Measurement		Y							
Winding Overhang				Y					
Seal Ring. Liners				Y					
Bearing oil catcher				Y					
Rotor journal				Y					
Tan delta, delta tan delta		Y	Y						
Capacitance measurement		Y	Y						
RTD, BTD Check		Y							
HV test (except electronic circuit)		Y			Y	Y		Y	Y
Shaft voltage		Y							
Phase seq. voltage		Y				Y			
Polarization index		Y							
Insulation resistance		Y			Y	Y		Y	Y
Efficiency By separation of Losses		Y							
Steady state reactance's		Y							
Record Aux. parameters		Y							
SCC		Y							
OCC		Y			Y	Y			
Voltage regulation						Y			
Function check								Y	Y
Heat run test		Y			Y	Y	Y		
Rotor impedance at various speeds in steps of 200 rpm		Y							
Resistance measurement		Y			Y	Y			
Gas tightness for Hydrogen cooled M/C		Y							

Y – Test Applicable

GENERATORS & AUXILIARIES

FINAL ACCEPTANCE TEST GENERATOR/EXCITOR

ITEM/ COMPONENTS /PROCESS	TESTS									
	Seal rings, liners	Winding Overhang	Vibration measurement	No load	Load characteristics	Characteristics of search coil, quad, axis	Ripple content	As per specification	Visual & dimension	Partial discharge
Works test on brush less exciter			Y	Y	Y	Y			Y	
PMG works test				Y	Y					
Static excitation system							Y	Y	Y	

Y - Test Applicable

SUB-SECTION–E-29

CABLING, EARTHING & LIGHTING PROTECTION

CABLING, EARTHING, LIGHTNING PROTECTION														
ATTRIBUTES / CHARACTERISTICS ITEMS/COMPONENTS / SUB SYSTEMS	Dimension	Paint shade, paint thickness, adhesion	Pre-treatment of sheet	IP protection	Proof load*	Surface finish	Deflection test*	HV & IR	Galvanize Test (If Applicable)	Functional	Bought out items/Bill of material	Routine tests as per relevant standard & specification	Acceptance tests as per relevant standard & specification	Constructional feature as per NTPC Specification
Wall Mounted-Lighting Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y
Switch box/junction box/ Receptacles Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y
Cable glands (BS-6121)	Y													Y
Cable lug	Y													Y
Lighting wire (IS-694)	Y											Y		
Flexible conduits	Y											Y		Y
Conduits (Galvanize & Epoxy) IS-9537 & IS-2629, 2633, 6745	Y		Y						Y			Y		Y
RCC Hume Pipe (IS-458)												Y		
Cable termination & straight through joint (IS 13573)	Y											Y		Y
Cable Trays, bends, tees, crosses, Flexible supports system & accessories IS-513, 2629,2633,6745	Y		Y		Y	Y	Y		Y			Y	Y	Y
Trefoil clamp	Y													Y
GI flats for earthing & lighting protection (IS 2062, 2629, 6745,2633)	Y		Y						Y			Y		Y
GI wire (IS-280)	Y											Y		
Fire Sealing System (BS –476)												Y	Y	Y

Note:

1. This is an indicative list of tests /checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
- 2.* Deflection Test on cable trays and Proof Load test on cable trays support system will be as per details given in the NTPC technical specification & approved MQP. The above acceptance tests shall be done only on one sample from each size of offered lot. This test is not applicable on bends, tees & crosses.
3. Make of all items will be subject to NTPC approval.

SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION E29- CABLING, EARTHING, LIGHTNING PROTECTION	Page 2 of 2

SUB-SECTION–E-30

DC SYSTEM

DC SYSTEM

LEAD ACID BATTERY

ATTRIBUTES / CHARACTERISTICS ITEMS, COMPONENTS, SUB SYSTEM ASSEMBLY	Dimensions & Finish	Conformance to relevant part dfg. & Manufacturer' s standards	Chemical composition	Lead Coating Thickness (min. 25 microns, IS: 6848 App.F) & Adhesion Check	Conformance to CPWD Spec. for Teak Wood	Paint Process checks, Paint Shade, Thickness, Adhesion & Finish	Constructional requirements as per NTPC Spec.	Routine & acceptance tests as per relevant standard
Container & Lids (IS : 1146)	Y	Y						
Vent Plugs	Y	Y						
Sealing Compound (IS : 3116)		Y	Y					
Positive & Negative Plates		Y	Y					
Separators (IS: 6071)	Y	Y						
Electrolyte (Water / Sulphuric Acid) (IS : 1069 / 266)		Y	Y					
Inter-cell Connectors & Fasteners	Y	Y		Y				
Battery Stand	Y	Y			Y	Y		
Cell Insulators	Y	Y						
Stack Assembly	Y	Y						
Lead Acid Battery (IS : 1652)	Y						Y	Y
Note: This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.								

Ni- Cd BATTERY

ATTRIBUTES / CHARACTERISTICS								
ITEMS, COMPONENTS, SUB SYSTEM ASSEMBLY								
	Dimensions & Finish	Impact Strength	Conformance to relevant part drg. & Manufacturer' s standards	Resistance to Alkali	Chemical composition	Nickel Plating thickness	Paint Shade, Thickness, Adhesion & Finish	Routine & acceptance tests as per relevant standard
Container & Lids	Y	Y	Y	Y				
Vent Plugs	Y		Y	Y				
Perforated Steel Strips	Y		Y	Y		Y		
Active Material for Positive & Negative Plates			Y		Y			
Separators	Y		Y	Y				
Electrolyte			Y		Y			
Inter-cell Connectors & Fasteners	Y		Y	Y		Y		
Battery Stand	Y			Y			Y	
Cell Insulators	Y		Y	Y				
Stack Assembly	Y		Y					
Ni-Cd Battery (IS : 10918)	Y							Y

Notes:

- This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
- Makes of all major Bought Out Items will be subject to NTPC approval.

BATTERY CHARGER

BATTERY CHARGER														
Attributes / Characteristics →	Make, Model, Type, Rating & Finish	Verification of Routine test reports as per relevant IS	Sheet Steel Pretreatment & Painting process checks	Conform to relevant Standard & NTPC spec	Dimensional check and Paint shade, thickness, adhesion & Finish checks	Complete physical examination for constructional features as per NTPC approved drgs & specification	Temperature Rise Test	Ripple Content Test, Load Limiter & AVR Operation Test	Dynamic Response Test	Operational & Functional Checks	HV & IR Test	Burn-In Test at 50^C for 48 hrs in energised condition	Alternating current measurement test	Degree of Protection Test as per NTPC Spec.
Items / Components / Sub- assembly ↓														
Rectifier Transformer and Reactors IS : 4540, 2026)	Y	Y		Y			Y				Y			
Electronic Components including Potentiometer (Vernier Type)	Y			Y		Y								
Electronic Cards	Y			Y								Y		
PCB & racks for electronic cards	Y					Y								
Control & Selector Switches (IS : 6875)	Y			Y						Y				
Indicating Meters (IS : 1248)	Y			Y						Y				
Indicating Lamps (IS: 13947)	Y			Y						Y				
Air Break Switches / Fuses (IS : 13947 / 13703)	Y			Y						Y				
Control Terminal Blocks (IS : 13947)	Y			Y										
Control Transformer (IS : 12021)	Y			Y						Y				
Push Buttons (IS : 4794)	Y			Y						Y				
MCB (IS : 8828)	Y			Y						Y				
PVC insulated Copper control wires (IS : 694)	Y			Y										
Sheet Steel (IS : 513)	Y		Y	Y										
Synthetic Rubber Gaskets	Y			Y										
Annunciator	Y									Y		Y		
Battery Charger	Y				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Notes:1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents. 2.Makes of all maior Bought Out Items will be subject to NTPC approval.														

BATTERY CHARGER (of capacity upto 24 V / 48 V , 150 A DC)										
Attributes / Characteristics 										
Items / Components / Sub- assembly 	Make, Model, Type, Rating	Dimensional check and Paint shade, thickness, adhesion & Finish checks	Complete physical examination for constructional features as per approved drgs	Ripple Content Test, Load Limiter operation & AVR Operation Test	Operational & Functional Checks of aux. Devices like annunciator, switches, indicators etc.	HV & IR Test	Burn-In Test	Dynamic response test	AC input current measurement test	Temperature rise test
Battery Charger	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Note 1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents. 2. Makes of all major Bought Out Items will be subject to NTPC approval.										

DC HEALTH MONITORING SYSTEM

Attributes / Characteristics →	Items / Components / Sub- assembly ↓									
		Make, Model, Type, Rating & Finish	Verification of Routine test reports as per relevant IS	Sheet Steel Pretreatment & Painting process checks	Conform to relevant Standard & NTPC spec	Dimensional check and Paint shade, thickness, adhesion & Finish checks	Complete physical examination for constructional features as per NTPC approved drgs & specification	Operational & Functional Checks	HV & IR Test	Burn-In Test at 50°C for 48 hrs in energized condition
										Degree of Protection Test as per NTPC Spec.
Enclosure		Y		Y	Y	Y				Y
Synthetic Rubber Gaskets		Y			Y					
Control & Selector Switches, Indicating Meters, Indicating Lamps		Y			Y			Y		
Control Terminal Blocks, Push Buttons, MCB		Y			Y			Y		
MCB		Y			Y			Y		
PVC insulated Copper control / signal cables		Y	Y		Y					
Transducers / detectors		Y	Y		Y			Y		
PCB & racks for electronic cards		Y								
Electronic Cards		Y						Y		Y
Microprocessor Based Controller		Y						Y		Y
SCADA		Y						Y		
Software		Y						Y		
DC Health Monitoring System		Y			Y	Y	Y	Y	Y	Y
Notes:										
1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.										
2. Makes of all major Bought Out Items will be subject to NTPC approval.										

SUB-SECTION–E-31

ESP

ESP ELECTRICAL PORTION

ATTRIBUTES / CHARACTERISTICS ITEMS/COMPONENTS, SUB SYSTEM ASSEMBLY	Visual	Make / Type / Rating etc.	Final Inspection as per ISS / IEC /BS	Remarks
TR Set	Y	Y		Refer table for Transformer Rectifier Set for ESP
ESP Insulator (IEC 168 / 273, IS 2544)	Y	Y	Y	ESP Insulators shall be additionally subjected to high temperature test on sample basis as per mutually agreed upon procedure.
Electrostatic Precipitation Management System	Y	Y		Refer table for Annunciation, control, PLC Panel
Microprocessor based Rapper Controller	Y	Y		Refer table for Annunciation, control, PLC Panel
Disconnecting switch (IS 13947)	Y	Y	Y	
Heaters (IS 4159 / BS 6351)	Y	Y	Y	
Note: 1) This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalisation. 2) Makes of all major Bought Out Items will be subject to NTPC approval.				

Table for Transformer Rectifier Set for ESP

ATTRIBUTES / CHARACTERISTICS ITEMS/COMPONENTS, SUB SYSTEM ASSEMBLY	Visual	Dimensional & Physical	Make/Type/Rating	Mech. / Chem. Properties	Electrical	Electronics	Welding	NDT	Pretreatment 7 tank	Painting,	All tests as per IS2026	All tests as per IEC-146
Thyristor	Y	Y	Y			Y						Y
Contactors	Y	Y	Y		Y							
Switch Fuse Unit	Y	Y	Y		Y							
HRC Fuse	Y	Y	Y		Y							
Current Transformer	Y	Y	Y		Y							
Over Voltage Protector	Y	Y	Y		Y							
Measuring Instruments	Y	Y	Y		Y							
Control Transformer	Y	Y	Y		Y							
Bushings	Y	Y	Y		Y							
Dial Thermometer	Y	Y	Y		Y							
Resistor wire wound	Y	Y	Y		Y							
Sudden Pressure Relay	Y	Y	Y		Y							
PVC Insulated Copper wire (ISI Marked)	Y	Y	Y		Y							
Terminal Block	Y	Y	Y		Y							
Gasket	Y	Y	Y	Y								
Electrolytic Copper	Y	Y	Y	Y								
Capacitor, Resistor	Y	Y	Y	Y	Y	Y						
PCB	Y	Y	Y		Y							
Insulated Conductor	Y	Y	Y	Y	Y							
Laminations	Y	Y	Y	Y	Y							
Press Board, Paper	Y		Y	Y	Y							
Insulating Oil (Silicon)	Y	Y	Y	Y	Y							
Radiator	Y	Y	Y	Y				Y				
Transformer Tank	Y	Y	Y	Y			Y	Y				
Panel Fabrication	Y	Y	Y	Y			Y		Y	Y		
Electronic Cards	Y	Y	Y		Y	Y						
Linear Reactor, Choke	Y	Y	Y	Y	Y							
Transformer Assembly	Y	Y		Y	Y						Y	
Control Panel	Y	Y	Y	Y	Y	Y				Y		
HV, TR Set	Y	Y	Y		Y	Y				Y	Y	
EPC Controller (Separate QAP	Y	Y			Y	Y						
Note: 1) This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. 2) All major Bought Out Items will be subject to NTPC approval.												

Annunciation, Control, PLC Panel

ATTRIBUTES / CHARACTERISTICS

ITEMS/COMPONENTS, SUB SYSTEM ASSEMBLY

Annunciation, Control, PLC Panel

Visual

GA, BOM, Lay Out of components

Dimensions

Paint Shade/ Thickness/ Adhesion

Component Rating/ Make / Type

Wiring

IR & HV

Review of TC for instruments

Accessibility of TBS/ Devices

Illumination

Functional Check for Control Element, Annunciation

Test as per IEC 1131 *

Routine & acceptance Tests as per IS 8623

Y

Y

Y

Y

Y

Y

Y

Y

Y

Y

Y

Y

Y

Note: 1) Detailed procedure of Burn-in and Elevated Temperature test shall be as per Quality Assurance Program in General Technical Conditions
2) This is an indicative list of test/ checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and Procedure along with relevant supporting documents.

- *Applicable for PLC

SUB-SECTION–E-32

GENERATOR BUSDUCT & NG EQPMTS

CLAUSE NO.		QUALITY ASSURANCE													एनटीपीसी NTPC
GENERATOR BUS DUCT & NG EQUIPMENT															
Attributes / Characteristics Items/Components Sub Systems		Visual & Dimensional Checks	Electrical / Mechanical / Chemical Properties	WPS & PQR	NDT (DP / UT / RT/ MPI)	Painting/ Silver Plating Quality, Thickness & Adhesion Test	Galvanizing Test as per IS: 2629 / 2633 / IS: 6745	Electrical clearance & Creepage distance	Functional/Operational check	Embossing of logo/Batch number	Make / Type Rating / Model / TC / General Physical Inspection	Trial Assembly at works.	Routine Test as per relevant standard / NTPC specs	Test as per IEEE-32 for NGR	IR Measurement before and after HV Test
Enclosure / Cubicle		Y	Y	Y	Y	Y									
Bus bar Conductor/Flexible Connector & Disconnecter Link		Y	Y	Y	Y										
Epoxy Seal-off Bushing, Post/Support Epoxy/Porcelain Insulator as per IS:5621 & 2544		Y	Y							Y			Y		
Galvanized Steel Structure & Plate		Y					Y								
Welding on Enclosure & Conductor joint		Y		Y	Y										
Silver plated connections						Y									
Elastomer Spring Head, Panel Mounted Items & NG Cubicle		Y							Y		Y		Y		
Bus Bar Pressurization System		Y							Y				Y		
Complete Bus Duct & Cubicles		Y				Y		Y				Y	Y		Y
Complete NGR (IEEE-32)		Y				Y			Y				Y	Y	Y
Gasket, Silica gel Breather, CT, VT, Surge Capacitor & Arrestor, NGT		Y									Y		Y		
Note: 1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and procedure along with relevant supporting documents during QP finalization for all the items. 2. All major Bought Out Items will be subject to NTPC approval. 3. Y-Test applicable															
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE					TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:					SUB-SECTION-E32 GENERATOR BUS DUCT & NG EQUIPMENT					PAGE 1 OF 1

SUB-SECTION–E-33

400KV SHUNT REACTOR

SHUNT REACTOR

Attributes / Characteristics															
	Items/Components Sub Systems	Visual & Dimensional Checks	Mechanical properties	Electrical strength	Thermal properties	Chemical Composition	Compatibility with oil	NDT / DPT / MPI / UT	Ageing Test.	Functional check	Voltage Ratio, Vector Group & Polarity Magnetic Balance Test	Make / Type / Rating / Model / TC / General Physical Inspection.	WPS & PQR	Routine Test as per relevant standard/NTPC specs.	Vacuum & Pressure Test
Tank	Y	Y						Y					Y		
H.V. & L.V. Cable Box / Flange throat	Y	Y													
Conservator / Radiator / Cooler / Pipes	Y	Y													
Copper Conductor (IS:191)	Y	Y	Y			Y									
Insulating Material	Y	Y	Y	Y		Y	Y								
CRGO Lamination & Built Core	Y	Y	Y			Y	Y								
Porcelain Bushing / Insulator (IS:2544 / 5621)	Y	Y	Y									Y		Y	
RIP/OIP Bushing (IS 12676, IS 2099,IS 3347& IEC 60137)	Y	Y	Y									Y		Y	
Gasket (IS 2712)	Y	Y				Y	Y		Y						
Air Cell	Y														Y
Transformer Oil			Y			Y								Y	
Core Coil Assembly & Pre-tanking	Y										Y				
Marshalling Box	Y	Y						Y		Y		Y		Y	
WTI, OTI, MOG, PRD, Thermistor, Breather, Terminal Connector, Fan & Pumps with Drives, Valves, Bucholz Relay										Y		Y			
Welding (ASME Sect-IX)								Y					Y		

CLAUSE NO.	QUALITY ASSURANCE 										
Attributes / Characteristics Items/Components Sub Systems	Oil Leakage Test	Jacking test followed by DP Test on load bearing Member	DGA of Oil for main tank	Measurement of capacitance and tan delta	Di-electric Tests	Switching impulse test on line terminal	Nitrogen / Dry Air Dew Point Measurement before final packing on transformer at receipt at site.	Lighting Impulse Test on all phases	Vibration and stress measurement test	Routine Test as per relevant standard/NTPC Spec.	Paint Shade, Thickness, Adhesion and finish.
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Complete Shunt Reactor (IS:5553 (P-I) / IEC: 289 & 76)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Notes: 1) This is an indicative list of test/checks. The manufacture is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents during QP finalization for all items. 2) All major Bought Out Items will be subject to NTPC approval. Y-Test applicable											
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE			TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:			SUB-SECTION- E33 SHUNT REACTOR			PAGE 2 OF 2		

SUB-SECTION–E-34

POWER TRANSFORMER (GT & ICT), UNIT & STATION TRANSFORMER

Generator Transformer/ Inter Connecting Transformer/ Inter Bus Transformer/Unit Transformer/Station Transformer

Attributes / Characteristics Items/Components Sub Systems	Visual & Dimensional Checks	Mechanical properties	Electrical strength	Thermal properties	Chemical Composition	Compatibility with oil	NDT (DPT / RT / UT)	Functional check	Ageing Test.	Voltage Ratio, Vector Group & Polarity, Magnetic Balance Test	Make / Type / Rating / Model / TC / General Physical	Isolation test on core/clamp/tank	WPS & PQR	Routine Test as per relevant standard / NTPC Specs	Vacuum & Pressure Test
Tank, H.V. & L.V. Cable Box / Flange throat	Y	Y					Y				Y		Y		
Conservator / Radiator / Cooler / Pipes	Y	Y					Y				Y				
Copper Conductor (IS:191)	Y	Y	Y		Y										
Insulating Material	Y	Y	Y	Y	Y	Y									
CRGO Lamination & Built Core	Y	Y	Y		Y	Y					Y				
Porcelain Bushing / Insulator (IS:2544 / 5621)	Y	Y												Y	
RIP - OIP Bushing (IS 12676, IEC 60137)	Y	Y	Y								Y			Y	
Gasket (IS 2712)	Y	Y			Y	Y			Y						
Air Cell	Y														Y
Transformer Oil									Y					Y	
On Load / Off-Circuit Tap Changer (IEC :214)	Y	Y	Y											Y	Y
Core Coil Assembly & Pre-tanking	Y									Y		Y			
Marshalling Box	Y							Y						Y	
WTI, OTI, MOG, Bucholz Relay, PRD, Thermistor, Breather, Terminal Connector, Bushing CT, Fan & Pumps with Drives, Valves								Y			Y				
Testing & Maintenance equipment											Y				
Welding (ASME Sect-IX)							Y						Y		

Attributes / Characteristics								
Items/Components Sub Systems	Oil Leakage Test	Jacking test followed by DP Test on load bearing Member	DGA of Oil for main tank and OLTC Chamber	Measurement of capacitance and tan delta	Di-Electric tests	Routine Test as per relevant standard / NTPC Specs	Nitrogen / Dry Air Dew Point Measurement before final packing on transformer at receipt at site.	Paint Shade Thickness and Adhesion & finish.
Complete Transformer (IS:2026 / IEC: 60076)	Y	Y	Y	Y	Y	Y	Y	Y

Note:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and procedure along with relevant supporting documents during QP finalization for all the items.
2. All major Bought Out Items will be subject to NTPC approval.
3. Read Mechanical strength as mechanical endurance for OLTC/OCTC
4. Y-Test applicable

SUB-SECTION–E-35

LT INDOOR TRANSFORMER

CLAUSE NO.		QUALITY ASSURANCE											एनटीपीसी NTPC
LT INDOOR TRANSFORMER													
Attributes / Characteristics Items/Components Sub Systems		Visual & Dimensional check	Mechanical properties	Electrical strength	Thermal Properties	Chemical Properties	NDT / DP / MPI	Voltage Ratio, Vector Group & Polarity	Make / Type / Rating / Model / TC / General Physical Inspection	WPS & PQR	Routine Test as per relevant standard	Measurement of capacitance & tan delta between winding	Routine Test
Enclosure door, H.V. & L.V. Cable Box / Flange Throat		Y	Y						Y				
Copper Conductor		Y	Y	Y		Y							
Insulating Material		Y			Y	Y							
CRGO Lamination & Built Core		Y											
Bushing /Insulator (IS:2544 / 5621)		Y							Y		Y		
Gasket		Y							Y		Y		
Off-Circuit Tap Changer		Y							Y				
Core Coil Assembly		Y						Y					
Marshalling Box		Y									Y		
WTI, Thermistor, Terminal Connector		Y							Y				
Welding										Y			
Complete Transformer (IS:11171 / IEC 60076)		Y										Y	Y
Notes: 1) This is an indicative List of test/checks. The manufacturer is to furnish a detailed Quality Plan indicating his practice and procedure along with relevant supporting documents during QP finalization for all item. 2) All major Bought Out Items will be subject to NTPC approval.													
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE				TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:				SUB SECTION E35- LT INDOOR TRANSFORMER				PAGE 1 OF 1	

SUB-SECTION–E-36

AUXILIARY TRANSFORMER

SUB-SECTION–E-37

H.T. CABLE

MV (3.3 kV / 6.6. kV / 11 kV / 33 kV) Cables

Attributes / Characteristics	Item / Components / Sub System Assembly	Make, Type & T.C as per relevant standard	Dimension/surface finish	Mechanical properties	Chemical Composition	Spark Test (as applicable)	Electrical properties	Hot Set Test/ Eccentricity &	Lay length & Sequence	Armour coverage, cross over, looseness, gap between two wires	Sequential marking/ Batch marking/ surface finish/ cable length	T.S & elongation before & after ageing on outer sheath & insulation	Thermal stability on outer sheath	Metallic (Cu) Screening (If applicable)	Anti-termite coating on wooden drums	Constructional requirements feature as per specification	Routine & Acceptance Test as per relevant standard & specification	FRLS Test
	Aluminum (IEC 60228)	Y	Y	Y	Y		Y											
	Semiconducting Compound	Y		Y			Y											
	XLPE Compound (IEC 60502-2 (2005))	Y		Y			Y					Y						
	FRLS PVC Compound (IEC-60754 Part-1)	Y		Y								Y	Y					Y
	Triple Extrusion & curing /Manufacturing of Core		Y			Y		Y										
	Copper Tape	Y	Y	Y			Y											
	Polyester tape	Y	Y															
	Core Laying								Y									
	Armor wire/strip	Y	Y	Y														
	Copper tapping	Y	Y											Y				
	Inner sheath	Y	Y															
	Armoring		Y						Y									
	Outer Sheathing		Y								Y							
	Power Cable (Finished)							Y	Y		Y	Y	Y			Y	Y	Y
	Wooden drum (relevant standard) /Steel Drum		Y												Y	Y		

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought out items will be subject to Owner's approval.

ROUTINE TESTS	Following routine tests shall be carried out on each drum of finished cables for all types & sizes.	
1)	Conductor Resistance test	
2)	High voltage test	
3)	Partial discharge test (for Screened cables only)	
ACCEPTANCE TESTS	Following Acceptance tests shall be carried out on each size of each type (voltage rating) of cables, in the offered lot.	
A) For Conductor (as per sampling plan mentioned in IEC 60502-2 (2005))		
	1)	Annealing test (Copper)
	2)	Tensile Test (Aluminum)
	3)	Wrapping Test (Aluminum)
	4)	Resistance test
B) For copper tape / Wires (as per sampling plan mentioned in IEC 60502-2 (2005))		
	1)	Measurement of Dimensions
	2)	Conductivity check
B) For Armour Wires / Formed Wires (If applicable) (as per sampling plan mentioned in IEC 60502-2 (2005))		
	1.	Measurement of Dimensions
	2.	Tensile Tests
	3.	Elongation Test
	4.	Torsion Test for Round wires only
	5.	Wrapping Test
	6.	Resistance Test
	7.	Mass of Zinc coating test For G S wires / Formed wires only
	8.	Uniformity of Zinc coating For G S wires / Formed wires only
	9.	Adhesion test For G S wires / Formed wires only
	10.	Freedom from surface defects

C) For XLPE insulation & PVC Sheath (as per sampling plan mentioned in IEC 60502-2 (2005))		
	1)	Test for thickness
	2)	Tensile strength & Elongation before ageing (for tests after ageing see “D”)
	3)	Hot set test (For XLPE insulation)
D) Ageing test:		
If the compound manufacturer is carrying out Ageing test, test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer will carry out ageing test & the test report will be reviewed by owner (quantum of ageing test sample shall be one sample /batch)		
(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre: - Routine Test of manufacturer internal test report are to be verified by owner and Main Contractor at the time of final inspection. Owner and Main Contractor will also witness routine tests on cables on 10% sample basis.		
(b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre: - Routine Test of manufacturer internal test report are to be verified by Owner at the time of final inspection. Owner will witness routine tests on cables for the first order on 10% sample basis and Main Contractor will witness routine tests on cables for the first order on 100% basis.		
1. For Smoke Density rating test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection.		
2. For Acid Gas Generation test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection.		
3. For Oxygen Index test: if the test result without conditioning is within (+)7% of the minimum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection.		
4. In case the test results without conditioning do not meet the maximum/minimum specified value, the manufacturer may exercise the option of retesting the samples after conditioning as per standard.		
E) Following tests will be carried out on completed cables as per relevant standard on each size of each type		
	1)	Insulation resistance test (Volume resistivity method)
	2)	High voltage test
	3)	Partial discharge test (for Screened cables only)
F) Following tests shall be carried out on only one size of offered lot (comprising of all sizes & types)		
	1)	Thermal stability test on outer sheath
	2)	Oxygen index test on outer sheath
	3)	Smoke density rating test on outer sheath
	4)	Acid gas generation test on outer sheath
	5)	Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cable
G) Following tests shall be carried on one length of each size of each type of offered lot:		
	1)	Constructional / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, marking of drum no. / Batch
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CLAUSE No.

CHAPTER NAME

		number of outer sheath extrusion
	2)	Measurement of Eccentricity & Ovality
GENERAL NOTE:		
(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by owner and Main Contractor at the time of final inspection. Owner and Main Contractor will also witness routine tests on cables on 10% sample basis. (b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by Owner at the time of final inspection. Owner will witness routine tests on cables for the first order on 10% sample basis and Main Contractor will witness routine tests on cables for the first order on 100% basis. 1. For Smoke Density rating test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 2. For Acid Gas Generation test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 3. For Oxygen Index test: if the test result without conditioning is within (+)7% of the minimum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 4. In case the test results without conditioning do not meet the maximum/minimum specified value, the manufacturer may exercise the option of retesting the samples after conditioning as per standard.		

SUB-SECTION–E-38

H.T. SWITCHGEAR

QA TABLE FOR HT SWITCHGEAR

ATTRIBUTES / CHARACTERISTICS ITEMS, COMPONENTS, SUB-SYSTEM ASSEMBLY	Make, Type, Model, Rating & TC	Electrical Properties	Mechanical properties	Chemical Properties	Dimensions & Finish	Constructional, Functional & Operational Features as per NTPC Spec.	Item to conform to relevant Standards	Pretreatment as per IS 6005	Paint shade, thickness, adhesion & finish	Functional Checks	HV & IR Test	Degree of Protection Routine test as per NTPC spec.	CB Operation timing check	All Routine Tests as per relevant standard
CRCA steel sheet/ Aluzinc*/ Zinalum*/ Galvalum*	Y		Y	Y	Y		Y							
Aluminum Bus bar material (IS : 5082)	Y	Y	Y	Y	Y		Y							
Copper Bus bar material (IS : 613)	Y	Y	Y	Y	Y		Y							
Bus bar Support Insulator	Y	Y	Y		Y		Y				Y			
HT Circuit Breaker (IEC-62271-100)	Y				Y	Y	Y			Y			Y	Y
HT Contactors (IS : 9046 / IEC 60470)	Y				Y	Y	Y			Y				Y
Protection & Auxilliary Relays	Y				Y	Y	Y			Y				Y
HT CT's & PT's (IS : 2705 / 3156)	Y				Y		Y							Y
HT Fuses (IS : 9385)	Y				Y	Y	Y							
Surge Arrester (IEC : 99 –4)	Y				Y		Y							Y
LT Contactors (IS : 13947)	Y				Y	Y	Y			Y				
Control & Selector Switches (IS : 6875)	Y				Y	Y	Y			Y				
Indicating Meters (IS : 1248)	Y				Y	Y	Y			Y				Y
Indicating Lamps (IS : 13947)	Y				Y	Y	Y			Y				
Push Buttons (IS : 4794)	Y				Y	Y	Y			Y				
Control Transformer (IS : 12021)	Y				Y	Y	Y			Y				Y
LT Fuses (IS : 13703)	Y				Y	Y	Y							
Energy Meters (IS : 722)	Y				Y	Y	Y			Y				Y
Transducers (IEC : 60688)	Y				Y	Y	Y			Y				Y
Diodes	Y	Y				Y	Y			Y				
Terminal Blocks	Y	Y				Y	Y							
Synthetic Rubber Gasket (IS : 11149 / 3400)	Y	Y			Y		Y							
Breaker Handling Trolley	Y				Y	Y			Y	Y				
HT Switchgear Panel (IEC-62271-200)	Y				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought Out Items will be subject to NTPC approval.
3. Temperature rise test reports for diode plates with actual heat sink will be verified.
- *. CRCA Galvanized steel with metal coating composed of Al (55%), Zn (43.4%) & Si (1.6%),

SUB-SECTION–E-39

MEDIUM VOLTAGE BUS DUCTS

Medium Voltage BUS DUCT											
Attributes / Characteristics Items/Components Sub Systems	Visual & Dimensional Checks	Electrical / Mechanical / Chemical Properties	WPS & PQR	NDT (RT / DP / MPI / UT)	Painting Quality & Adhesion Test	Galvanising Test as per IS: 2629 / 2633 / 6745	Electrical clearance & Creepage distance	Functional/Operational check	Make / Type Rating / Model / TC / Embossing/Printing of make & batch /General Physical Inspection	Trial Assembly at works.	Routine Test as per relevant standard / NTPC Specification
Enclosure / Cubicle	Y	Y		Y	Y		Y				Y
Bus bar Conductor / Flexible Connector & Dis-connector Link	Y	Y		Y							
Galvanised Steel Structure & Plate (Steel as per IS:2062)	Y					Y					
Epoxy / Seal-off Bushing & Epoxy / Porcelain Post / Support Insulator	Y	Y					Y		Y		Y
Welding of enclosure & conductor	Y		Y	Y							
Gasket, Silica gel Breather, Elastomer Spring Head		Y						Y	Y		
Complete Bus Duct & Cubicles IS:8084	Y				Y		Y			Y	Y
Note: 1) This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents. 2) All major Bought Out Items will be subject to NTPC approval.											

SUB-SECTION–E-40

L.T. POWER CABLE & CONTROL CABLE

LT Power Cables & Control Cables

Attributes / Characteristics Item / Components / Sub System Assembly	Make, Type & T.C as per relevant standard	Dimension/surface finish	Mechanical properties	Chemical Composition	Spark Test(as applicable)	Electrical properties	Hot Set Test/ Eccentricity & Ovality	Lay length & Sequence	Armour coverage, cross over, looseness, gap between two	Sequential marking/ Batch marking/ surface finish/ cable length	T.S & elongation before & after ageing on outer sheath & insulation	Thermal stability	Anti termite coating on wooden	Constructional requirements feature as per specification	Routine & Acceptance Tests as per relevant standard & specification	FRLS Tests
Aluminum (IEC 60228)	Y	Y	Y	Y		Y										
Copper (IEC 60228)	Y	Y	Y	Y		Y										
XLPE Compound (IEC 60502-2 (2005))	Y		Y			Y	Y				Y					
PVC insulation Compound (IEC 60502)	Y		Y			Y					Y	Y				
FRLS PVC Compound (IEC-60754 Part-1)	Y		Y								Y	Y				Y
Extrusion & curing /Manufacturing of Core (PVC / XLPE)		Y			Y	Y						Y				
Core Laying								Y								
Armour wire/strip	Y	Y	Y													
Inner sheath	Y	Y														
Armoring		Y							Y							
Outer Sheathing		Y								Y						
Finished Cable (IEC-60754 Part-1, IEC 60332 part III cat B/relevant standard)								Y	Y	Y	Y	Y		Y	Y	Y
Wooden drum(relevant standard) /Steel Drum		Y											Y	Y		

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought out items will be subject to Owner's approval.

ROUTINE TESTS		Following routine tests shall be carried out on each drum of finished cables for all types (PVC / XLPE insulated) & sizes.	
1)		Conductor Resistance test	
2)		High voltage test	
ACCEPTANCE TESTS		Following Acceptance tests shall be carried out on each size of each type (PVC / XLPE insulated) of cables, in the offered lot.	
A) For Conductor (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))			
	1)	Annealing test (Copper)	
	2)	Tensile Test (Aluminum)	
	3)	Wrapping Test (Aluminum)	
	4)	Resistance test	
B) For Armour Wires / Formed Wires (If applicable) (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))			
	1.	Measurement of Dimensions	
	2.	Tensile Tests	
	3.	Elongation Test	
	4.	Torsion Test For Round wires only	
	5.	Wrapping Test	
	6.	Resistance Test	
	7.	Mass of Zinc coating test For G S wires / Formed wires only	
	8.	Uniformity of Zinc coating For G S wires / Formed wires only	
	9.	Adhesion test For G S wires / Formed wires only	
	10.	Freedom from surface defects	
C) For PVC / XLPE insulation & PVC Sheath (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))			
	1)	Test for thickness	
	2)	Tensile strength & Elongation before ageing(for tests after ageing see “D”)	
	3)	Hot set test (For XLPE insulation)	
D) Ageing test:			
If the compound manufacturer is carrying out Ageing test, test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer will carry out ageing test & the test report will be reviewed by owner (quantum of ageing test sample shall be one sample /batch)			
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION E40- LT POWER & CONTROL CABLE
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E) Following tests will be carried out on completed cables as per relevant standard on each size of each type (PVC / XLPE insulated)		
	1)	Insulation resistance test (Volume resistivity method)
	2)	High voltage test
F) Following tests shall be carried out on only one size of offered lot (comprising of all sizes & types)		
	1)	Thermal stability test on PVC insulation and outer sheath
	2)	Oxygen index test on outer sheath
	3)	Smoke density rating test on outer sheath
	4)	Acid gas generation test on outer sheath
G) Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cables as per following sampling plan:		
		This test will be carried out using composite sampling i.e. irrespective of size; cables of one particular type (i.e. armoured PVC insulated, unarmoured PVC insulated, armoured XLPE insulated, unarmoured XLPE insulated) will be bunched together, as per calculations in line with the IEC. All sizes of PVC & XLPE insulated, armoured & unarmoured cables shall be covered. For one particular type, cables with OD less than or equal to 30 mm shall be clubbed together in touching formation while cables with OD greater than 30 mm shall be clubbed together leaving a gap equal to OD of cable having least diameter. Cable OD shall be taken as nominal overall diameter as per approved datasheet.
H) Following tests shall be carried out on one length of each size of each type (PVC / XLPE insulated) of offered lot:		
	1)	Constructional / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, drum / Batch (outer sheath extrusion batch)number marking on sheath
	2)	Measurement of Eccentricity & Ovality
GENERAL NOTE:		
(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by owner and Main Contractor at the time of final inspection. Owner and Main Contractor will also witness routine tests on cables on 10% sample basis. (b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by Owner at the time of final inspection. Owner will witness routine tests on cables for the first order on 10% sample basis and Main Contractor will witness routine tests on cables for the first order on 100% basis.		
1. For Smoke Density rating test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 2. For Acid Gas Generation test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 3. For Oxygen Index test: if the test result without conditioning is within (+)7% of the minimum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 4. In case the test results without conditioning do not meet the maximum/minimum specified value, the manufacturer may exercise the option of retesting the samples after conditioning as per standard.		

SUB-SECTION–E-41

L.T. SWITCHGEAR

LT SWITCHGEAR (MCC, PCC, ACDB, DCDB, FUSE BOARDS, LOCAL PUSH BUTTON STATION, LOCAL MOTOR STARTERS)														
ATTRIBUTES / CHARACTERISTICS →														
ITEMS/ COMPONENTS/ SUB SYSTEM ASSEMBLIY ↓	Make, Model, Type, Rating & TC	Dimensions & Finish	Electrical properties	Mechanical Properties	Chemical properties	Functional & Operational Features as per NTPC Spec.	Item to conform to relevant Standards	Pretreatment as per IS 6005	Paint Shade, Adhesion, Thickness & Finish	Functional Checks	Milli-volt drop Test	IR – HV – IR Test	Degree of Protection Routine test as per NTPC spec	All Routine tests as per NTPC spec. & IS
Sheet Steel (IS : 513)	Y	Y		Y	Y		Y							
Aluminum Bus bar Material (IS : 5082)	Y	Y	Y	Y	Y		Y							
Copper Bus bar Material (IS : 613)	Y	Y	Y	Y	Y		Y							
Support Insulator	Y	Y	Y	Y			Y							
Air Circuit Breaker (IS: 13947)	Y	Y				Y	Y			Y	Y			Y
Energy Meters (IS : 13010, 13779)	Y	Y				Y	Y			Y				Y
Power & Aux. Contactors (IS : 13947)	Y	Y				Y	Y			Y				
Protection & Aux. Relays (IS : 3231) (IEC 60255 / IEC 61850)	Y	Y				Y	Y			Y				Y
Control & Selector Switches (IS : 13947)	Y	Y				Y	Y			Y				
CT's & PT's (IS 2705 / 3156)	Y	Y					Y							Y
MCCB (IS : 13947)	Y	Y					Y			Y				
Indicating Meters (IS : 1248)	Y	Y				Y	Y			Y				Y
Indicating Lamps (IS : 13947)	Y	Y				Y	Y			Y				
Air Break Switches (IS : 13947)	Y	Y				Y	Y			Y				
Control Terminal Blocks	Y	Y				Y	Y							

LT SWITCHGEAR (MCC, PCC, ACDB, DCDB, FUSE BOARDS, LOCAL PUSH BUTTON STATION, LOCAL MOTOR STARTERS)														
ATTRIBUTES / CHARACTERIS- TICS → ↓ ITEMS/ COMPONENTS/ SUB SYSTEM ASSEMBLIY	Make, Model, Type, Rating & TC	Dimensions & Finish	Electrical properties	Mechanical Properties	Chemical properties	Functional & Operational Features as per NTPC Spec.	Item to conform to relevant Standards	Pretreatment as per IS 6005	Paint Shade, Adhesion, Thickness & Finish	Functional Checks	Milli-volt drop Test	IR – HV – IR Test	Degree of Protection Routine test as per NTPC spec	All Routine tests as per NTPC spec. & IS
	Fuse (IS 13703)	Y	Y				Y	Y						
Control Transformer (IS : 12021)	Y	Y				Y	Y			Y				Y
Push Buttons (IS : 4794)	Y	Y				Y	Y			Y				
Transducer (IEC : 60688)	Y	Y				Y	Y			Y				Y
MCB (IS : 8828)	Y	Y				Y	Y			Y				
Breaker Handling Trolley	Y	Y				Y			Y	Y				Y
Synthetic Rubber Gasket (IS : 11149)	Y	Y		Y	Y		Y							
LT SWITCHGEAR (IS : 8623)	Y	Y				Y	Y	Y	Y	Y		Y	Y	Y
Notes:														
1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.														
2. Makes of all major Bought Out Items will be subject to NTPC approval.														

LT BUSDUCT																		
ATTRIBUTES , CHARACTERISTICS			ITEM, COMPONENTS, SUB SYSTEM ASSEMBLY	Dimension & Surface Finish	Make, Type, Rating & TC	Electrical Properties	Mechanical Properties	Chemical Properties	Item to conform to relevant IS	WPS Approval, Welder Qualification	Weld Quality Check (DP test & x-ray Test)	Paint Shade, Thickness, Adhesion & Finish	Tightness by Torque measurement	Electrical Clearances	Galvanizing Test as per IS 2629/ 2633/ 4759	IR – HV – IR Test	Phase Sequence Check	Degree of Protection routine test as per NTPC spec.
Aluminum Sheets / Plates / Strips / Flexibles / tubes (IS : 5082 / 737)				Y	Y		Y	Y	Y	Y	Y							
CRCA Flats / ISMC (IS 2062)				Y	Y		Y	Y	Y									
Neoprene / Synthetic Rubber Gaskets (IS 11149 / 3400)				Y	Y		Y	Y										
Rubber Bellows (IS : 3400)				Y	Y		Y	Y										
Support Insulator (BS : 2782, IEC : 660, IS : 10912)				Y	Y	Y	Y											
Galvanized Structure & GI Earthing Flat (IS : 2629 / 2633 / 4749)				Y	Y				Y						Y			
Space Heater & Thermostat					Y	Y										Y		
LT Busduct (IS : 8623 PART 2)				Y	Y				Y	Y	Y	Y	Y	Y		Y	Y	Y
Notes:																		
1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.																		
2. Makes of all major Bought Out Items will be subject to NTPC approval.																		

SUB-SECTION–E-42

MOTORS

MOTOR

TESTS/CHECKS TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-4722 /IS- 9283/IS 2148/IEC60034\IEC 60079-I/ IS- 12615	vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y										
Shaft	Y	Y	Y	Y	Y	Y			Y										
Magnetic Material	Y	Y	Y	Y			Y			Y		Y							
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y										
Stator copper	Y	Y	Y	Y			Y		Y			Y							
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y										
Insulating Material	Y		Y	Y			Y					Y							
Tubes, for Cooler	Y	Y	Y	Y	Y				Y		Y								
Sleeve Bearing	Y	Y	Y	Y	Y				Y		Y								
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y											
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y											
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y										
Wound stator	Y	Y					Y	Y											
Wound Exciter	Y	Y					Y	Y											
Rotor complete	Y	Y					Y						Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y												

CLAUSE No.

CHAPTER NAME

Accessories, RTD, BTD, CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y																
Complete Motor	Y	Y	Y												Y	Y	Y	Y1	Y

Note:

1. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, following methodology to be followed for Inspection Categorization:

Note for LT Motor:

i) Motor rating up to 50 KW: Inspection CAT- III : Acceptance of Motor up to 50 KW is based on COC of the Manufacturer and Main Contractor confirming as follows:

“It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s KVA/KW, temperature rise, distance between center of stud gland plate and tested in accordance with approved drawing /data sheets.”

ii) Motor rating above 50 KW & less than 75 KW: Inspection CAT- II as per NTPC approved MQP: Acceptance of Motor rating above 50 KW & less than 75 KW is based on NTPC rev report as per IS:12615 - 2018 (including latest revision) duly witnessed by main contractor along with COC of the Manufacturer and Main Contractor confirming as follows:

“It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s KVA/KW, temperature rise, distance between center of stud gland plate, space heater and tested in accordance with approved drawing /data sheets.”

iii) Motor rating 75 KW & above: Inspection CAT-I: As per NTPC approved MQP.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard

3. Makes of major bought out items for HT motors will be subject to NTPC approval.

4. Y1 = for HT Motor / Machines only.

5. For LT Motors, stator core stack length & grade, no load loss and winding resistance w.r.t. type tested motor for IE2/IE3 shall be checked/verified in addition to Compliance of relevant standard IS:12615/IEC requirement. In case actual results are not within the tolerance limit as declared by manufacturer during QP submission, the motor shall be subjected to efficiency test.

SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	BID DOC. NO.:	TECHNICAL SPECIFICATION SECTION – VI	PART - B SUB-SECTION-VI E42- MOTORS	Page 2 of 2

SUB-SECTION–E-43

SERVICE ELEVATOR (GEAR TYRE)

QUALITY ASSURANCE

Passenger/ Service Elevators (GEAR TYPE)

ITEM	TEST/CHECK									
	Material Test	DPI/MPI	Ultrasonic Test	Dimensions/Physical	Functional/ Operational Test/ Run Test	Performance Test	Other Tests	All routine tests as per applicable standard	Plain shade, thickness & adhesion	Assembly/fit up
Shaft/ Rack/Gears	Y	Y	Y	Y						
Plates	Y			Y						
Wire rope				Y			Y5			
Safety device								Y		
Geared Machine					Y					
VVVF Drive					Y		Y3	Y		
Power, Control & Trailing Cables								Y4		
Control Panel				Y					Y	
ARD System					Y			Y		
Electrical motor								Y		
Complete Elevator				Y	Y	Y1	Y2			Y

Y1 –TEST TO BE DONE AT SITE

Y2 - LOAD/OVERLOAD TEST TO BE DONE AT SITE AS APPLICABLE.

Y3 – Burn in test on electronic card

Y4 – Routine tests including FRLS tests as per Tech. Spec.

Y5- Test report as per relevant std.

NOTE: 1. This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the applicable practices and procedures followed along with relevant supporting documents during QAP finalization.

2. Makes of all bought out items shall be subject to NTPC approval

SUB-SECTION–E-44

STATION LIGHTING

STATION LIGHTING

Item Components Sub System Assembly Attributes Characteristics	Make, Type, Rating/ TC	Dimension	Pre-Treatment of sheet	Paint Shade Thickness Adhesion & Finish	Galvanization Tests	IP Test	Bought Out Items/ Bill of Material	HV & IR	Functional Check as per spec.	Constructional Feature as per NTPC spec.	Routine Test as per relevant std and spec	Acceptance Test as per relevant std and spec	Item to conform to relevant standard
Luminaries (IS-10322 Part-5 Sec.1 (non –LED type)	Y					Y		Y			Y	Y	Y
Electronic Ballast	Y										Y	Y	Y
Lighting Wire (IS-694)	Y										Y		
Fans (IS-374)	Y										Y		
Pole (IS-2713)	Y			Y						Y	Y	Y	
Lamps (IS-9800, IS-9974)	Y										Y	Y	
Lighting Mast (with raise & lower lantern type)	Y	Y			Y					Y	Y	Y	
Wall Mounted Lighting Panel (IS-513, IS-5)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Switch Box/ Junction Box/Receptacles/ Local Push Button Station / Lighting Panel (IS-513, 2629, 2633, 4759, 6745)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Cable Gland (BS-6121)	Y	Y									Y		
Cable Lug (IS-8309)	Y	Y									Y		
Flexible Conduit	Y										Y		
Lighting Transformer (IS-11171)	Y									Y	Y		
Epoxy & Galvanized Conduit (IS-9537, 2629, 2633, 4759, 6745)	Y	Y									Y		Y

LED Luminaire quality requirements:

- 1) LED modules to conform to IS: 16103 part 2. Manufacturer to issue a certificate of compliance for the same.
- 2) Control gear to conform to IS 15885-part 2 section 13. Manufacturer to issue a certificate of compliance for the same.
- 3) LED luminaire to conform to IS 16107-part 2 section 1. Manufacturer to issue a certificate of compliance for the same.
- 4) LED luminaire marking to be as per IS 16107-part 2 section 1. Manufacturer to issue a certificate of compliance for the same.
- 5) Acceptance tests as per IS 16107-part 2 section 1 to be carried out on LED luminaire except long duration tests i.e. a) Chromaticity coordinates & correlated color temperature (CCT); b) Color rendering index (CRI). Manufacturer will submit a COC for above tests i.e. CCT & CRI
- 6) LED driver make, model, type & rating may be as per recommendations of LED module manufacturer.

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought Out Items will be subject to NTPC approval.

SUB-SECTION–E-45

SWITCHYARD

SWITCHYARD

Attributes / Characteristics Items/Components Sub Systems	Make, model, Type & Rating, Test Certificate	Routine & Acceptance Test as per IS / IEC	Functional requirements as per NTPC Specification
765 kV GIS (IEC:62271-203)	Y	Y	Y
400 kV GIS (IEC:62271-203)	Y	Y	Y
220 kV GIS (IEC:62271-203)	Y	Y	Y
132 kV GIS (IEC:62271-203)	Y	Y	Y
Circuit Breaker (IEC:62271-100)	Y	Y	Y
Isolator (IEC:62271-102)	Y	Y	Y
Current Transformer (IEC:60044/BS:3938/IS2705/ IEC: 61869)	Y	Y	Y
Capacitor Voltage Transformer (IEC:186A / 358/IS3156/IEC60044/ IEC: 61869)	Y	Y	Y
Potential transformer (IEC 60044 / IS3156)			
Surge Arrestor (AIS) (IEC:99- 4/IS:3070)	Y	Y	Y
Wave Trap (IEC:353 / IS:8792 / 8793)	Y	Y	Y
Sub Station Automation system (IEC 61850)	Y	Y	Y
Protection Relays	Y	Y	Y
Energy meter	Y	Y	Y
Bus Post Insulator (IEC:168 / 815 / IS:2544)	Y	Y	Y
Disc, Pin & String Insulator (IEC:383 / IS:731)	Y	Y	Y
Aluminum Tube (IS:5082 / 2673 / 2678)	Y	Y	Y
Conductor (IS:398)	Y	Y	Y
Hardware fittings for Insulator (IS:2486 / BS:3288)	Y	Y	Y
Hollow insulator (IEC:233/ IS:5621)	Y	Y	Y
Spacers, Clamps & Connector (IS:10162 / 5561/ 617)	Y	Y	Y
Galvanized Steel Structures (IS:2062/2629/4759/6745)	Y	Y	Y
Vibration Damper (IS:9708)	Y	Y	Y

SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI BID DOC. NO:	SUB SECTION E45 SWITCHYARD	PAGE 1 OF 2

Attributes / Characteristics Items/Components Sub Systems	Make, Type Rating, and Model, Test Certificates	Routine & Acceptance Test as per relevant IS/IEC	Functional requirements as per NTPC Specification
Sag Compensating Spring DIN:2089/2096 IS:3195 / 7906	Y	Y	Y
Long rod Insulator	Y	Y	Y
SF6 Gas filling & evacuating plant	Y	Y	Y
SF6 Gas Leak Detector	Y	Y	Y
Leakage Current Analyzer	Y	Y	Y
Nitrogen Gas Filling Device	Y	Y	Y
Event Logger	Y	Y	Y
Operation Analyzer	Y	Y	Y
Disturbance Recorder	Y	Y	Y
Synchronizing Trolley	Y	Y	Y
Relay Test Kit	Y	Y	Y
Notes: 1) This is an indicative list of test/checks. The manufacture is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents during QP finalisation for all items. 2) All major Bought Out Items will be subject to NTPC approval.			

SUB-SECTION–E-46

DIESEL GENERATOR SET

DIESEL GENERATOR SET

DIESEL ENGINE												
TESTS/CHECKS	ITEMS/COMPONENTS	Material Test	DP/MPI	UT(On forging and piston Bonding)	Balancing	Hydraulic/water fill test	Assy./fit up	Dimension	Functional/Operation test	Performance test as per BS-5514/or equivalent IS/ISO- Standard including Governing Test for 3 hours at full load and one hr at 10% overload	Fuel consumption, rated power measurement,rated speed	All other tests(if applicable) as per Spec./ relevant standard
	Crank shaft	Y	Y	Y	Y							
	Cylinder blocks/heads	Y				Y						
	Liner/ Radiator	Y				Y						
	Rotating/moving parts other than crank shaft	Y	Y									
	Piston	Y	Y	Y								
	Diesel Engine						Y	Y	Y	Y	Y	Y
Note: 1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents in line in case required as per agreement with NTPC. 2. Make of all major BOIs will be subject to NTPC approval.												
ALTERNATOR												

ITEMS/COMPONENTS	TESTS/CHECKS																	
	Visual	Dimensional	Make/Type/Rating/TC/General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing (WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	All tests as per IS--4722	vibration	Over speed	Tan delta, shaft voltage & polarization index test
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y					Y									
Shaft	Y	Y	Y	Y	Y	Y			Y									
Magnetic Material	Y	Y	Y	Y	Y		Y			Y		Y						
Rotor Copper/Aluminum	Y	Y	Y	Y		Y	Y		Y									
Stator copper	Y	Y	Y	Y			Y		Y			Y						
SC Ring	Y	Y	Y	Y	Y	Y	Y	Y	Y									
Insulating Material	Y		Y	Y			Y					Y						
Tubes for Cooler	Y	Y	Y	Y	Y				Y		Y							
Sleeve Bearing	Y	Y	Y	Y	Y				Y		Y							
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y										
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y										
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y				Y									

ALTERNATOR

TESTS/CHECKS ITEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating/TC/General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	All Routine tests as per IS-/IS-4722	vibration	Over speed	Tan delta, shaft voltage & polarisation index test
Wound stator	Y	Y					Y	Y										
Wound Exciter	Y	Y					Y	Y										
Rotor complete	Y	Y					Y						Y	Y				
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y											
Accessories, RTD, BTD,CT,AVR. Brushes, Diodes,Space heater, antifriction bearing, cable glands, lugs, gaskets etc.	Y	Y	Y															
Alternator (IS 4722)	Y	Y	Y												Y	Y	Y	Y1
Note:1 . his is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and Procedure along with relevant supporting documents during QP finalisation. 2. Make of all major BOIs will be subject to NTPC approval. Y1= for HT Machines only.																		

FINAL ASSEMBLY

ITEMS/COMPONENTS	TESTS/CHECKS									
	Material Test	Dimension	WPS/PQR/Welding	NDT/DP/MPI/UT	Check completeness	Hydraulic/Leak/Pressure test	Functional Tests	All routine test as per Spec/ IS	No load test for 5 min & partial load for one hour of the DG set assembly	Clearances & Alignment
Base frame	Y	Y	Y	Y	Y					
Fuel Tank	Y	Y	Y	Y	Y	Y				
Battery								Y		
Battery Charger								Y		
Control Panel								Y		
Assembled DG Set		Y			Y		Y		Y	Y
NOTES: - This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents during finalization of QP. - Make of all major Bought Out Items will be subject to NTPC approval.										

SUB-SECTION–E-47

VFD MOTOR

VFD MODULE				
ATTRIBUTES / CHARACTERISTICS ITEMS/COMPONENTS, SUB SYSTEM ASSEMBLY	Visual & Dimensional checks	Make / Type / Rating etc.	Final Inspection as ISS / IEC	Remarks
HT Breaker (IEC 56)	Y	Y	Y	
DC Reactor	Y	Y		For details refer table for DC Reactor
Transformer	Y	Y		For details refer table for Transformer
Motor	Y	Y		For details refer separate table for Motor
VFD Panel	Y	Y		For details refer table for VFD
Note: 1) This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. 2) Make of all major Bought Out Items will be subject to NTPC approval.				

DC REACTOR

ATTRIBUTES / CHARACTERISTICS ITEMS/COMPONENTS, SUB SYSTEM ASSEMBLY								
	Visual	Dimensional	Mech. & Chem. Property	Electrical Characteristics	Pretreatment by Seven Tank	Painting by Stove Enameling	Final Inspection as per IS-2026	Welding/NDT
Winding Material (Aluminium)	Y	Y	Y	Y				
Insulation Material	Y	Y		Y				
Sheet Steel	Y	Y	Y					
Winding	Y	Y		Y				
Fabrication of Enclosures	Y	Y			Y	Y		Y
Assembly	Y	Y						
Routine Tests	Y	Y					Y	

Note : 1) This is an indicative list of tests/checks. The manufacturer to furnish a detailed Quality Plan indicating their practice & procedure along with relevant supporting documents during QP finalisation for all items.
2) All major Bought Out Items will be subject to NTPC approval.

TRANSFORMER (OIL FILLED)

Attributes / Characteristics Items/Components Sub Systems	Visual & Dimensional Checks	Mechanical properties	Electrical strength	Thermal properties	Chemical Composition	Compatibility with oil	NDT / DPT / MPI / UT	Ageing Test.	Voltage Ratio, Vector Group & Polarity, Magnetic Balance Test	Make / Type / Rating / Model / TC / General Physical Inspection.	WPS & PQR	Routine Test as per relevant test	Routine Test
Tank, H.V. & L.V. Cable Box / Flange throat	Y	Y					Y						
Conservator / Radiator / Cooler / Pipes	Y	Y					Y						
Copper Conductor (IS:191)	Y	Y	Y		Y								
Insulating Material	Y	Y	Y	Y	Y	Y							
CRGO Lamination & Built Core	Y	Y	Y		Y	Y							
Bushing / Insulator (IS:2544 / 5621)	Y	Y								Y		Y	
Gasket	Y				Y	Y		Y				Y	
Transformer Oil (IS:335 / IEC296)												Y	
Off-Circuit Tap Changer	Y									Y			
Core Coil Assembly & Pre-tanking	Y								Y				
Marshalling Box	Y	Y					Y					Y	
WTI, OTI, MOG, PRD, Breather, Terminal Connector, Bucholz Relay, Globe & Gate Valve,	Y									Y			
Welding (ASME Sect-IX)	Y										Y		
Complete Transformer (IS:2026/ IEC-60076)	Y												Y



CLAUSE No.

QUALITY ASSURANCE

Note: 1) This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2) All major Bought Out Items will be subject to NTPC approval.

SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- E47- VFD MODULE	Page 4 of 7

DRY TYPE TRANSFORMER

Attributes / Characteristics Items/Components Sub Systems	Visual & Dimensional check	Mechanical properties	Electrical strength	Thermal Properties	Chemical Properties	NDT / DP / MPI	Voltage Ratio, Vector Group & Polarity	Make / Type / Rating / Model / TC / General Physical Inspection	WPS & PQR	Routine Test as per relevant standard	Measurement of capacitance & tan delta between winding	Routine Test
Enclosure door, H.V. & L.V. Cable Box / Flange Throat	Y	Y						Y				
Copper Conductor	Y	Y	Y		Y							
Insulating Material	Y			Y	Y							
CRGO Lamination & Built Core	Y											
Bushing /Insulator (IS:2544 / 5621)	Y							Y		Y		
Gasket	Y							Y		Y		
Off-Circuit Tap Changer	Y							Y				
Core Coil Assembly	Y						Y					
Marshalling Box	Y									Y		
WTI, Thermister, Terminal Connector	Y							Y				
Welding									Y			
Complete Transformer (IS:11171 / IEC 60076)	Y										Y	Y
Notes: 1) This is an indicative List of test/checks. The manufacturer is to furnish a detailed Quality Plan indicating his practice and procedure along with relevant supporting documents during QP finalization for all item. 2) All major Bought out Items will be subject to NTPC approval.												

VFD PANEL

Attributes Characteristics Item Components Sub System Assembly	Electrical Properties	Mechanical Properties	Chemical Properties	Dimensions / Finish	Type/ Rating/Functional check	HV/IR	Routine test as per relevant std.	Constructional Features	IS:6005 ,Seven tank process	Paint finish/ shade/thickness adhesion	Mountings / BOM/ Make, Completeness / Wiring	Interlock Functional & Operation Testing / Simulation check	Degree of Protection Test	Final testing as per Relevant IS/IEC
Sheet Steel (IS-513)		Y	Y	Y										
Aluminum / Copper Bus-bar(IS-5082/IS-613/IS-1987)	Y	Y	Y	Y										
Support Insulator (BS-2782/IEC-660/IS-10912)	Y	Y	Y	Y										
Control / Selector Switch(IS-6875)					Y	Y	Y							
Contact/ MCB(IS-13947)					Y	Y	Y							
O/L Protection relays(IS-3231)					Y		Y							
C.T /V.T/ Indicating Meter(IS-2705/3156/1248)					Y	Y	Y							
Fuse/ Fuse carrier(IS-13703)					Y	Y	Y							
Terminals/lugs/pvc wires(IS-13947//IS-694)	Y			Y	Y	Y	Y							
Timers(IS-3231)					Y	Y	Y							
Push Button/ Lamp/ (IS-6875)					Y	Y	Y							
Control Transformer (IS-12021)					Y	Y	Y							
Mimic, Annunciater					Y		Y							
GASKET(IS-11149)		Y	Y	Y	Y		Y							
Fabrication								Y						
Pretreatment & Painting									Y	Y				
VFD panel										Y	Y	Y	Y	Y

NOTE:

1. This is an indicative list of Test/ Checks. The manufacturer to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. All major Bought Out Items will be subject to NTPC approval.

CLAUSE No.

QUALITY ASSURANCE



SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- E47- VFD MODULE	Page 7 of 7

SUB-SECTION–E-48

CONSTRUCTION POWER RING MAIN & LT SUB-STATION, HT LINES

CLAUSE NO.	QUALITY ASSURANCE									
CONSTRUCTION POWER – RING MAIN & LT S/S & HT Lines										
Attributes / Characteristics Items / Components / Sub System Assembly		Dimensions & finish	Make, Model, Type, Rating & TC	Item to conform to relevant standards	Functional & Operational features as per NTPC spec.	Galvanizing Tests	Pretreatment as per IS 6005	Paint shade, thickness, adhesion & finish	Functional Checks	All Routine / Acceptance Tests as per NTPC Spec. & IS
HT AC Switch Outdoor type (IS: 9920)		Y	Y	Y	Y		Y	Y	Y	Y
Outdoor HT Fuse & Fuse base (IS : 9385) / Drop Out Fuse Assembly		Y	Y	Y	Y				Y	Y
HT Outdoor Type Lightning Arrester (IEC : 99 - 4)		Y	Y	Y						Y
ONAN Transformer (IS 2026)		Y	Y	Y						Y
LT Power Control Centers (IS 8623)		Y	Y	Y						Y
Distribution Boards / Fuse Boards (IS 8623)		Y	Y	Y						Y
HT armored Cable (IS : 7098)		Y	Y	Y						Y
LT armored Power & Control cable (IS : 1554)		Y	Y	Y						Y
Cable Termination Kits and Straight Through Joints (VDE 0278)		Y	Y	Y						Y
ACSR Conductor (IS : 3835)		Y	Y	Y						Y
Earth wire & Guy wire/ Stay set (IS : 6594)		Y	Y	Y						Y
Galvanized Steel Structure (IS 2633 / 2629 / 6745 / 802)		Y	Y	Y		Y				Y
Steel Tubular Poles (IS 2713)		Y	Y	Y			Y	Y		Y
Rail Poles (IRS : 90 L)		Y	Y	Y			Y	Y		Y
ISMC Channel / Angle / Flat (IS 2062)		Y	Y	Y						
Hardware (IS 1367)		Y	Y	Y						
Disc & Pin Insulator (IS 731)		Y	Y	Y						Y
Strain Porcelain Insulator (IS 5300)		Y	Y	Y						Y
Suspension / Tension Clamp for Earth wire (IS 398 Pt 2)		Y	Y	Y						Y
Hardware for insulator (IS 2586)		Y	Y	Y						Y
Vibration damper (IS 9708)		Y	Y	Y						Y
LT Air Circuit Breaker (IS : 13947)		Y	Y	Y	Y				Y	Y
LT CT / PT (IS : 2705 / 3156)		Y	Y	Y						Y
MCB (IS : 8828)			Y	Y	Y				Y	Y
MCCB (IS : 13947)			Y	Y	Y				Y	Y
Air Break Switch / LT Fuse (IS : 13947 / 13703)			Y	Y	Y					Y
Control & Selector Switches (IS : 6875)			Y	Y	Y				Y	Y
CT / PT (IS : 2705 / 3156)			Y	Y	Y				Y	Y
Energy Meters (IS 722)			Y	Y	Y				Y	Y
Indicating meters (IS : 1248)			Y	Y	Y				Y	Y
Push Buttons (IS : 4794)			Y	Y	Y				Y	Y
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI BID DOC. NO:			SUB-SECTION E48-CONSTRUCTION POWER RING MAIN & LT S/S& HT Lines			PAGE 1 OF 2		

CLAUSE NO.	QUALITY ASSURANCE										एनटीपीसी NTPC																																																																																																		
<table><tr><th>Attributes / Characteristics →</th><th></th><th>Dimensions & finish</th><th>Make, Model, Type, Rating & TC</th><th>Item to conform to relevant standards</th><th>Functional & Operational features as per NTPC spec.</th><th>Galvanizing Tests</th><th>Pretreatment as per IS 6005</th><th>Paint shade, thickness, adhesion & finish</th><th>Functional Checks</th><th>All Routine / Acceptance Tests as per NTPC Spec. & IS</th></tr><tr><th>Items / Components / Sub System Assembly ↓</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr><tr><td>Indicating Lamps (IS: 13947)</td><td></td><td></td><td>Y</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td>Y</td><td>Y</td></tr><tr><td>PVC insulated copper wires (IS : 694)</td><td></td><td></td><td>Y</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td>Y</td></tr><tr><td>Cable Lugs / Cable Glands (IS 8309 / BS 6121)</td><td></td><td></td><td>Y</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td>Y</td></tr><tr><td>Lighting Fixtures (IS 10322)</td><td>Y</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td></td><td>Y</td></tr><tr><td>GI Pipe for Earthing (IS : 2629 / 2633 / 4749)</td><td>Y</td><td>Y</td><td>Y</td><td></td><td></td><td>Y</td><td></td><td></td><td></td><td></td></tr><tr><td>Fence (IS : 278)</td><td></td><td></td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Danger Plate (IS 2551)</td><td></td><td></td><td></td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td>Y</td></tr></table>											Attributes / Characteristics →		Dimensions & finish	Make, Model, Type, Rating & TC	Item to conform to relevant standards	Functional & Operational features as per NTPC spec.	Galvanizing Tests	Pretreatment as per IS 6005	Paint shade, thickness, adhesion & finish	Functional Checks	All Routine / Acceptance Tests as per NTPC Spec. & IS	Items / Components / Sub System Assembly ↓											Indicating Lamps (IS: 13947)			Y	Y	Y				Y	Y	PVC insulated copper wires (IS : 694)			Y	Y	Y					Y	Cable Lugs / Cable Glands (IS 8309 / BS 6121)			Y	Y	Y					Y	Lighting Fixtures (IS 10322)	Y	Y	Y							Y	GI Pipe for Earthing (IS : 2629 / 2633 / 4749)	Y	Y	Y			Y					Fence (IS : 278)			Y	Y							Danger Plate (IS 2551)				Y						Y
Attributes / Characteristics →		Dimensions & finish	Make, Model, Type, Rating & TC	Item to conform to relevant standards	Functional & Operational features as per NTPC spec.	Galvanizing Tests	Pretreatment as per IS 6005	Paint shade, thickness, adhesion & finish	Functional Checks	All Routine / Acceptance Tests as per NTPC Spec. & IS																																																																																																			
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Lighting Fixtures (IS 10322)	Y	Y	Y							Y																																																																																																			
GI Pipe for Earthing (IS : 2629 / 2633 / 4749)	Y	Y	Y			Y																																																																																																							
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SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE			TECHNICAL SPECIFICATION SECTION – VI BID DOC. NO:			SUB-SECTION E48-CONSTRUCTION POWER RING MAIN & LT S/S& HT Lines			PAGE 2 OF 2																																																																																																				

SUB-SECTION–E-49

QA TABLE FOR SOLAR ROOF

CLAUSE NO.	QUALITY ASSURANCE		
SPV MODULE This is indicative List of tests/ checks. The manufacturer is to furnish a detailed quality Plan indicating the practice & procedure along-with the relevant supporting documents. 1. PCU- A) Incoming Quality Checks on bought out items B) In-process quality checks C) Routine tests as per following on the assembled PCU: 1) Test to demonstrate automatic / manual synchronization and connection to utility service 2) Functional check on all protections 3) Check on accuracy of all parameters measured by PCU 4) Test to demonstrate operation of start-up, stable operation of the PCU, disconnection and shutdown controls and response to other control signals D) Following sample tests assembled PCU: (1 Unit per offered lot) Heat run test including measurement of phase currents, efficiencies, harmonic content and power factor at four points preferably 25, 50, 75 and 100% of the rated nominal power. 2. SPV module-SPV modules quality plan should include the following: A) Incoming Quality Checks on bought out items (listed in third party test reports of relevant standard) B) In-process Quality Checks C) Sample tests as per following: 1) SPV modules to be checked visually for following defects: (sampling as per General Inspection Level II and AQL 1.5% as per IS 2500 Part 1) a) Scratches on the frame and/or glass b) Excessive or uneven glue marks on glass or frame c) Inconsistent cell colors d) Completeness of module in all respects 2) Performance of SPV module at STC (sampling as per General Inspection Level II and AQL 1.5% as per IS 2500 Part 1) 3) IR-HV-IR test (sampling as per General Inspection Level II and AQL 1.5% as per IS 2500 Part 1) 4) Robustness of terminations on 1 sample per offered lot 5) Mechanical load test on 1 sample per offered lot 3. Array Junction Box/ String Monitoring Box-Array Junction quality plan should include the following: A) Checks on bought out items as per internal standards of the manufacturer B) In-process checks, as per internal standards of the manufacturer C) Sample tests as per following:1) IR-HV-IR test (sampling as per General Inspection Level-II and AQL 1.5% as per IS 2500 Part 1) 2) String Monitoring Card/ Power Supply card/ DC-DC Converter function check on one sample of SMB (In case of String Monitoring Box only) 3) Communication Function Test on one sample (In case of String Monitoring Box only) 4) Degree of protection visual checks like gasket profile, sealing arrangement, paper pull check 4. DC Cable- Routine and Acceptance Test as per the relevant Standard applicable as per technical specifications			
SIPAT SUPER THERMAL POWER PROJECT, STAGE III (1X800 MW) TECHNICAL SPECIFICATION FOR EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION E49- SPV MODULE	PAGE 1 OF 1

SUB-SECTION–E-50

VMS & TSI SYSTEM

CLAUSE NO.	QUALITY ASSURANCE								एनडीपीसी NTPC																																																																																	
	<table><tr><th colspan="9">VMS & TSI System</th></tr><tr><th>TEST/ATRIBUTES CHARACTERISTICS ITEM</th><th>Linearity(R)</th><th>Frequency Response(R)</th><th>Calibration with simulated output.(R)</th><th>Spectrum(Harmonic Analysis (A)</th><th>Predictive Analysis Functions (A)</th><th>Storage & Comparative analysis of vibration(A)</th><th>Generation/analysis of plots (A)</th><th>Simulation test & generation of operator guidance (A)</th></tr><tr><td>TURBO SUPERVISORY/ VIBRATION MONITORING SYSTEM</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Proximeter</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Acclerometer</td><td>Y</td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>LVDT</td><td>Y</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Monitor</td><td>Y</td><td></td><td>Y*</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Overall System</td><td></td><td></td><td></td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr><tr><td colspan="9">R-Routine Test </td></tr></table>									VMS & TSI System									TEST/ATRIBUTES CHARACTERISTICS ITEM	Linearity(R)	Frequency Response(R)	Calibration with simulated output.(R)	Spectrum(Harmonic Analysis (A)	Predictive Analysis Functions (A)	Storage & Comparative analysis of vibration(A)	Generation/analysis of plots (A)	Simulation test & generation of operator guidance (A)	TURBO SUPERVISORY/ VIBRATION MONITORING SYSTEM									Proximeter	Y	Y							Acclerometer	Y	Y							LVDT	Y								Monitor	Y		Y*						Overall System				Y	Y	Y	Y	Y	R-Routine Test								
VMS & TSI System																																																																																										
TEST/ATRIBUTES CHARACTERISTICS ITEM	Linearity(R)	Frequency Response(R)	Calibration with simulated output.(R)	Spectrum(Harmonic Analysis (A)	Predictive Analysis Functions (A)	Storage & Comparative analysis of vibration(A)	Generation/analysis of plots (A)	Simulation test & generation of operator guidance (A)																																																																																		
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LVDT	Y																																																																																									
Monitor	Y		Y*																																																																																							
Overall System				Y	Y	Y	Y	Y																																																																																		
R-Routine Test																																																																																										

SUB-SECTION–E-51

MEASURING INSTRUMENTS

MEASURING INSTRUMENTS						Page- 1/2			
Item Components Sub System Assembly	Attributes Characteristics								
	Dimensions (R)	Make, Model, Type, Rating (R)	Process / Electrical connection (R)	Calibration (R)	Test as per standard(R)	Insulation Resistance (R)	IBR Certification (As applicable)(R)	Hydro Test(R)	Material Test certificate ®
	1. PR Gauge (IS-3624)	Y	Y	Y	Y	Y			
	2. Temp. Gauge (BS-5235)	Y	Y	Y	Y	Y			
	3. Pr./D.P.Switch(BS-6134)	Y	Y	Y	Y	Y	Y		
	4. Electronic Transmitter(IEC-60770)	Y	Y	Y	Y	Y	Y		
	5. Temp. Switch	Y	Y	Y	Y	Y	Y		
	6. Electrical Metering Instrument (IS-1248)	Y	Y	Y	Y	Y	Y		
	7. Transducer (IS-14570)	Y	Y	Y	Y	Y	Y		
	8. Thermocouples (IEC – 584 / ANSI-MC-96.1)	Y	Y	Y	Y	Y	Y		
9. RTD(IS-2848)	Y	Y	Y	Y	Y	Y			
10. Thermowell	Y		Y				Y	Y	Y
R-Routine Test A- Acceptance Test Y – Test applicable									
Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.									

MEASURING INSTRUMENTS

Page- 2/2

Item Components Sub System Assembly	Attributes Characteristics												
	GA, Dimensions, Paint Thickness	Make, Model, Type, Rating	Process / Electrical connection (R)	Calibration/Functional (R)	Requirement as per standard (R)	WPS approval (A)	Non-destructive testing (R)	Calculation for accuracy (R)	HV/ IR Test (R)	IBR Certification as applicable (R)	Hydro test (R)	Material test certificate (A)	Integral Testing of complete
11. Orifice plate(BS-1042)	Y	Y	Y	Y *	Y	Y **	Y **			Y	Y **	Y	
12. Flow nozzle(BS-1042)	Y	Y	Y	Y *	Y	Y	Y			Y	Y	Y	
13. Impact head type element	Y	Y	Y					Y				Y	
14. Electronics Water Level Indicator (EWLI)	Y	Y	Y		Y		Y		Y	Y	Y	Y	Y
15. Flue Gas & Ambient Air Analysers	Y	Y	Y	Y					Y				Y
16- SWAS System with Analyser & Chiller#	Y	Y	Y	Y			Y		Y	Y	Y	Y	Y
17- Dust emission monitors	Y	Y	Y	Y									
18- Containerised Room	Y	Y	Y						Y			Y	
R-Routine Test A- Acceptance Test Y – Test applicable													
*Calibration to be carried out on one flow element of each type and size if calibration carried out as type test same shall not be repeated.													
** As applicable													
#Vaccuminasation test of chiller assembly													
Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.													

SUB-SECTION–E-52

DDCMIS

CLAUSE NO.	QUALITY ASSURANCE		
	DDCMIS		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-52 DDCMIS	PAGE 1 OF 8

CLAUSE NO.	QUALITY ASSURANCE																		
1.00.00 1.01.00	REQUIREMENTS OF AUTHORISATION-TO-SHIP-TEST (ATST) FOR DDCMIS																		
	(a) Authorization-to-ship-test (ATST) or Factory Acceptance Test (FAT) (both terms have been used interchangeably) shall include all required tests to fully demonstrate to Employer's satisfaction that each equipment/sub-system/system as well as software modules furnished as per this specification as well as DDCMIS as a whole, fully meets the functional, parametric and other requirements of this specification and Employer's approved drawings/documents under all operating regimes. The procedure defined here is applicable for one DDCMIS system. Number of DDCMIS systems and their sub-systems shall be as defined in Part-A of technical specifications.																		
	(b) Contractor to note that ATST / FAT procedure given below in subsequent clauses are only indicative in order to help the Contractor in understanding the requirements and help him in submitting a detailed procedure based on these guidelines meeting all the specification requirements.																		
	(c) The results of the following activities shall be made available to the Employer's representative before start of ATST / FAT.																		
	(i) Compliance check for Major Design Feature (including Customization if any), as per Part-C, GTR or agreements regarding this.																		
	(ii) Implementation check of various applications including those based on NTPC input, as per Part-C, GTR or agreements regarding this.																		
	(d) Generally, the ATST / FAT shall be carried out with the equipment earmarked for the particular project and unit. However, for the following item, the testing can be carried out with similar / equivalent dummy equipment fulfilling the following condition, subject to Employer's approval.																		
	<table><tr><th>SN</th><th>ITEM</th><th>CONDITION</th></tr><tr><td>1</td><td>LVS</td><td>Testing of LVS functionalities can be done by using monitors connected to the LVS Workstations. Dispatch of LVS can be allowed like a cat-III item, but only after successful testing of functionalities as indicated above.</td></tr><tr><td>2</td><td>LVS WS / OWS</td><td>LVS WS / OWS for the first unit to be tested on the target machines. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of LVS WS / OWS of subsequent units can be allowed like a cat-III item, but only after successful testing of first unit as indicated above.</td></tr><tr><td>3</td><td>MASTER CLOCK</td><td>Can be directly dispatched if alternate test set-up for time synchronization can be arranged.</td></tr><tr><td>4</td><td>NETWORK COMPONENT</td><td>To be done with target machines only for first unit. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of network components of subsequent units / station can be</td></tr></table>				SN	ITEM	CONDITION	1	LVS	Testing of LVS functionalities can be done by using monitors connected to the LVS Workstations. Dispatch of LVS can be allowed like a cat-III item, but only after successful testing of functionalities as indicated above.	2	LVS WS / OWS	LVS WS / OWS for the first unit to be tested on the target machines. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of LVS WS / OWS of subsequent units can be allowed like a cat-III item, but only after successful testing of first unit as indicated above.	3	MASTER CLOCK	Can be directly dispatched if alternate test set-up for time synchronization can be arranged.	4	NETWORK COMPONENT	To be done with target machines only for first unit. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of network components of subsequent units / station can be
	SN	ITEM	CONDITION																
	1	LVS	Testing of LVS functionalities can be done by using monitors connected to the LVS Workstations. Dispatch of LVS can be allowed like a cat-III item, but only after successful testing of functionalities as indicated above.																
2	LVS WS / OWS	LVS WS / OWS for the first unit to be tested on the target machines. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of LVS WS / OWS of subsequent units can be allowed like a cat-III item, but only after successful testing of first unit as indicated above.																	
3	MASTER CLOCK	Can be directly dispatched if alternate test set-up for time synchronization can be arranged.																	
4	NETWORK COMPONENT	To be done with target machines only for first unit. In case the testing carries over to next unit, dummy equipment may be used. Dispatch of network components of subsequent units / station can be																	
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:	SUB-SECTION-E-52 DDCMIS	PAGE 2 OF 8															

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1.01.01			allowed like a cat-III item, but only after successful testing of functionalities as indicated above.
	5	VARIOUS BUS SYSTEM CABLES	For FAT, the target Main system bus shall be used. In case the testing carries over to next unit, dummy equipment may be used.
1.01.02	The Authorization-To-Ship-Test (ATST) shall include all reasonable exercises which the combination of equipment and software can be expected to perform. These tests shall be divided into, as a minimum, but not limited to the following categories:		
	(a)	Hardware tests	
	(b)	Functional tests	
	(c)	Parametric test	
	All reference documents like all approved drawings / documents, NTPC specifications, DDCMIS system manuals, etc. shall be available at the start of ATST. The Quality Assurance related tests shall be as per approved QP (Quality Plan) for DDCMIS. The ATST tests are briefly described in subsequent clauses.		
	Hardware tests		
	These tests shall include but not be limited to the following tests. These tests will be conducted on full population on sample basis as finalized during ATST procedure finalization and NTPC engineer’s decision during ATST.		
	(a.) Verification of healthiness of all types of modules e.g., I/O modules, controller modules, processors, peripherals, etc. on a sample basis.		
	(b.) System configuration:		
	(1.) Verification of system configuration with reference to approved configuration diagrams including verification of controller configuration, group / sub-group segregation; grouping of controllers, I/O redundancy, verification of multiple measurement scheme, HMIPIS configuration, etc.		
	(2.) Verification of major features of complete DDCMIS like on line removal of I/O and controller modules, etc. in line with specification requirements.		
	(3.) Verification of spare capacity for example spare channels, spare wired-in space in cabinets/ cubicles, terminal blocks, peripherals, etc. as per approved documents.		
	(c.) Simulation of inputs / Outputs		
	System shall have feature to simulate/ forcing I/Os on OWS / LVS OWS. Additionally hardware simulation of I/Os shall be available for specific applications like fail safe system.		
	(d.) Accuracy test:		
	System accuracy for each type of analog input shall be demonstrated on sample basis, if this test is not carried out in MDFT.		
	(e.) Demonstration of the manual and auto switchover from master to standby system bus, controllers, I/Os, processors etc.		
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1.01.03	(f.)	Loop reaction time shall be demonstrated for loops / logics / functions applicable as per specification and ATST procedure.		
	(g)	SOE function shall be tested as follows, where the same is applicable (refer Part-A of specifications). For SER function, verification of resolution of SOE inputs, time synchronization with master clock, data base modification, SOE report, printout, other features etc. For this purpose a test-simulator to generate sequences of 1 ms resolution for 50 points (or as agreed during finalization of ATST procedure) distributed in different panels shall be made available during testing.		
	(h)	Power supply: Testing of power supply system to DDCMIS, tolerance of DDCMIS w.r.t. voltage & frequency limits as specified, performance of DDCMIS with power supply break as specified .(One sample of each type)		
	(i)	Diagnostics Tests : On – line diagnostic tests on HMIPIS, individual peripherals, Control System, programmer stations, etc.		
	Functional Tests			
	The following tests shall be carried out on Contractor's DDCMIS.			
	(a.)	Functional tests of CLCS:		
	(1.)	Verification of proper signal acquisition, conditioning and distribution, 2 transmitters / 3 transmitter selection.		
	(2.)	Verification of proper realization of controller functions like bump less transfer from auto to manual and vice versa, functional checking of bias circuit (wherever provided), etc.		
	(3.)	Verification of response of control system by simulating changes in the system inputs in line with the approved ATST procedure.		
(4.)	Verification of signal exchange between FGs and from other systems (if applicable)			
(b.)	Functional tests of OLCS:			
(1.)	Verification of proper signal acquisition, conditioning and distribution, 1v2, 2v3 implementation.			
(2.)	Verification of proper realization of logic functions, sequence control functions, running of complete start up program sequence in all modes of operation, shut down program, etc.			
(3.)	Verification of logic computation in controller by simulating inputs.			
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	(4.) Verification of signal exchange between FGs and from other systems (if applicable) (c.) Functional tests for HMIPIS (1.) Verification of all types of displays, logs including their formats, bar graphs, X-Y plots etc. availability of all operator functions. (2.) Verification of event generation and handling capabilities of HMIPIS processors by simulating various types of events/data and observing associated event sequence display and alarms.. (3.) Calculations: All calculations shall be tested on sample basis to demonstrate that these are in accordance with the specification and Employer's inputs as applicable. The Contractor shall prepare all tests cases for calculations for proper verification for the features required for each type of computations. (4.) Checking historical storage and retrieval functions including long term storage. (5.) Testing of initialization and loading of configuration data, etc. (6.) Verification of all programmer's stations functions for HMIPIS and Control System, as well as for documentation facility as specified. (7.) Testing of each peripheral viz., monitors, printers, optical disks, hard disk drive, etc. (8.) Testing of time synchronization function of system time of DDCMIS (Control System, HMIPIS & Systems on LAN). In case it is not possible to bring the master clock procured under this package, then signal generator with stable source, capable of generating all required type of synchronizing signal to be arranged by Contractor. (9.) Testing of the Station LAN shall be carried out with unit DDCMIS (with panels), standalone DDCMIS (with panels or software simulation), Switchgear DDCMIS and at least one (1) other DDCMIS system (with panels or software simulation), as well as two client PC's, one third party PLC and Numerical relay system (if applicable). Bidder shall arrange a PC with OPC server (excluded from his scope of supply) which shall be used by the Bidder to simulate signal exchange between Bidder's Station LAN and third party PLC during the testing of Station LAN, at Bidder's works . During the testing of Station LAN as mentioned above complete switchgear DDCMIS (with panels) shall be connected. Numerical Relay & Ethernet Switch Vendor will arrange a prototype ring with at least three Ethernet switches (L2) with one IED of each type and L3 Switches network, at the works of the DDCMIS supplier along with the necessary engineering support. Exact test setup shall be finalized during detailed engineering. (10.) Unified HMIPIS: Testing of Unified HMIPIS functionality as per respective approved documents. (d.) Security Audit (as applicable)		
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CLAUSE NO.	QUALITY ASSURANCE			
1.01.04	(1.) For checking compliance to the security policies & procedures in Station LAN/HMI of all DDCMIS and Switchgear Relay network integrated to the Switchgear DDCMIS, security audit by a certified auditor (as per CERT- IN panel) is to be arranged by the Contractor during ATST. The security audit for Switchgear Relay network integrated to the Switchgear DDCMIS shall be done on prototype ring and hardware arranged by the vendor during Station LAN FAT. This shall include vulnerability assessment of the workstations/ servers and penetration testing of the Station LAN through the firewall from a node outside the network. Suitable actions based on the findings of the security audit shall be carried out by the Contractor.			
	Parametric tests Following tests shall be carried out to test Contractor’s DDCMIS w.r.t. specification requirements. (a.) For control system (CLCS+OLCS): (1.) CPU loading (2.) Cycle time/controller reaction time. (3.) Memory spare capacity (b.) For MMIPIS (1.) CPU loading (2.) Spare duty cycle (3.) Spare memory capacity (c.) Spare duty cycle for system bus (d.) Various display & command response time (e.) System accuracy (if not carried out in MDFT) (f.) Display update time on OWS LVS Parametric tests of Unified HMIPIS for complete Unit DDCMIS shall also be carried out, if specified in Part-A of specifications.			
	1.02.00 Integrated Test Set-Up For integrated testing of the total DDCMIS system, the Contractor shall employ a test set-up, which will be capable of generating I/O signals in a requisite manner. It is preferable to adopt soft signal simulating device to avoid / minimise the cumbersome process of physical connection of I/Os through potentiometers, switches, Lamps / LEDs etc. The exact configuration / set-up shall be as finalized during detailed engineering.			
1.02.01	The Contractor is to submit Authorisation-To-Ship-Test (ATST) procedure and requirements of above and other applicable clauses of this specification. Since, the exact definition & extent / parameters of ATST can be finalized only when the engineering of DDCMIS has been finalized to a great extent, it is required that the detailed draft ATST procedure be submitted by the Contractor at a later date as intimated by the Employer during engineering stage for Employer’s comment and finalization. Contractor shall incorporate all modifications, additions/ deletions to the			
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CLAUSE NO.	QUALITY ASSURANCE		
	ATST procedure as indicated by the Employer. The ATST shall be conducted as per Employer approved procedure for ATST. The Employer reserves the right to ask the Contractor to conduct any other test not covered in ATST procedure also during the ATST which may be required to fully satisfy the Employer regarding full compliance with specification requirements. Contractor shall conduct all such tests also within the quoted lump sum price for this contract.		
1.02.02	The results of all ATS Tests shall be properly documented by the Contractor and submitted to Employer along with all annexures.		
1.02.03	Following the tests, if in the opinion of the Employer, the system has not been adequately manufactured, programmed, tested or debugged the Contractor shall make good all deficiencies, and re-run the test to fully satisfy the Employer regarding full compliance with specification requirements and requisite quality standards.		
1.02.04	The system shall not be shipped without approval of Employer in writing.		
1.02.05	Upon successful completion of Authorization-To-Ship Test, the Employer will provide the Contractor with a written authorization for shipment of the system equipment to the project site.		
1.02.06	All final documentation as per requirement of this specification shall be available at the time of Authorization-To-Ship-Test and this shall be dispatched along with the equipment in required number of copies.		
1.02.07	Contractor shall note that no payments towards dispatch of equipment and subsequent activities shall be due and payable to the Contractor till the Contractor is able to successfully demonstrate to Employer's satisfaction that the DDCMIS and parts thereof fully meet the Authorization-To-Ship Test requirements.		
1.02.08	The ATST or FAT of DDCMIS shall be conducted at the employer approved works of the DDCMIS supplier or DDCMIS Supplier's Associate. Further DDCMIS shall be supplied from the same works.		
2.00.00	The ATST requirements as indicated above shall form an integral part of QAP (Quality Assurance Plan) of DDCMIS system(s) envisaged for the package/project. Over and above the tests and requirement indicated above, the QP for DDCMIS system shall be submitted to employer for approval. The QAP envisaged for the offered DDCMIS system for employer shall also include testing of following attributes of the offered system by Employer.		
2.01.00	The tests indicated in the following QA tables are indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents, if desired by employer.		
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CLAUSE NO.	QUALITY ASSURANCE										
	DISTRIBUTED DIGITAL CONTROL MONITORING & INFORMATION SYSTEM (DDCMIS)										
	TESTS ITEMS										
		Pre Power on Check (#) (R)									
		Post Power on Check (%) (R)									
		Internal cabling / Wiring checking(R)									
		Door Alignment, waviness, and Locking (R)									
		Louvers, Fans, wire mesh, Lifting arrangement (R)									
		HV / IR on wired panels (R)									
		Paint Shade, Thickness and Illumination (R)									
		Hardware/Make as per BOM (R)									
Dimensions, GA, layout (R)											
Environmental Stress Screening test (R).											
DDCMIS											
DDCMIS CUBICLES	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
OWS and Peripherals								Y			
R-Routine Test		A- Acceptance Test				Y – Test applicable					
Note: 1) These test are minimum requirement and necessary covered in Manufacturing Quality Plan and manufacturer is also need to include their practices and Procedure in MQP along with relevant supporting documents. # Pre power on check: - Wire dressing, looseness, Availability of Fuses and MCB, Modules are inserted properly, Earthing connection, Input Voltage checking, Availability of resistance matt near panels, Availability of Electro Static Discharge measure for electronics components. % Post Power On Check: - Current & power consumption of DDCMIS Cabinets, I/O check as per signal flow.											
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SUB-SECTION–E-53

POWER SUPPLY

CLAUSE NO.	QUALITY ASSURANCE																		
	POWER SUPPLY FOR C&I SYSTEMS (UPS/BATTERY/BATTERY CHARGER/ACDB/DCDB)																		
	ITEMS	TESTS	Visual/dimension/rating/ Paint Adhesion/ Thickness (R)	General arrangement/BOM/make of components /Mimic®	Efficiency .regulation(R)	Input voltage variation (A)	Out put voltage and frequency adi. range(A)	Preliminary light load test(R)	Load transfer retransfer test (R) *	AC input failure and return test (R)	Parallel operation and current division(R)	Relative harmonic content(R)	Restart with PRI A.C and battery (separately)(R)	System transfer and retransfer (R)*	Asynchronous transfer(R)	Ripple content(R)	Load limiter operation (R)	IR/HV(R)	Tests as per standard & specification (R)&(A)
			UPS/CONVERTER (IEC-146 PT-4)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	VOLTAGE STABILISER	Y	Y	Y	Y	Y					Y		Y					Y	
	LEAD ACID BATTERY (PLANTE)-IS-1652																		Y
	Ni-CD BATTERY(IS-10918/IEC-623)																		Y
	ACDB/DCDB	Y	Y															Y	Y
	BATTERY CHARGER	Y	Y	Y	Y	Y				Y						Y	Y	Y	Y
	R-Routine Test			A- Acceptance Test							Y – Test applicable								
	* Transfer time and Over shoot /under shoot during load & system transfer shall be recorded.																		
	Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.																		
	SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE					TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:					SUB-SECTION-E-53 POWER SUPPLY					PAGE 1 OF 1			

SUB-SECTION–E-54

INSTRUMENTATION CABLE

CLAUSE NO.	QUALITY ASSURANCE 												
	INSTRUMENTATION CABLE												
	TESTS ITEMS												
		Conductor Resistance ® & (A)	High Voltage ® & (A)	Insulation Resistance ® & (A)	Constructional detail, dimensions (A)	Outer-Sheathe/core marking, end sealing (A)	Thermal Stability (A) +	Visual, Surface finish (A) +	Electrical Parameters ** (A) +	Persulphate Test (A) +	Overall/Coverage/Continuity (A)	Swidesh chimney Test (SS-4241475) (A) ++	FRLS Test * (A) ++
													Tensile & Elongation before & after aging (A) ++
													Vol. Resistivity. at room & Elevated Temp. (A) ++
													Spark test report review ®
	1. Instrument cable twisted and shielded												
	Conductor(IS-8130)	Y			Y			Y					
	Insulation(VDE-207)				Y	Y	Y	Y					Y
	Pairing/Twisting				Y	Y		Y					
	Shielding				Y			Y		Y			
	Drain wire	Y			Y			Y		Y	Y		
	Inner Sheath				Y	Y	Y	Y				Y	Y
	Outer Sheath				Y	Y	Y	Y				Y	Y
	Over all cable	Y	Y	Y	Y	Y		Y	Y		Y		Y
	Cable Drums(IS-10418)				Y			Y					
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE				TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:				SUB-SECTION-E-54 INSTRUMENT CABLE				PAGE 1 OF 1	

Note : High Temp. cables shall be subjected to tests as per VDE-207(Part-6) Compensating cables shall be checked for Thermal EMF/Endurance test as per IS 8784.

Note : This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating his practice & Procedure along with relevant supporting documents during QP finalization for all items.

Note : ® - Routine Test A - Acceptance Test Y - Test Applicable

Note : Sampling Plan for Acceptance test shall be as per IS 8784 (As applicable)

- * FRLS Tests: Oxygen / Temp Index (ASTM D-2863), Smoke Density Rating (ASTM – D 2843), HCL Emission (IEC-754-1)
- ** Characteristic Impedance, Attenuation, Mutual Capacitance, Cross Talk (As applicable)

+ Sample size will be One No. of each size/type per lot.

++ Sample size will be One No. sample for complete lot offered irrespective of size/type.

SUB-SECTION–E-55

CONTROL VALVE

SUB-SECTION–E-56

ELECTRICAL ACTUATOR

CLAUSE NO.	QUALITY ASSURANCE													
	ELECTRICAL ACTUATOR WITH INTEGRAL STARTER													
	Test/Attributes Characteristics ITEM/ COPONENT/ SUB SYSTEM ASSEMBLY/ TESTING													
		RPM ®	No Load Current ®	IR & HV Test®	Mounting Dimension®	All routine Test as per Standard & Specification®	Correct Phase Sequence®	Operation & Setting of limit Switch/Torque Switch®	Stall Torque/Current (A)	Hand Wheel operation/ Auto de clutch function (A)	Function of Aux. like Potentiometer, space heater, position indicator ®	EPT output ®	Local/ Remote (Open-Stop-Close) Operation®	Safety check (Single phasing, Phase correction, Tripping etc.) (A)
	ELECTRICAL ACTUATOR with Integral Starter , Non-Intrusive Electrical Actuator (EN15714-2)													
	Motor	Y	Y	Y	Y	Y								
	Final Testing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the practices and procedure adopted along with relevant supporting documents. - SIL 2 certificate if applicable ® - Routine Test (A) - Acceptance Test Y - Test applicable													
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE				TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:				SUB-SECTION-E-56 Electrical Actuator with Integral Starter				PAGE 1 OF 1		

SUB-SECTION–E-57

PROCESS, CONNECTION & PIPING

CLAUSE NO.	QUALITY ASSURANCE														एनडीपीसी NTPC		
	Process, Connection & piping FOR C&I SYSTEMS																
	ITEMS	TESTS	Visual & Dimensions ®	GA, BOM, Layout of component & construction feature, Paint Shade/thickness ®	Flattening,flaring,hydrotest,hardness check as per ASTM standard (A)	Component Ratings ®	Wiring ®	Make, Model, Type, Rating®	IR & HV ®	Review of TC for instrument/devices (R)	Accessibility of TBs/Devices Illumination,grounding ®	Tubing ®	Leak/Hydro test(A)	Chemical/physical properties of material (A)	Proof pressure test,Dismantling & reassembly test,Hydraulic impulse and vibration test (R)	Tests as per standards & specification	
	Local Instrument enclosure	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y				
	Local instruments racks	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y				
	Junction Box	Y	Y*		Y		Y	Y		Y							
	Gauge Board	Y	Y		Y		Y		Y			Y	Y				
	Impulse pipes and tubes	Y		Y			Y							Y			
	Socket weld fittings ANSI B-16.11	Y					Y							Y		Y	
	Compression fittings	Y					Y						Y	Y	Y		
	Instrument valves & Valve manifolds	Y					Y						Y	Y			
	Copper tubings ASTM B75	Y						Y									Y
	*-applicable for painted junction boxes.																
	Note: R-Routine Test A- Acceptance Test Y – Test applicable																
	Note: This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.																
	SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE			TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:					SUB-SECTION-E-57 PROCESS CONNECTION & PIPING				PAGE 1 OF 1				

SUB-SECTION–E-58

SURVEILLANCE & COMMUNICATION SYSTEM

CLAUSE NO.	QUALITY ASSURANCE								एनटीपीसी NTPC
	Surveillance & Communication System, PLC, Fire ,LVS & Control Desk								
	Item Components Sub System Assembly	Attributes Characteristics							
		Make, Model, Type, Rating, BOM®	GA/ Dimension / Paint Shade & Thickness®	Functional / operational check®	Switching capability and sequence®	HV/ IR Test®	SPL level and Sweep test response®	PAN Range / Tilt Speed/Zoom	FAT / Integrated Function Test along with Other System
	IP Based PA System								
	Components- Call Stations, Amplifier, Loud Speaker, Master Control Unit, Acoustic Hood, Enclosure , Power Supply, LAN Switch, Server, Work Station, Storage, Software	Y	Y	Y	Y		Y		
	IP PA -Complete System	Y	Y			Y		Y	
	IP Based CCTV								
	Component- Camera, Keyboard, Joystick, Housing, Pan-Tilt Unit , LAN Switch, Server, Work Station, Storage, Software	Y	Y	Y	Y			Y	
	IP CCTV-Complete System	Y	Y			Y		Y	
	Large Video Screen	Y	Y	Y				Y	
	Modular Control Desk with draw-out console	Y	Y	Y		Y		Y	
	PLC (IEC-1131)	Y	Y	Y		Y		Y	
	Fire Detection System(EN-54 Pt-2/Pt-5/Pt-7, UL 268,UL 521, UL-864)	Y	Y	Y				Y	
	Note : 1) This is an indicative list of test/checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and procedure along with relevant supporting documents. R –Routine Test Y -Test Applicable								
	SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI BID DOC. NO-		Sub Section E-58 Surveillance & Communication System, PLC, Fire ,LVS & Control Desk			PAGE 1 OF 1	

SUB-SECTION–E-59

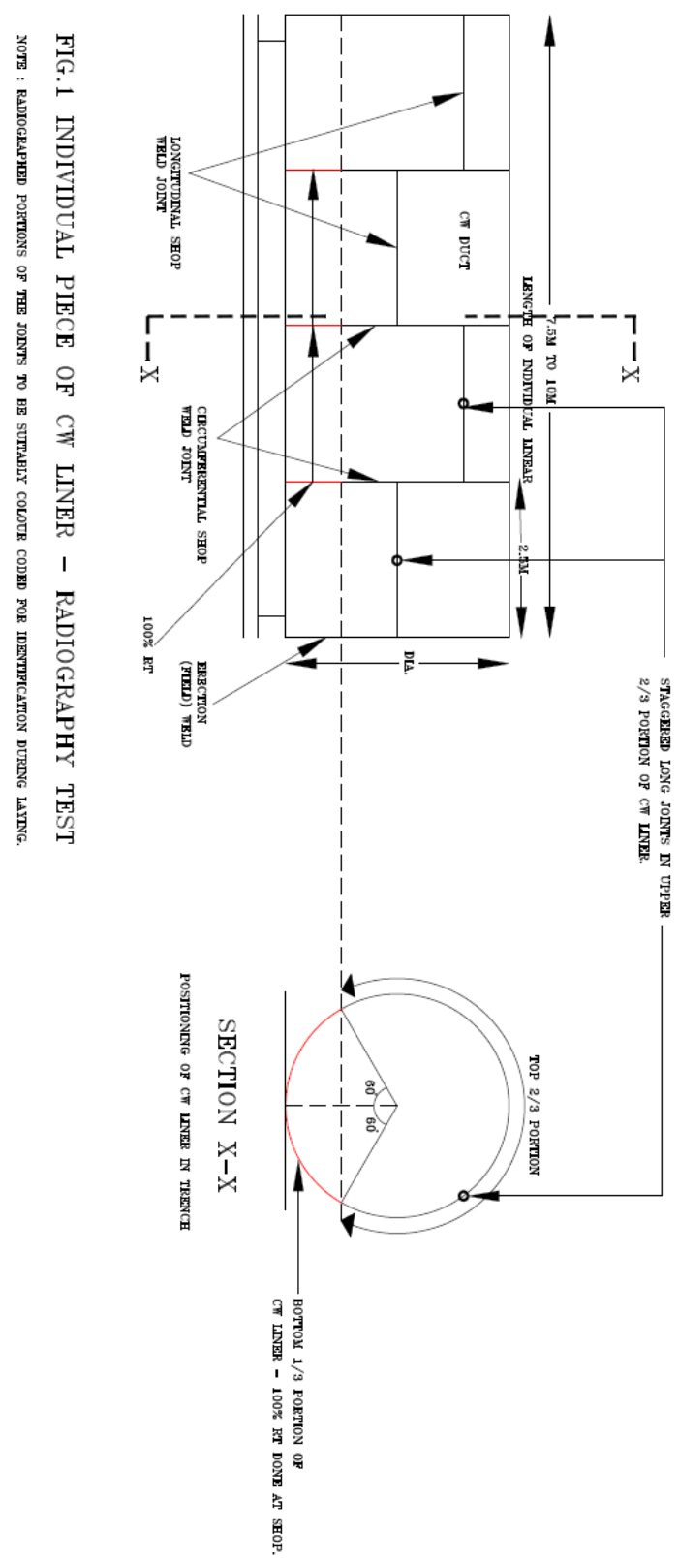
CIVIL WORKS

Clause No.	Quality Assurance		
1.0 a) b) 2.0 a) b) c) d)	 <u>QA CIVIL WORKS</u> SAMPLING AND TESTING OF CONSTRUCTION MATERIALS Before execution of any civil work the contractor shall conduct full-scale suitability tests on various construction and building material such as soil, fine and coarse aggregates, cement, construction chemicals, supplementary cementitious materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from reputed institutes such as NCCBM-Ballabgarh, CSMRS-Delhi, selected IIT's as agreed by the Employer. The test samples for such full-scale testing shall be jointly sampled and sealed by the Employer and contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance department (FQA) representative of the Employer. Format for sampling and testing of cement, coarse aggregate, fine aggregate, chemical admixture, fly ash, water, concrete mix design is enclosed at Annexure-I. The contractor shall timely initiate the action with regard to the evaluation of aggregates and other building material including concrete mix design, so as to ensure completion of these tests before start of civil works at site, thereby not affecting any project work. The test reports and recommendations for suitability of the materials including concrete mix design shall be promptly submitted by the contractor to the Engineer-in-charge (EIC)/Head of Field Quality Assurance (FQA) Department of Employer. LABORATORY AND FIELD TESTING The field laboratory for QA and QC activities shall be established and installed with the adequate facilities to meet the requirement of envisaged day to day tests during execution of the work. Temperature and humidity controls shall be available wherever necessary during testing of samples. The contractor shall furnish a comprehensive list of testing equipment/ instrument required to meet the planned/scheduled tests for the execution of works for EIC acceptance/ approval. 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. The tests which cannot be carried out/do not have facilities for testing in the field laboratory shall be done at Employer acceptable third-party testing laboratory. All equipment and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the EIC. The calibration certificates shall specify the fitness of the equipment and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment and instruments by NABL or such accrediting agency complying with ISO/IEC-17025 accreditation and the calibration reports shall be submitted to EIC for their review and acceptance. The QA and QC activities (include all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirements) in all respects as specified in the technical specifications/ drawings / data sheets / quality plans / relevant standard codes / contract documents shall be carried out at no extra cost to the Employer. The contractor shall carry out testing in accordance with the relevant IS/standards /codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the EIC.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION-E-59 QA CIVIL WORKS	Page 1 of 6

Clause No.	Quality Assurance		
	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: A) Approval conditions for procurement of structural steel sections through SAIL Conversion/Wet Leasing agent: 1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply. 2. Billets shall be procured from Employer approved Main Steel Producers. Proper records for traceability from raw material to final product shall be maintained. 3. 100% chemical analysis of the raw material (Billets) shall be carried out as per IS: 2830. Testing of one sample per 40 MT for each type of section or part thereof shall be carried out as per IS: 2062 on finished product. 4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). MTC of finished sections shall be correlated with original MTC for Billets received from Main Steel Producer and Manufacturer Test Report of chemical analysis of Billets mentioned at point no.3. MTC of finished sections shall include the reference of MTC for Billets from Main Steel Producer. 5. Employer will have access to carry out the surveillance checks for in-process stage. 6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer. In case of non-availability of certain size/s of steel tubes conforming to IS:1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from above acceptable primary steel producers, the same may be sourced from BIS approved sources having valid BIS license subject to the conditions given at point no. B) below: B) Approval conditions for procurement of Steel tubes conforming to IS: 1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from BIS approved sources: 1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply. 2. Raw materials shall be procured from Employer approved Main Steel Producers. 3. 100% chemical analysis of the raw material (steel) shall be carried out as per IS: 228. Testing of samples of steel tubes and hollow sections from each lot shall be carried out as per IS: 1161 & IS: 4923 respectively on finished product. 4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). 5. Employer will have access to carry out the surveillance checks for in-process stage. 6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer. The specific methodology to be followed for above procurement through conversion route/BIS approved sources route shall be subject to approval by Employer in advance.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION-E-59 QA CIVIL WORKS	Page 3 of 6

Clause No.	Quality Assurance			
5.0	CW LINER/DUCT			
	The following tests / checks shall be carried out for CW Liner works:			
	A. Fabrication Works			
	SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD	
	(I) CW Liner/ Pipes Fabricated using Steel Plates with Longitudinal & Circumferential Weld Joints at			
	i) Site (Field Shop) or			
	ii) Factory			
	Option-1			
	1.	WPS, PQR& welder's Qualification	100%	
	2.	DPT on root run	100% for pipes up to 1200mm diameter	
	3.	DPT after back gouging	100% for pipes above 1200 mm diameter	
	4.	UT	Not recommended.	
	5.	RT	5%	
	6.	DPT on finished butt welds	10%	
	7.	Hydro test	1.5 times the design pressure or 2 times the working pressure whichever is higher.	
	Option-2			
	1.	WPS, PQR& welder's Qualification	100%	
	2.	DPT on root run	100% for pipes up to 1200mm diameter	
	3.	DPT after back gouging	100% for pipes above 1200mm diameter	
	4.	UT	Not recommended	
	5.	RT	- 100 % RT on circumferential joints in the bottom 1/3 portion of CW liner for weld length as per Fig 1 - 5% RT on top 2/3 portion of circumferential joints and - 5% RT on longitudinal joints	
	6.	DPT on finished butt welds	10%	
	7.	Hydro test	No Hydro test	
(II) CW Liner/ Pipes Fabricated using H.R. coils with spiral weld joints at				
i) Factory				
1.	WPS, PQR& welder's Qualification	100%		
2.	DPT on root run	Not applicable		
3.	UT	Not recommended.		
4.	RT	5% RT		
5.	DPT on finished butt welds	10% DPT		
6.	Hydro test	Hydro test at 1.5 times the design pressure or 2 times the working pressure whichever is higher.		
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION-E-59 QA CIVIL WORKS	Page 4 of 6

Clause No.	Quality Assurance			
	SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD	
	B. Erection Works at site			
	Tests for CW Liner erection at site			
	1.	WPS, PQR& welder's Qualification	100%	
	2.	DPT on root run	100% for pipes unto 1200mm diameter	
	3.	DPT after back gouging	100% for pipes above 1200mm diameter	
	4.	UT	Not recommended.	
	5.	RT	5%	
	6.	DPT on finished butt welds	10%	
	7.	Hydro test	1.5 times the design pressure or 2 times the working pressure whichever is higher. In exceptional cases where hydraulic test is not possible the same may be substituted with 100% RT as per the instruction/discretion of EIC.	
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:		SUB-SECTION-E-59 QA CIVIL WORKS
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Clause No.	Quality Assurance एनडीपीसी NTPC
	 FIG.1 INDIVIDUAL PIECE OF CW LINER – RADIOGRAPHY TEST NOTE : RADIOGRAPHED PORTIONS OF THE JOINTS TO BE SUITABLY COLORED FOR IDENTIFICATION DURING LAYING.

CLAUSE NO.	Chapter name			एनटीपीसी NTPC		
	ANNEXURE - I Format of Request Letter for Evaluation of Materials Ref: _____ Date: _____ To, Sub.: <u>Evaluation of materials and concrete mix design</u> Dear Sir, We have awarded the work of _____ on M/s _____ vide our LOA No. _____ dated_____for execution of Civil Works. Based on provisions of contract, M/s _____ are expected to get the following tests/ evaluation done through your laboratory and accordingly the tests have been described below. M/s _____ have been advised to deposit the requisite evaluation/ testing charges and to deliver the test samples of quantities, specified below. 1. Evaluation of Cement: a) To carry out different physical tests on cement samples i.e. Blaine’s fineness, initial and final setting time, soundness and compressive strength at 3, 7 and 28 days as per IS: 4031 and drying shrinkage and specific gravity in case of PPC. b) To carry out chemical analysis of the cement samples as per IS: 4032, including the total alkali content of the cement (Na₂O equivalent). c) To advise the suitability of cement based on the test results of a) and b) above. 2. Evaluation of Aggregates: a) To carry out different tests on coarse aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material content (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale, Total of % of all deleterious materials), soundness, crushing value, impact value, abrasion value, elongation index and flakiness index, as per IS: 383 & IS: 2386. b) To carry out different tests on fine aggregate sample i.e. specific gravity, water absorption, sieve analysis, soundness, deleterious material content (coal & lignite, clay lumps, material finer than 75-micron sieve, soft fragment, shale, Total of % of all deleterious materials), silt content, organic impurities and mica content as per IS: 383 & IS: 2386. c) To prepare evaluation report based on test results of a) and b) above and to advise regarding suitability of fine and coarse aggregates to be used with the cement of 1) above. 3. Evaluation of Aggregates for Potential Alkali-Aggregate Reactivity: a) To carry out petrographic analysis and Alkali-Aggregate Reactivity as per IS 2386 (PART VIII & VII). b) If rock type is limestone, X-Ray diffraction test (XRD) shall be carried out to determine clay mineral in the rock for preliminary conclusions and to carry out repeated temperature cycle test to determine residual expansion of aggregate for concrete to be used in dynamic foundations like TG, Fans, mills, crushers etc. Additionally, Alkali carbonate reactivity test may be carried out wherein the parameters shall be reported in conjunction with the petrographic analysis.					
SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC.NO.:	SUB-SECTION E-59 QA CIVIL WORK	PAGE 1 OF 3			

CLAUSE NO.	Chapter name	एनटीपीसी NTPC																							
	c) To prepare a report based on test results of a) and b) above and to advise regarding suitability of aggregates to be used with the cement of 1) above and further testing required if any. 4. Evaluation of Flyash Sample (if applicable): a) To carry out various physical and chemical tests on fly ash sample i.e. Blaine's fineness, lime reactivity, specific gravity, loss on ignition and other chemical tests as per IS: 3812, conforming to grade-I. b) To advise the suitability of fly ash sample based on the test results of a) above. 5. Evaluation of water: To carry out various physical and chemical tests as per IS: 456 and IS:3025. 6. Evaluation of admixtures: To carry out various physical and chemical tests as per IS: 9103. Note: Test certificate shall be obtained from the supplier to compare the values given in Table 2 of IS: 9103 i.e. uniformity tests and requirements. 7. Concrete Mix Design: Based on the provisions of technical specification, the Following may be specified by site Construction department/Quality department ** a) For RCC Work i. Grade of concrete : ii. Slump required, mm : iii. Cement- Type and grade : iv. Max Size of Aggregates, mm: v. Exposure conditions : vi. Maximum water-cement ratio: vii. Minimum cement content : viii. Concrete admixture to be used or not (If yes, specify the brand/ type/batch no. of admixture) : ix. Fly ash to be used or not (If yes, indicate % of fly ash to be used): b) For PCC work: Same as i) to ix) of a) above a) For piling work (if required): Same as i) to ix) of a) above 8. Details of material sampled: In order to facilitate the above mentioned tests, specified quantities of samples have been collected and sealed jointly (by Employer – Quality department, Execution department and contractors' representative) is being sent for testing. The impression of seal has also been punched below. a) Quantity of material required for each mix-design: <table><tr><th>Sl. No.</th><th>Material Description</th><th>Quantity Required</th></tr><tr><td>i)</td><td>Cement</td><td>2 bags (sealed in double polythene bags)</td></tr><tr><td>ii)</td><td>Coarse Aggregates</td><td>100 Kg of each fraction as explained below: e.g.; If Maximum size of aggregates (MSA) is 20mm, then 100 Kg each of 20-10mm and 10mm down are required. If MSA is 40mm then 100Kg each of 40-20mm, 20-10mm and 10mm down are required.</td></tr><tr><td>iii)</td><td>Fine Aggregates</td><td>200Kg</td></tr><tr><td>iv)</td><td>Chemical Admixtures</td><td>2 Litres</td></tr><tr><td>v)</td><td>Water</td><td>100 Litres</td></tr><tr><td>vi)</td><td>Fly ash (If decided to be used)</td><td>100Kg</td></tr></table>				Sl. No.	Material Description	Quantity Required	i)	Cement	2 bags (sealed in double polythene bags)	ii)	Coarse Aggregates	100 Kg of each fraction as explained below: e.g.; If Maximum size of aggregates (MSA) is 20mm, then 100 Kg each of 20-10mm and 10mm down are required. If MSA is 40mm then 100Kg each of 40-20mm, 20-10mm and 10mm down are required.	iii)	Fine Aggregates	200Kg	iv)	Chemical Admixtures	2 Litres	v)	Water	100 Litres	vi)	Fly ash (If decided to be used)	100Kg
	Sl. No.	Material Description	Quantity Required																						
	i)	Cement	2 bags (sealed in double polythene bags)																						
	ii)	Coarse Aggregates	100 Kg of each fraction as explained below: e.g.; If Maximum size of aggregates (MSA) is 20mm, then 100 Kg each of 20-10mm and 10mm down are required. If MSA is 40mm then 100Kg each of 40-20mm, 20-10mm and 10mm down are required.																						
	iii)	Fine Aggregates	200Kg																						
	iv)	Chemical Admixtures	2 Litres																						
	v)	Water	100 Litres																						
	vi)	Fly ash (If decided to be used)	100Kg																						
	SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC.NO.:	SUB-SECTION E-59 QA CIVIL WORK	PAGE 2 OF 3																				

c)

Sl. No.	Material Description	Quantity Required
i)	Coarse aggregate	
a)	80-40mm	60Kg
b)	40-20mm	60Kg
c)	20-10mm	60Kg
d)	<10mm	60Kg
ii)	Fine aggregates	60Kg
iii)	Cement	2 samples (1 bag each), contemplated for use in construction.

** This line may be deleted in the letter sent to the institute.

INDICATIVE FIELD QUALITY PLAN										Annexure II	
SUPPLIERS NAME AND ADDRESS		ITEM : Civil Work		QP NO. : REV. NO. :		PROJECT: PACKAGE:		SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW) EPC PACKAGE			
		SUB-SYSTEM : GEOTECH INVESTIGATION, FOUNDATIONS, EXCAVATION & FILL, SITE LEVELLING, CONCRETE, ROAD, BUILDING ETC.		DATE :		CONTRACT NO. :					
				PAGE :		MAIN CONTRACTOR :					
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3		4	5	6	7	8	9	D*	10
1	GENERAL REQUIREMENTS										
A	Setting up of Field QA&QC laboratory, Availability of requisite laboratory set up and equipment in good working condition & duly calibrated well before commencement of concerned activity.		As agreed / required	B	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	The contractor shall establish the mobilize the requisite laboratory equipment/set up and skilled QA&QC manpower within 30 days from the mobilization date of Main contractor at site. Functioning & calibration status of laboratory equipment in proper working condition to be verified on monthly basis.
B	Submission of QA & QC manpower deployment schedule and availability of manpower		As agreed / required	B	Physical	Manpower shall be deployed progressively as per the work front and discipline wise progress	Tech Specs and Const. Drawings		SR	√	
C	Sampling for testing of construction materials (Coarse aggregate, fine aggregate etc.), materials for concrete mix design etc.		As agreed / required	A	Physical	Once per each source	Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations from Employer acceptable laboratories to be submitted to EIC/FQA head for their review and acceptance.
D	Submission of Monthly Test/QA reports/data		As agreed / required	A	Physical	Monthly	Tech Specs and Const. Drawings		SR/TR	√	
E	Stacking and storage of construction materials and components at site		As per IS:4082	B	Physical	Random in each week	Tech Specs and Const. Drawings, Manufacturer's guidelines and IS 4082		SR		
F	Survey										
	Construction of Bench Mark / Grid Pillars	To mark reference co-ordinate & elevation	As required / agreed	B	Physical	Each Bench Mark/ Grid Pillars	As per technical specifications/approved drawings		SR	√	Joint protocol for co-ordinate and elevation
2	EXCAVATION, FILLING/BACKFILLING AND COMPACTION WORKS										
2.1	Excavations-										
i		Nature, type of soil/rock before and during excavations	As agreed / required	B	Visual	Random	Tech Specs and Const. Drawings		SR		GTI report to be referred. In case of ambiguity localised GTI may be carried out or excavation samples to be send to NTPC acceptable Third party lab for determination of soil/rock strata.
ii		Initial ground level before start of excavations, shape, Dimensions of excavations & Side slope of final excavation and Final excavation levels.	As agreed / required	B	Measurement	100%	Tech Specs and Const. Drawings		SR	√	
2.2	Excavation in Hard Rock- If required										
i		Receipt, Storage, accountability of Explosive	As agreed / required	B	Physical	Random in each week	Indian Explosive Act 1940/all statutory norms, Tech Specs and Const. Drawings		SR	√	Employer approved specialist blasting agency such as CMRI, NIRM shall be deployed at site for trial blasts, design
ii		Execution of Blasting Operation	As agreed / required	B	Physical	Random in each shift	IS:4081, Tech Specs and Const. Drawings/		SR		blasts, blast vibration monitoring etc.
iii		Submission of Blasting report to EIC	As agreed / required	B	Physical	Each blast	Tech Specs and Const. Drawings			√	Seismographs shall be deployed at site for monitoring of blast operation vibrations.
iv		Excavation in Hard Rock (Blasting Prohibited)	As agreed / required	B	Physical	100%	As per approved drawing/ scheme, Tech Specs and Const. Drawings		SR	√	
2.3	Filling/ Backfilling										
i	Suitability of fill material	Grain size analysis, Organic Matter, Liquid Limit, plastic limit, Shrinkage limit & Free Swell Index and chemical analysis(like Organic Matter, Calcium carbonate, pH value, Total soluble sulphate etc.) as required in TS	As per IS: 2720	B	Physical	Once per each type of source or change of source subject to a min. of 2 samples	IS:2720 (Pt.IV), IS:2720 Pt.XXII, IS:2720 (Pt.XI)/relevant part, Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations regarding suitability of the fill material from NTPC acceptable laboratories to be submitted to EIC for review and acceptance. Geo technical investigation report may also be considered as basis for suitability of fill material if available as per the discretion of EIC.
2.4	Standard proctor Test	Optimum moisture content (OMC) and max. dry density (MDD) of filling/backfilling materials	As per IS: 2720	A	Physical	One in every 10000 cum for each type and source of fill materials	IS 2720 (Pt.VII), Tech Specs and Const. Drawings		SR/TR	√	

2.5	Compaction of Filling / Backfilling Works									
i	Moisture content	Moisture content of fill before compaction	As per IS: 2720	B	Physical	Random	IS 2720 (Pt.II), Tech Specs and Const. Drawings	SR/TR	✓	
ii		Dry density by core cutter method ---- OR---- Dry density in place by sand replacement method ---- OR---- any other method as per IS 2720	As per IS: 2720	A	Physical	i) For foundation back fill: one in every 10 foundations for each compacted layer. ii) For area filling: every 1000 SQM area for each compacted layer.	IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII)/ IS 2720 Relevant Part/ Tech Specs and Const. Drawings	SR / TR	✓	Number of readings for field density test may be decided by EIC according to the size of the soil bed which is subject to testing as the dry density of the soil varies appreciably from point to point. However, in no case, readings should be less than three as compaction result drawn out of less than three readings may give erroneous result.
iii		Relative density (Density Index)	As per IS: 2720	A	Physical	----do----- (I) & (ii) above	IS 2720 (Pt. XIV), Tech Specs and Const. Drawings	SR/TR	✓	
3	RAW MATERIALS FOR CONCRETE									
3.1	CEMENT									
i	Material	Physical and chemical properties as per relevant IS codes	As required/ agreed	A	Review of MTC/ test reports	for each manufacturing Week number	IS : 269/ IS:1489/ IS:455, Tech Specs and Const. Drawings	MTC	✓	To be procured from BIS approved source having valid BIS License. Each consignment of cement shall be duly correlated with manufacturers' TC.
ii		Testing of cement for Setting time (Initial & Final) and compressive strength	As per IS:4031	A	Physical	one for each manufacturing Week number	IS : 269/ IS:1489/ IS:455, Tech Specs and Const. Drawings	SR/Test Report	✓	Additionally, If the cement is stored more than 90 days in godown of contractor then the same shall be retested for Setting time & Comp. Strength.
3.1 b	Fly ash (if applicable)									
		Physical and chemical properties as per IS 3812 Part I (Table 1 and 2)	As per IS 3812 Part I	A	Physical	once in a week or change of source whichever is earlier	IS:3812 Part I and Tech. Spec./Design mix.	SR/Test Report	✓	Batching plant shall have facility for mixing of fly ash.
3.2	Coarse Aggregate									
i		Moisture content	IS:2386	B	Physical	To be done every day before start of work	IS : 456/IS : 383/IS: 2386 Part-III/Tech Spec	SR/LB	✓	During monsoon, frequency may be increased and accordingly water content in concrete will be adjusted.
ii		Sieve analysis, flakiness index, elongation index	IS:2386	B	Physical	One per 100 cum. or part thereof	IS: 2386 Part-I, IS:383 / Tech Spec	SR/LB/TR	✓	
iii		Specific gravity, Soundness, Water absorption, Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale, Total of % of all deleterious materials),	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS: 2386 Part-II, IS: 2386 Part-V, IS:456, IS:383/Tech Spec	SR/LB/ TR	✓	During Design mix, these tests may be carried out.
iv		Alkali aggregate reactivity and Petrographic examination	IS 2386	A	Physical	-do-	IS: 2386 (Part-VII/VIII), IS:383 Spec/ASTM C-1260 / ASTM 1293 /Tech	SR/LB/ TR	✓	
v		Crushing value, Abrasion value and Impact value	IS:2386	A	Physical	-do-	IS:383, IS-2386 Part IV/Tech Spec	SR/LB/ TR	✓	
3.3	Fine Aggregate									
i		Moisture content	IS:2386	B	Physical	To be done every day before start of work	IS : 456/IS : 383/IS: 2386 Part-III/Tech Spec	SR/LB	✓	During monsoon, frequency may be increased and accordingly water content in concrete will be adjusted.
ii		Sieve analysis, Silt content	As agreed / required	B	Physical	One per 100 cum. or part thereof	Tech Spec/ IS 2386 / IS 456/ IS 383	SR/LB/ TR	✓	
iii		Specific gravity, Soundness, Water absorption, Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale, Total of % of all deleterious materials (excluded mica as well as included mica content)), organic impurities	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS: 2386 Part-II, IS: 2386 Part-V, IS:456, IS:383/Tech Spec	SR/LB/ TR	✓	During Design mix, these tests may be carried out.
iv		Alkali aggregate reactivity and Petrographic examination	IS 2386	A	Physical	-do-	IS: 2386 (Part-VII/VIII), IS:383 Spec/ASTM C-1260 / ASTM 1293 /Tech	SR/LB/ TR	✓	

3.4	Water	Complete Testing as per IS:456-2000	As per IS:456	B	Testing	Once for each source and thereafter yearly in case of borewell. If water is used from open source like river, stream, canal etc., then water testing is to be done quarterly.	IS:456-2000/ Tech. spec.	TR	√	
3.5	Admixtures for Concrete	Material/Type of admixture and its suitability	As per IS:9103	A	Review of MTC/ test reports	For each lot received at site	As per Designed mix and IS:9103/ Tech. Spec.	Test Report/ MTC	√	
4	CONCRETING (MIXING, CONVEYING, PLACEMENT, COMPACTION, CURING & TESTING)									
4.1	Batching Plant (if installed)									
i		Calibration of Batching Plant		A	Physical	After initial setting up of batching plant, calibration by NABL accredited agency must be done before use of batching plant for production of concrete.	Review of calibration chart/ Certificate/IS 4925	Calibration Certificate	√	Additionally, Batching Plant shall be calibrated regularly at least once in a 3 months in-house. The weights for batching plant calibration to be calibrated once in year by NPL/NABL accredited lab./Weights & Measures Dept.
4.2	CONCRETE									
i		4 Trial mixes to ascertain the workability and cube strength	After receiving the recommended mix design	A	Physical	4 trial mix. for each mix proportion	Tech. Spec.,IS 456/IS 10262	SR/LB	√	The concrete for field trials shall be produced by methods of actual concrete production.
ii		Concrete Cube strength Test	IS:516	A	Physical	One set of 6 cubes per 50 Cum or part thereof for each grade of concrete per shift whichever is earlier.	IS:516, IS:456, Tech. Spec.	SR/LB/ TR	√	Min. of 6 cubes for each mix, 3 specimen shall be tested at 7 days & remaining 3 shall be for 28 days Comp. Strength.
iii		Workability - slump test	IS:1199	B	Physical	At the time of concrete pouring at site every two hrs.	IS:456/Tech. Spec.	SR/LB/ TR	√	
iv		Temperature Control of Concrete as per Tech. spec./IS standard	Thermometer	B	Physical	100%	Temperature as per technical specification/Relevant standard	SR	√	
v		Water Cement Ratio		B	Physical	For each batch of concrete	As per approved Design Mix	SR/Batch slip	√	
vi		Placement of concrete, Compacting, Curing	As required	B	Physical	At Random	IS:456, Period of curing as per IS 456	SR		
4.3	TESTS / CHECKS ON RCC STRUCTURE IN HARDENED CONDITION									
i		Visual inspection of concrete surface just after removal of shuttering	As agreed / required	B	Visual	100%	As per IS:456/ tech. Specification.	SR		
ii		Dimensional check on finished structures	As agreed / required	B	Measurement	100%	As per IS:456/ tech. Specification and Const. Drawings	SR/LB	√	
iii		Position and alignment of embedded parts and inserts	As agreed / required	B	Visual	100%	As per provisions and tolerances of equipment supplier, Tech Specs and Const. Drawings			
iv		Embedment of inserts in concrete shall be checked for gap if any using hammer for all dynamic foundations	As agreed / required	B	Physical	100%	As per Technical Specification	SR	√	No hollow sound
v		Submission of grouting / repair methodology to EIC for approval if concrete surface / position and alignment of embedded parts / inserts are found defective	--	B	Review and approval	once for each type of defect	As per provisions and tolerances, Tech Specs and Const. Drawings		√	
vi		UPV Tests on top deck of TG foundation, Columns & Other Foundations as per Technical Spec.	IS:13311/IS:516	A	Physical	As per Tech. Spec.	IS:13311/IS:516/As per Technical Specification	Test Report	√	
vii		Core Test	IS:516	A	Physical	As required by Employer EIC.	As per IS:456, IS 516	SR/LB/ TR	√	Compressive strength based on core test is required to be carried out in case of doubt regarding the grade of concrete used, either due to poor workmanship or based on the results of cube strength test as per 4.2 ii) above and as per discretion of EIC.
viii		Water Tightness Test of liquid retaining structure/ tanks	As required	A	Test	100%	IS:3370/ Tech. Specification	SR/LB	√	
5	REINFORCEMENT STEEL AND ITS PLACEMENT									
i	Material	Physical and chemical properties as per relevant IS codes and Tech spec.	As agreed/required	A	Review of MTC	Each batch/lot of delivery	As per IS 1786, IS 432, IS 1566, tech spec and cont. drawing	MTC	√	To be procured from Employer approved source.

ii		Freedom from cracks surface flaws, Lamination & excessive rust.	As agreed / required	B	Visual	Random in each shift	IS: 1852, IS:432, IS:1786, Tech Specs and Const. Drawings	SR		To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.
iii		Bar bending schedule with necessary lap, Spacers & Chairs	As agreed / required	B	Physical & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502	SR	√	
iv		Acceptance - disposition of cage w.r.t. reference axes, cover, spacing of bars, spacers and chairs after the reinforcement cage is put inside the formwork	Measuring tape & as required	B	Visual & Measurement	Random in each shift*	IS 456, Tech Specs and Const. Drawings	SR	√	* for foundations, frequency shall be Each foundation
6	FOUNDATION SYSTEM									
i		Foundation casting - Layout, Shape, dimensions, Reinforcement, concreting, curing etc.	As required / agreed	B	Physical	Each foundation	As per technical specifications and construction drawings	SR	√	lines and levels to be checked. Concrete Grade to be checked as per Mix Design
7	STAGING AND FORMS									
i		Materials and accessories	As agreed / required	B	Visual	Once before start of work	As per relevant IS, Tech Specs and Const. Drawings	SR		
ii		Soundness of staging, shuttering and scaffolding including application of mould oil / release agent	As agreed / required	B	Visual	Once before start of work	As per manufacturer's spec. and as per 3696,4014, 4990, Tech Specs and Const. Drawings	SR		
iii		Acceptance of formwork before start of concreting : disposition w.r.t. reference axes, size, etc.	Measuring tape & as required	B	Physical / visual	Before start of each concreting	As per provisions and tolerances in IS 456, Tech Specs and Const. Drawings	SR	√	
8	SLIPFORM SHUTTERING									
i		Submission of Slip form Work system to be used	As required / agreed	B	Submission	Before Commencement of work	As per specifications	SR	√	
ii		Check for the Slip form shutters	As required / agreed	B	Physical	Before Commencement of work	As per specifications	SR		Check for water level system, Controls, Walkways etc.
iii		Details Positions and arrangement of Jack rods	-	B	Approval	Before Commencement of work	As per specifications	SR	√	
iv		Details of Proposed arrangement for continuous readings	-	B	Approval	Before Commencement of work	As per specifications	SR	√	
v		Check for All type of openings, Chases, Fixing of Blocks and similar built-up features	As required / agreed	B	Physical	100% during execution	Construction Drawings and specifications	SR		No any type of openings ,chases , blocks other than shown in the construction drawings or approved by EIC shall be executed in the concrete.
vi		Details of proposed method for concrete curing and protection	-	B	Approval	Before Commencement of work	Construction Drawings and specifications	SR	√	Submitted to EIC for approval
vii		Check of Concrete Curing and Protection	As required / agreed	B	Physical	At Random	Construction Drawings and specifications	SR	√	Concrete shall not remain uncured for period longer than 12 hours
viii		Check for Sliding Operation & Monitoring of Sliding Portion	As required / agreed	B	Physical	Each Sliding	As per specifications	SR		Rate of Sliding, Delays in sliding, Discontinuity or stop start sliding to be checked
ix		Progress Height	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	To be recorded in tabular form and on graphs immediately after each monitoring
x		Centre line in relation to the centres at the base	As required / agreed	B/A	Physical	Min. once per shift/ Min. once per day	As per specifications	SR	√	
xi		Internal wall faces in relation to the concrete at the base	As required / agreed	B	Physical	Once per shift	As per specifications	SR		
xii		Wall thickness	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	
xiii		Twist	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	
xiv		Verticality of the structure	As required / agreed	B/A	Physical	Every day in morning/ Random	As per specifications	SR	√	
xv		Check for Tolerances for chimney construction	As required / agreed	B	Physical	For every day monitoring	As per specifications	SR	√	
9	EMBEDDED PARTS (INCLUDING LAYING OF RAILS & ANCHOR FASTENERS) --If Applicable.									
i		Material	As agreed / required	B	Review of MTC/ test reports	Each batch/lot of delivery	As per Tech Specs and Const. Drawings	SR/MTC	√	

i		Position / alignment / levels of embedded parts / bolt hole / pipe sleeves / rails / PVC pipes / etc. as per TS and construction Drg.	As agreed / required	B	Physical/ measurement	100%	As per Tech Specs and Const. Drawings	SR/ Protocol	√	Exposed surface of the embedded parts other than holding down bolts are to be painted with as per technical specifications.
ii		Welding / tying of embedment to reinforcement	As agreed / required	B	Physical/ measurement	Random in each shift	As per Tech Specs and Const. Drawings	SR		
10	JOINTS IN CONCRETE, DAMP PROOF COURSE									
i	JOINTS IN CONCRETE	Joint material - bitumen impregnated fibre board, PVC water stops, Sealing compound, Expanded polystyrene board, Hydrophilic strip, Acrylic polymer etc. (as given in technical spec)	As per manufacturer Standards	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings, IS 1838, IS 1834, IS12200	SR/MTC	√	
ii	DAMP PROOF COURSE	Material - Hot bitumen and water proofing materials etc. (as given in technical spec).	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings, IS 702	SR/MTC	√	
iii		Acceptance of installation of Joints material & Acceptance of damp proof course.	As agreed / required	B	Acceptance	Each installation randomly	Tech Specs and Const. Drawings		√	
11	GROUTING									
i		Material	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii		Compressive strength of grouting material before its use.	As agreed / required	A	Physical	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/LB/ TR	√	
iii		Compressive strength of cubes after grouting.	As agreed / required	A	Physical	Random	Tech Specs and Const. Drawings	SR/LB/ TR	√	
iv		Acceptance of the grouts : Mixing, placement, application and grout pressure (as applicable)	As agreed / required	B	Physical	Each grout section	Tech Specs and Const. Drawings	SR	√	
12	MASONARY WORKS									
12.1	Test on Bricks									
i		Compressive strength, water absorption, efflorescence.	As agreed / required	A	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings	SR/LB/ TR	√	
ii		Dimensions , shape, warpage.	As agreed / required	B	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings	SR/LB	√	Warpage test is applicable for facing bricks only as per IS:2691.
12.2	Modular aerated panel									
i	Material	As required	As agreed / required	A	Review of test report	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/LR	√	
12.3	Autoclaved Aerated Concrete (AAC) block									
i		Material	As agreed / required	B	Review of MTC	Each batch/lot of delivery	Tech Specs /IS 2185 Part III and Const. Drawings	SR/MTC	√	
ii		Compressive Strength and Density	As agreed / required	A	Physical	As per relevant IS Code/ One Sample for 10,000 nos. or part thereof	Tech Specs /IS 2185 Part III	TR	√	
iii		Dimensions, shape	As agreed / required	B	Physical	As per relevant IS Code/ One	Tech Specs /IS 2185 Part III	TR/SR	√	
12.4	Test on Mortar									
i	Sand	Grading	As agreed / required	B	Test	once per 100 Cum or part thereof	IS:2116	SR/LB	√	
ii		Compressive strength	As agreed / required	B	Test	At random	IS 2250-1981, Tech Specs and Const. Drawings	SR/TR	√	
12.5	Masonry construction	Workmanship, verticality and alignment	As agreed / required	B	Visual/ Physical	100%	IS 2212, IS 1905 , Tech Specs and Const. Drawings	SR/LB		
13	PLASTERING- MATERIAL AND WORKMANSHIP									
i	Sand	Deleterious Material	As agreed / required	B	Physical	Once per source	IS : 2386 (Part-I &II) & IS :2116, Tech Specs and	SR/TR	√	
ii		Grading	As agreed / required	B	Physical	50 Cum/or part thereof	Tech Specs and Const. Drawings	SR/TR	√	
iii		Silt content	As agreed / required	B	Physical	One per 100 cum., or part thereof	CPWD/ Tech Spec/ IS 2386/ IS 456/ IS 383	SR/LB/ TR	√	
iv	Stone grit plaster/ granular textured coat finish (if applicable)	Material	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	
v	Galvanised wire mesh (if applicable)	Galvanized hexagonal wire netting for lath plastering	As agreed / required	B	Review of MTC/ test reports	Each batch/lot of delivery at site	Tech Specs and Const. Drawings	SR/MTC	√	
vi		Thickness, Trueness and finishing of plaster, grooves etc.	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings	SR/LB	√	
14	PAINTING SYSTEM - CONCRETE WORKS (including Chimney) AND PLASTERED MASONARY SURFACES									
i	Materials and accessories- Oil Bound, Acrylic Emulsion, Chemical Resistant, Oil Resistant Paint etc. as applicable (as given in technical spec).	Shade, type from brand and manufacturer as approved by EIC.	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii	Surface preparation	As required	As agreed / required	B	Physical / visual	Random in each shift	Tech Specs and Const. Drawings	SR		

iii	Acceptance of painted surfaces	Shade, finish, WFT	As agreed / required	B	Physical/visual	Each surface at random	Tech Specs and Const. Drawings	SR	√	
14.2	PAINTING SYSTEM - STEEL WORKS (OTHER THAN STRUCTURAL STEEL WORKS)									
i		Painting Materials and accessories	-	A	Review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii		Surface preparation	As agreed / required	B	Physical / visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/	SR	√	
iii		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
v		Acceptance of painted surfaces : DFT, Finish, Shade	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
15	SHEETING, INSULATION & ALLIED WORK									
i		Material : Profiled Colour coated Metal Deck & Cladding sheets	As agreed / required	A	Review of CHP/ Test reports	Each lot received at site	Tech Specs and/ Const. Drawings/ profiled drawing	CHP/TR	√	Co-relation with CHP/TR (Video-jet printing or coil no. or any other means) may be verified with the lot received at site.
ii		Insulation material (other than Chimney insulation), galvanized wire net, aluminium foil, fasteners	As agreed / required	A	Review of MTC/ test reports	Each lot received at site	Tech Specs and/ Const. Drawings	SR / LB/MTC	√	All tests as per specification
iii		Insulation material (for Chimney insulation)	As agreed / required	A	Review of MTC/CHP/MDCC reports	Each lot received at site	Tech Specs and/ Const. Drawings	MTC/CHP/ MDCC/Insp ection report	√	
iv		Installation, lap alignment & workmanship.	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and/ Const. Drawings	SR		No gas cutting of colour coated sheets acceptable .
v		Finishing and acceptance	As agreed / required	B	Visual/ Physical	Each installation	Tech Specs and/ Const. Drawings	SR/LB	√	
16	DOORS , WINDOWS, VENTILATORS & GRILLS									
i	Steel doors	Materials & Check for shape tolerances thickness, welding & finishing of sections as per TS	As agreed / required	B	Visual/ Physical / test report	For each lot received at site	Tech Specs and Const. Drawings	SR / LB/TR	√	Review of test report
ii	Wood/Timber	Moisture content & anatomy	As agreed / required	A	Physical	For each lot received at site	Tech Specs and Const. Drawings/ IS 287	SR/LB	√	Tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun. Frequency of check may be decided by EIC based on quantity and requirement.
iii	Wood work in frames	Check for dimensions, surface finish	As agreed/ required	B	Physical	Random for each installation	Tech Specs and Const. Drawings	SR	√	
iv	Flush Door shutter	End emersion test, knife test, adhesion test	As agreed/ required	A	Review of MTC/test reports	For each lot received at site	IS 2202, Tech Specs and Const. Drawings	SR/MTC	√	The required tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun in addition to review of MTC/TR. Frequency of check may be decided by EIC based on quantity, requirement and IS 2202.
v	Particle Door		As agreed / required	A	Review of MTC/ test reports	For each lot received at site	IS:12823, Tech Specs and Const. Drawings	SR/MTC	√	The required tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun in addition to review of MTC/TR. Frequency of check may be decided by EIC based on quantity, requirement and IS 12823.
vi	Anodised aluminium works (Door & Window)	Materials- Aluminium sections, Coating	As agreed / required	A	Visual/ Physical / test report	For each lot received at site	IS: 1948, IS: 1949, IS:733, IS1285, IS:1868, IS:11857/ Tech Specs and Const. Drawings	SR / LB	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Anodization shall be as per Tech. Spec. Frequency of check may be decided by EIC based on quantity, requirement and relevant IS code.
vii	Fire proof doors	Material & Receipt inspection	As agreed / required	A	Review of MTC/ purchase order (unpriced copy) / drawings of suppliers / certificate of CBRI/CPRI/GOV. LAB. & Visual/ Physical/ Review of MTC	For each source & For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	The door drawing proposed for supply should have been tested and approved by CBRI Roorkee/CPRI/GOV. LAB. for the similar dimensions for minimum fire rating as required in Tech. spec.
viii	Rolling shutters	Surface finish and thickness of plate of approved make and DFT	As agreed / required	B	Physical / visual / review of MTC	Random for each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ix	Steel windows / Grills/ Louvre	Material fabrication and fixtures	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings	SR/MTC	√	

x	Doors / Windows Sections	Material - Rolled Steel, Z Sections, T-iron frames sections, Plates etc.	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
xi	Glass and glazing, Reflective toughened glass as per TS.	Material	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	IS: 14900, IS:1081, IS: 3548, IS:5437 Tech Specs and Const. Drawings	SR/MTC	√	
xii	Curved dome on roof/ Poly Carbonate Sheet	Materials - As per tech spec.	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Frequency of check may be decided by EIC based on quantity, requirement and Relevant IS code.
xiii	False Ceiling	Materials - As per tech spec.	As agreed / required	A	Review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Frequency of check may be decided by EIC based on quantity, requirement and Relevant IS code.
xiv		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
17	WATER PROOFING (Roof / Basement Treatment)									
i		Methodology for the application of water proofing system	As required	B	Review	for each type of treatment	Tech Specs and Const. Drawings	SR	√	
ii	Graded under bed	Levels / slopes	As required	C	Physical	100%	Tech Specs and Const. Drawings			
iii	Elastomeric coatings	Material- Primer coat, finishing coat	As required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iv	Wearing course	Materials - As per tech spec.	As required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
v		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings			
18	Fencing and Gates									
i	PVC coated chain link fencing (IS 2720), Welded wire mesh (IS 1566), Reinforced barbed tape galvanised (IS 2629) etc.	Materials	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
ii	Structural steel, painting system, caster wheel, ball and bearing, fixtures and fasteners	Materials	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iii		Alignments, erection painting, DFT etc. and acceptance of the installation and working	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings	SR	√	
19	FLOOR FINISHES AND ALIED WORKS									
i	Cement Concrete Flooring	Glass/ PVC strips in joints	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings	SR		
ii	Ceramic tiles, vitrified tiles, glass mosaic, acid alkali resistant tiles, heavy duty cement concrete tiles (Materials as per TS)	Materials	As agreed / required	B	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications. In case non-availability of MTC, sample to be tested as per relevant IS code.
iii	Interlocking Blocks	Materials	As agreed / required	A	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iv	Kota Stone, Granite and Marble	Materials: Quality, texture, thickness, colour for each lot of delivery	As agreed / required	B	Physical	Each lot of delivery	Tech Specs/ BOQ and Const. Drawings	SR/TR	√	
v	Metallic / non-metallic hardener	Material	As agreed / required	B	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	
vii	Acid / alkali and oil resistant high built seamless epoxy based resin and treatment	Material	As agreed / required	A	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	TR/MTC	√	work to be done by skilled manpower
		Surface preparation (as applicable)	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings, IS 2395			
viii	Rubber Flooring	Material	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings / IS 809	TR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
ix		Finishing and acceptance of all above BOI	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
20	WATER SUPPLY / SANITARY INSTALLATIONS									
i	Material	Sanitary items and fixtures i.e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes (GI/ MS/ SCI/ CI / RCC), manhole cover and frames, Over head / loft type etc. as per TS	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	
ii		leakage of pipes	As agreed / required	B	Physical	Each installation	Tech specs and const drawings	SR	√	
iii		Acceptance of installations of all sanitary items and fixtures	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings	SR		

20.2	RCC Pipes								
i	Material (As per TS)	RCC pipes	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MT C	√ To be procured from BIS Approved Sources having valid BIS License.
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR	
20.3	Water Storage Tanks								
i	Material (As per TS)	Over head / loft type	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MT C	√ To be procured from BIS Approved Sources having valid BIS License.
ii		Acceptance and leakage	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings	SR	
21.0	SPECIAL ITEMS								
21.1	Earthing Mat (Grounding System)								
i	Material (As per TS)	Earthing mat	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	As per relevant IS and Tech. Specs / Manufacturer's, IS 3043	SR/TR/MT C	√
ii		Weld sizes & length	Visual/Tape	B	Visual/ Measurement	100%	Tech Specs and Const. Drawings		Employer approved electrodes shall be used
iii		D P test	DP test Kit	A	Physical	10% at random of the offered lot	Tech Specs and Const. Drawings	TR	√
iv		Earth test	Earthing test kit	A	Physical	100%	Tech Specs and Const. Drawings,	SR/TR	√
21.2	Bitumen layer for tank foundation								
i	Material (As per TS)	Grade of bitumen	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	As per relevant IS and Tech. Specs /MTC	SR/MTC	√ APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii	Acceptance and workmanship	Application / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR	
21.3	Composite Aluminium Panels and structural glazing								
i	Material (As per TS)	Type of aluminium panels / structural glazing / fasteners and fixtures / silicon sealant	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Technical specifications / drawings	SR/TR/MT C	√ MTC shall cover all the properties / parameters as per technical specifications
ii	Acceptance and workmanship	Installation / workmanship	As agreed / required	B	Physical	Random	Technical specifications / drawings	SR	
21.4	Pressure Release Valves								
i	Material (As per TS)		As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Technical specifications / drawings	SR/TR/MT C	√
ii	Acceptance and workmanship	Acceptance / Installation / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR	√
21.5	ANTI WEED TREATMENT								
i	Material (As per TS)	Anti-weed treatment materials	As agreed / required	B	Review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/TR/MT C	√
ii		Execution of treatment	As agreed / required	B	Physical	Random check for each treatment	Tech Specs and Const. Drawings	SR	
23	PILING WORK (If Applicable)								
23.1	Execution								
i		Borehole diameter	As required	B	Physical	100%	As per appd. Drawings and technical specification	SR/LB	√
ii		Pile layout	Total station	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√
iii		Recording ground level and pile termination level	As required	B	Measurement	Random	As per appd. Drawings and technical specification	SR/LB	√
iv		Cleaning/Flushing of pile bore	As required	B	Measurement	Each pile	IS 2911/ Tech. Specs.	SR/LB	√
v		Size of bore and During boring of pile record commencement of SPT/ core recovery to ensure socketing length equivalent in terms of the Diameter of the pile below the socketing horizon.(if applicable)	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√
vi		Pouring of concrete to project above cut off level.	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√
23.2	Testing								
i		Bentonite	IS:2720	A	Physical / Test report	Once per lot	As per IS:2720, IS 2911/ tech. Specs.	MTC/TR	√ One sample from each source (brand/manufacturer) to be tested at Employer acceptable third party lab.
ii		Density check on sample of mud collected from pile bore bottom	IS 2911	B/A	Physical	Each pile/ Randomly 1 in 10 piles (i.e. 10%)	IS 2911/ Tech. Specs./approved PILING METHODOLOGY	SR/LB	√ Tests to be done before placing of concrete.
ii		Slump test of concrete	IS:1199	B	Physical	Every 2 hrs at pouring point of concrete	IS:2911, As per appd. Drawings and technical specification	SR/LB/TR	√

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i		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Atterberg limits	Atterberg limits determination	A	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iii		Moisture Content prior to compaction	As required / agreed	B	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Density of compacted Layer	As required / agreed	B	Physical	one test per 1000 sqm.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Deleterious Constituents	As required / agreed	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
vi		CBR	As required / agreed	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.3 Water Bound Macadam (WBM)										
i		Aggregate Impact Value	Aggregate Impact value Test Apparatus	A	Physical	One test per 1000 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 250 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iii		combined Flakiness and Elongation Indices	Flakiness & Elongation test gauge	B	Physical	One test per 500 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iv		Atterberg limits of binding material	Atterberg limits determination	A	Physical	One test per 50 cum of binding material	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Atterberg limits of screenings	Atterberg limits determination	A	Physical	One test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
23.4 Wet Mix Macadam (WMM) for base course and sub-base course										
i		Aggregate Impact value	Aggregate Impact value Test Apparatus	A	Physical	One test per 1000 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iii		Combined Flakiness index and elongation index	Flakiness & Elongation test gauge	B	Physical	One test per 500 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iv		Atterberg Limits of portion of aggregate passing 425 micron sieve	Atterberg limits determination	A	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Density of compacted Layer	As required / agreed	B	Physical	one set of three tests per 1000 sqm.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	Template, straight edge
23.5 Premix Bituminous Macadam (BM)										
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Aggregate Impact Value / Los Angeles Abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 200 cum of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Combined Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 350 cum for each source	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
v		Water absorption of aggregate	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vi		Water sensitivity of mix	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vii		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	

ix		Percentage of fractured faces	As required / agreed	B	Physical	one test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
x		Binder content	Bitumen extractor	A	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xi		Control of Temperature of binder and aggregate for mix and of the mix at the time of laying and rolling	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xii		Rate of spread of mixed materials	As required / agreed	B	Physical	At Regular Interval	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.6 Bituminous Concrete										
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73 or IRC:SP-53, IS-15462	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Aggregate Impact Value / Los angels abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 350 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 350 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Soundness Test (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
v		Water absorption of aggregate	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vi		Sand equivalent test	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vii		Plasticity Index	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
viii		Polished stone value	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
ix		Percentage of fractured faces	As required / agreed	B	Physical	One test per 350 cum of aggregate when crushed gravel is used	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
x		Mix Grading	Set of Sieves	B	Physical	One set for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xi		Stability and voids analysis of mix including theoretical maximum specific of loose mix	As required / agreed	B	Physical	Three tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xii		Moisture Susceptibility of mix (AASHTO T283)	As required / agreed	A	Physical	One test for each mix type whenever there is change in the quality or source of coarse or fine aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xiii		Temperature of binder in boiler, aggregate in dryer and mix at the time of laying and compaction	Thermometer	B	Physical	At regular intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xiv		Binder content	Bitumen extractor	A	Physical	One set for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xv		Rate of spread of mixed materials	As required / agreed	B	Physical	After every 5th truck load	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xvi		Density of compacted Layer	As required / agreed	A	Physical	One test per 700 Sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	

		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR	Template, straight edge	
23.7	Premix surfacing and Seal coat									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	✓ APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES	
ii		Aggregate Impact Value / Los Angeles Abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 200 cum of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
iii		Combined Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 100 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
v		Water absorption of aggregate	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
vi		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
vii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
viii		Polished stone value	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
ix		Temperature of binder at application	Thermometer	B	Physical	At regular interval	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
x		Binder Content	Bitumen extractor	A	Physical	Two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
xi		Percentage of fractured faces	As required / agreed	B	Physical	One test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
23.8	Tack Coat/ Prime coat									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓ APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES	
ii		Binder temperature for application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
iii		Rate of spread of binder	As required / agreed	B	Physical	Three tests per day	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
23.9	RCC pavement/ PQC/ Geopolymer Concrete									
	Quality checks for Materials used for Pavement concrete		As per Table 900-6 of MORTH Spec.							
	Quality checks for concrete used for Pavement concrete		As per Table 900-6 of MORTH Spec.							
23.10	Alignment, Level, Surface regularity and rectification									
i		Horizontal alignment, Surface levels and Surface regularity	As required / agreed	B	Physical	As per section 900 of MOSRTH specification	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR		
ii		Rectification	As required / agreed	B	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	✓	
		LEGENDS : * Records identified with tick (✓) shall be essentially included by supplier in QA documentation. # Class A : Critical, Class B : Major, Class C : Minor. Class 'A' checks shall be witnessed by Employer FQA and Execution Engineer, Class 'B' checks shall be witnessed by Employer Execution Engineer, Class 'C' checks shall be witnessed by Main contractor engineer. CLASS 'A' & 'B' CHECKS SHALL BE NTPC CHP STAGE. SR - Site Register, TR- Test Report, LB-Log Book, IR - Inspection Report, MTC - Manufacturer's Test Certificate. Surveillance of Class 'A' checks shall be perform By Employer Head (FQA), Class 'B' by Employer FQA Engineer and for class 'C' Another Executing Engineer authorised by Head (Executing Deptt). Note: Any non conformity/ deviation to the Quality plan must be brought to notice of NTPC/Employer. Dispositioning authority shall be the authorised representative of NTPC/Employer.					For Employer Use	Employer DOC NO. :		
Main-supplier							 A Maharatna Company	REVIEWED BY	APPROVE D BY	APPROVAL SEAL

SUB-SECTION–E-60

INDICATIVE VENDOR LIST

Disclaimer for Indicative Vendor List

- 1.1 Reasonable efforts have been made to collate the sub-vendors proposed by the various main contractors from time to time against different Projects/Packages and accepted by NTPC for various items. 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.
- 1.2 The approved sub-vendor list drawn is not based on NTPC driven enlistment process but based on the sub- vendors proposed by various Main Contractors. As such, it is possible that some of the Suppliers/Manufacturers who may be involved in similar work/process may not be appearing in the list as such sub-vendors may not have been proposed by Main Contractors against NTPC Contracts.
- 1.3 In case the successful bidder chooses to propose additional sub-vendors with relevant experience after the award of the contract such sub-vendors will be considered in terms of Clause no: 19.1 of GCC, provided the proposals are received sufficiently in time: 90 days prior to ordering date of a Bought Out Items/Start of Manufacturing so as not to impede the progress of the contract.
- 1.4 Sub-vendors have been grouped under different categories of items. It is possible that an item characterized by certain specific features such as range and type required as per Main Contractor's design requirements may not be in the range of the listed sub-vendor's manufacturing process/capability. As such the main contractor to ascertain the vendor's capability to meet his specific requirements before considering a sub-vendor.

SIPAT STPP STAGE-III (1 X 800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- E-60 INDICATIVE VENDOR LIST	Page 1 of 2

- 1.5 It is to be noted by the bidders that any shortfall in contract performance attributable to the sub-vendor listed will not absolve the contractor from his contractual obligations in any manner.
- 1.6 The approval was granted based on the evaluation of relevant capabilities and facilities possessed by the sub-vendor at the time of evaluation. Also, some of the sub-vendors may not be active. As such, the successful bidder is to carry out his own due diligence before considering the listed sub-vendor for subletting: the current status of the sub-vendor, the continued availability of productive resources including Human Resources.
- 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.
- 1.8 In the post award during detailed engineering, Main contractor to take up with sub vendors and ensure/verify approval conditions of NTPC/Owner before placing the orders.

SIPAT STPP STAGE-III (1 X 800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- E-60 INDICATIVE VENDOR LIST	Page 2 of 2

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.:	
		Package/ पैकेज: EPC PACKAGES							REVISION NO : 00	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 02.05.2023	
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
1	RAPH	I			REFER SUB QR ITEM LIST Refer Note 1				STATIC COMPONENTS, ROTATING COMPONENTS, GUIDE/SUPPORT BEARINGS-NTPC APPROVED VENDORS	
2	FD, PA & ID FANS	I			REFER SUB QR ITEM LIST Refer Note 1				STATIC, ROTATING COMPONENTS AND BLADES - NTPC APPROVED VENDORS	
3	COAL MILL	I			REFER SUB QR ITEM LIST Refer Note 1				MILL COUPLING, PGB, GRINDING ROLLS, BULL RING SEGMENTS, MILL HOUSING, SEPARATOR AND OTHER MAIN COMPONENTS - FROM NTPC APPROVED SOURCES	
4	ESP	I			REFER SUB QR ITEM LIST Refer Note 1				COLLECTING ELECTRODE, EMITTING ELECTRODE - NTPC APPROVED VENDORS	
5	GRAVIMETRIC COAL FEEDERS	I			REFER SUB QR ITEM LIST Refer Note 1					
6	RECIRCULATION PUMP	I			REFER SUB QR ITEM LIST Refer Note 1					
7	AUXILIARY BOILER	I			REFER SUB QR ITEM LIST Refer Note 1					
8	ESP SUPPORT STRUCTURE (AUTO WELDED COLUMNS & ROOF BEAMS)	I			NTPC APPROVED SOURCES		A		REFER BOILER STRUCTURE LIST	
9	SEAMLESS TUBES	\$			VALLOUREC & MANNESMANN TUBES	FRANCE, GERMANY	A		CS & AS T-11, T-22, T-23, T-91, T-92	
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	DALMINE, ITALY	A		CS & AS T-11, T-22	
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	SILCO, ROMANIA	A		CS & AS T-11, T-22, T-23, T-91	
		\$			TENNARIS GLOBAL SERVICES SA,URUGUAY	NKK TUBES, JAPAN	A		CS & AS T-11, T-22, T-91	
		\$			MAHARASHTRA SEAMLESS LTD	RAIGAD	A		CS HOT FINISHED OD:21.0 MM TO 168.3 MM WT: 2.0 MM TO 20.0 MM COLD FINISHED OD:19.0 MM TO 88.9 MM WT: 1.0 MM TO 12.0 MM	
		\$			IBF S.P.A	ITALY	A		CS & AS T-11, T-12, T-22, T-91	
		\$			JFE STEEL CORPORATION	JAPAN	A		CS & AS T-11, T-22, T-23, T-91, T-92	
		\$			TUBOS REUNIDOS INDUSTRIAL, S.L.U	SPAIN	A		CS & AS T-11, T-22, T-23, T-91, T-92	

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.:	
		Package/ पैकेज: EPC PACKAGES							REVISION NO : 00	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 02.05.2023	
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
		\$			JINDAL SAW LIMITED	NASHIK	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 33.4 MM TO 168.3 MM WT: 3.5 MM TO 21.95 MM COLD FINISHED OD: 6.0 MM TO 140.0 MM WT: 0.8 MM TO 15.0 MM	
		\$			REMI METALS GUJARAT LTD	BHARUCH	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 28.6 MM TO 177.8 MM WT: 3.0 MM TO 28.0 MM COLD FINISHED OD: 9.0 MM TO 127.0 MM WT: 1.6 MM TO 20.0 MM	
		\$			WAYMAN GORDAN	USA	A		CS,T11,T12,T22,T91	
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		CS,T-11, T23, T-22, T-91 & T-92	
		\$			HEAVY METALS & TUBES LTD	AHMEDABAD	A		CS HOT FINISHED UP TO OD: 76.2 MM AND WT:12.0 MM	
		\$			PRODUCTOS TUBULARES,	SPAIN	A		CS & AS T-11, T-22. T-23. T-91	
		\$			ISMT	AHMEDNAGAR,B ARAMATI	A		CS, T11, 12, 22 HOT FINISHED OD: 38.0 MM TO 273.0 MM WT: 3.5 MM TO 40.0 MM COLD FINISHED OD: 18.0 MM TO 140.0 MM WT: 1.5 MM TO 15.0 MM	
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		CS, T-11, T-22, T23, T-91, & T-92	
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		CS, T-11, T23, T-22, T-91 & T-92	
		\$			BHEL SSTP	TRICHY	A		CS, T-11, T-12, T-22	
10	SEAMLESS TUBES(RIFFLED)	\$			SALZGITTER MANNESAMANN PRECISION	FRANCE	A		CS	
11	SEAMLESS TUBES(SS)	\$			KOBE SPECIALITY STEEL CO LTD	JAPAN	A		SS304, SS347H	
		\$			SMST	ITALY	A		SS304, 347H, SUPER 304	
		\$			TUBACEX	SPAIN	A		SS304, 347H, SUPER 304	
		\$			PASCO SPL STEEL CO.	SOUTH KOREA	A		SS304, 347H, SUPER 304	
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		SS 304, SS347H, SUPER 304 OD UP TO 114.3 MM	
12	SEAMLESS PIPES	\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	DALMINE, ITALY	A		CS & AS P-11, P-22, P-91	

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO./ दस्तावेज सं.:	
		Package/ पैकेज: EPC PACKAGES				AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची			REVISION NO : 00	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 02.05.2023	
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
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		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	SILCO, ROMANIA	A		CS & AS T-11, T-22, T-91 UPTO DIA 159 MM	
		\$			TENNARIS GLOBAL SERVICES SA,URUGUAY	NKK TUBES, JAPAN	A		CS & AS T-11, T-22, T-91	
		\$			VALLOUREC & MANNESMANN TUBES	FRANCE, GERMANY	A		CS & AS P-11, P-22, P-91. P-92	
		\$			TUBOS REUNIDOS INDUSTRIAL, S.L.U	SPAIN	A		CS & AS P-11, P-22, P-91	
		\$			ISMT	AHMEDNAGAR, BARAMATI	A		CS, T11, 12, 22 HOT FINISHED OD: 38.0 MM TO 273.0 MM WT: 3.5 MM TO 40.0 MM COLD FINISHED OD: 18.0 MM TO 140.0 MM WT: 1.5 MM TO 15.0 MM	
		\$			REMI METALS GUJARAT LTD	BHARUCH	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 28.6 MM TO 177.8 MM WT: 3.0 MM TO 28.0 MM COLD FINISHED OD: 9.0 MM TO 127.0 MM WT: 1.6 MM TO 20.0 MM	
		\$			VALCONVY TRUB CHOMUTOV,	CZECH REPUBLIC	A		CS & P-12 & P-22	
		\$			ARCELORMITTAL TUBULAR PRODUCTS ROMAN S.A	ROMANIA	A		CS	
		\$			WAYMAN GORDAN	USA	A		CS & AS P-11, P-22, P-91	
		\$			MAHARASHTRA SEAMLESS LTD	RAIGAD	A		CS HOT FINISHED OD:219.1 MM TO 355.6 MM WT: 6.35 MM TO 35.1 MM COLD FINISHED OD:19.0 MM TO 88.9 MM WT: 1.0 MM TO 12.0 MM	
		\$			PRODUCTOS TUBULARES,	SPAIN	A		CS & AS P-11, P-12, P-22, P-91	
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		CS & AS P-11, P-22, P-91 & P-92	
		\$			TENNARIS GLOBAL SA, URUGUAY	NKK TUBES, ITALY	A		P-91, P-22, P-11, P12, CS	
		\$			JINDAL SAW LIMITED	NASHIK	A		CS, T11, 12, 22 HOT FINISHED OD: 33.4 MM TO 168.3 MM WT: 3.5 MM TO 21.95 MM COLD FINISHED OD: 6.0 MM TO 140.0 MM WT: 0.8 MM TO 15.0 MM	
		\$			IBF S.P.A	ITALY	A		P-92, P-91, P-22, P-11, P12, CS	
		\$			JFE STEEL CORPORATION	JAPAN	A		P-92, P-91, P-22, P-11, P12, CS	
		\$			BHEL SSTP	TRICHY	A		CS	
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		P-11, P-22, P-91, P-92 UP TO OD 160 MM	

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		\$			RINGMILL SPA	ITALY	A		CS OD UP TO 914 MM & WT UP TO 102 MM & AS P-91	
		\$			FORGIATURA MORANDINI SRL	ITALY	A		CS & AS P-11, P-22, P-91 & P-92	
13	PLATES AND ROLLED SECTION (CS & AS EXCLUDING CS- IS:2062 GRADES)	\$			INDUS STEEL	BELGIUM	A		CS-SA515 AS UP T0 GR-91	
		\$			ILSENBURGER GROBBLECH	GERMANY	A		CS-SA 299, SA515, BS EN 10025, AS UP TO GRADE 91	
		\$			DILLINGER-GTSVENTES	GERMANY	A		CS-SA 299, SA515, BS EN 10025, A36, AS UP TO GRADE 91	
		\$			SIJ ACRONI D.O.O., SLOVENIA	SLOVENIA	A		CS- SA515, BS EN 10025, A36, AS UP TO GRADE 91	
		\$			THYSSENKRUPP	GERMANY	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			INDUSSTEEL LOIRE	FRANCE	A		CS-SA 299, SA515; AS UP TO GRADE 22	
		\$			ARCELLOR MITAL NIPPON STEEL (Formerly ESSAR Steel)	HAZIRA	A		CS- SA515, BS EN 10025, A36, AS GRADE 12 &22	
		\$			VOESTALPINE GROBBLECH GMBH	AUSTRIA	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			SAIL	BHILAI/SALEM	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			NIPPON STEEL	JAPAN	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			POSCO	SOUTH KOREA	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			REINER BRACH GMBH & CO.	GERMANY	A		CS- SA 299 SA515 BS EN 10025 A36, AS UP TO GRADE 22	
		\$			LLYODS STEEL INDUS LTD	INDIA	A		ALLOY STEEL PLATES AS PER A-204 & A-387 UPTO THICKNESS OF 40MM FOR STRUCTURAL STEEL APPLICATION , IN NON-PRESSURE PARTS.	
14	PLATES & ROLLED SECTION (CS-IS 2062 STRUCTURAL STEEL GRADES)	\$			REFER TO SUB-VENDORS MENTIONED IN THE TECHNICAL SPECIFICATIONS SEC-VI, PART-B		A			
15	PLATES(SS)	\$			OUTOKUMPU	SWEDEN	A		SS PLATES UP TO 20 MM THK	
		\$			INDUSSTEEL	BELGIUM	A		GRADE-304,309,310,316	

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		\$			JSL STAINLESS	JAIPUR	A		LINER SS 304	
		\$			INDUSSTEEL LOIRE	FRANCE	A		GRADE-304,309,310,316	
		\$			SAIL	BHILAI/SALEM	A		GRADE-304,309,310,317	
		\$			COLUMBUS STAINLESS STEEL	SOUTH AFRICA	A		GRADE-304,309,310,318	
16	SEPARATOR & STORAGE TANK	I			ALSTOM	USA	A			
		I			BHEL	TRICHY	A			
		I			GE INDIA	DURGAPUR	A			
		I			DOOSAN	SOUTH KOREA	A			
		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A			
17	HEADERS AND SUCTION MANIFOLDS	I			ALSTOM	USA	A			
		I			BHEL	TRICHY	A			
		I			GE INDIA	DURGAPUR	A			
		I			DOOSAN	CHENNAI	A			
		I			DOOSAN VINA	VIETNAM	A			
		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A			
18	SPIRAL WATER WALLS	I			BHEL	TRICHY	A			
		I			GE INDIA	DURGAPUR	A			
		I			ALSTOM	USA	A			
		I			DOOSAN	CHENNAI	A			
		I			DOOSAN VINA	VIETNAM	A			
		I			DOOSAN	SOUTH KOREA	A			
19	TUBULAR PRODUCTS(COILS & PANELS) EXCLUDING SPIRAL WALLS	I			GE INDIA	DURGAPUR	A			
		I			BHEL	TRICHY	A			
		I			ALSTOM	USA	A			
		I			DOOSAN	CHENNAI	A			
		I			DOOSAN VINA	VIETNAM	A			
		I			DOOSAN	SOUTH KOREA	A			
		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A			
		I			MHI	JAPAN	A			
20	CRITICAL PIPING /PCP(MS, CRH, HRH, FW) AND BOILER PIPING	I			BHEL	TRICHY, THIRUMAYAM	A			
		I			GE INDIA	DURGAPUR	A			
		I			DOOSAN	SOUTH KOREA	A			

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		I			BHR	GERMANY	A			
		I			DEE DEVELOPMENT	PALWAL	A			
		I			BENTEC	USA	A			
		I			L&T PIPING CENTRE	HAZIRA	A			
		I			SEONGHWA IND CO LTD	SOUTH KOREA	A			
21	MISC HP PIPING EXCLUDING CRITICAL PIPING(CS, AS UP TO GRADE 91)	I			BHEL	TRICHY	A			
		I			GE INDIA	DURGAPUR	A			
		I			DOOSAN	SOUTH KOREA	A			
		I			BHR	GERMANY	A			
		I			DEE DEVELOPMENT	PALWAL	A			
		I			BENTEC	USA	A			
		I			L&T PIPING CENTRE	HAZIRA	A			
		I			SEONGHWA IND CO LTD	SOUTH KOREA	A			
		I			PAL ENGG	YAMUNANAGAR	A			
22	MISC HP PIPING EXCLUDING CRITICAL PIPING(CS, AS UP TO GRADE 22)	I					A		ABOVE MENTIONED PIPING VENDORS ARE ALSO ACCEPTABLE	
		I			ISGEC	YAMUNANAGAR	A		UP TO GRADE 22	
		I			UNITECH MACHINES LTD	SAHARANPUR	A		ONLY FOR CS GRADE	
		I			BEND JOINTS PVT LTD	BHOPAL	A		ONLY FOR CS GRADE	
		I			SEAM INDUSTRIES PVT LTD	NAGPUR	A		ONLY FOR CS GRADE	
		I			S&G	PALWAL	A		CS & AS UP TO GRADE 22 (EXCEPT BOILER PIPING & CRITICAL PIPING)	
		I			FLASH FORGE	VISAKHAPATNA M	A		ONLY FOR CS GRADE	
23	MIXING SPHERES	I			GE INDIA	DURGAPUR	A			
		I			BHEL	TRICHY	A			
		I			ALSTOM	USA	A			
		I			DOOSAN	SOUTH KOREA	A			
24	COAL BURNER ASSY & SOFA/OFA PORT/AA PORT	I			ALSTOM	USA	A			
		I			BHEL	TRICHY	A			
		I			DOOSAN	SOUTH KOREA	A			

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		I			L&T-MHPS PVT LTD	HAZIRA	A			
		I			DEE DEE ENGINEERING ENTERPRISES	TRICHY	A			
25	AIR COOLED OIL GUN ASSEMBLY	I			BHEL	TRICHY	A			
		I			SIGMA POWER	TRICHY	A			
		I			DOOSAN	SOUTH KOREA	A			
26	HFO/LFO PUMPS									
		I			ALEKTON	CHENNAI	A			
		I			UT PUMPS	FARIDABAD	A			
		I			ROTO PUMPS LTD.	GREATER NOIDA	A			
		I			ALLWEILER INDIA PVT.LTD.	GERMANY	A			
		I			BOURMANN	GERMANY	A			
		I			TUSHACO PUMPS PVT LTD/ALLWEILER INDIA PVT.LTD.	DAMAN	A			
		I			LEISTRITZ PUMPEN GmbH	GERMANY	A			
		I			KRAL	AUSTRIA	A			
27	SOOT BLOWERS(LRSB, WALL DESLAGGER, ROTARY BLOWER, TEMP PROBE)	I			BHEL	TRICHY	A			
		I			CLYDE BERGMANN	NOIDA	A		UNDER THE SUPERVISION OF M/S CLYDE BERGMANN, GERMANY	
		I			CLYDE BERGEMANN	GERMANY	A			
		I			DIAMOND POWER SPECIALITY LTD	SCOTLAND	A			
		I			DAIEYOUNG MACHINERY	KOREA	A			
28	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE	I					A		MAIN BOIS E.G. HOOK, MOTORS AND CRITICAL C&I ITEMS TO BE FROM NTPC APPROVED SOURCES	
		I			CONSOLIDATED HOISTS	SATARA	A		EOT CRANES UPTO 40 MT & HOISTS ABOVE 35 MT	
		I			REWA INDUSTRIES	FARIDABAD	A		EOT CRANES UPTO 25 MT	
		I			GRIP ENGINEERS	HYDERABAD	A		HOIST UPTO 40 MT	
		I			POWER BUILD PVT LTD,	V V NAGAR	A		HOIST UPTO 10 MT	
		I			UNIVERSAL HOIST	THANE	A		HOIST UPTO 20 MT	
		I			ARMSEL MHE PVT LTD	BANGALORE	A		UP TO 20 MT	

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		I			ANUPAM INDUSTRIES	VITHAL, UDYOGNAGAR	A		EOT CRANES UPTO 50 MT	
		I			TRACTOR TRIFOR	FARIDABAD	A		HOIST UPTO 35 MT	
		I			CONSOLIDATED HOISTS	PUNE	A		HOISTS UPTO 20 MT	
		I			DYNAMECH CRANES	THANE , MUMBAI	A		UP TO 20 MT	
		I			HERCULES HOIST LTD.	MUMBAI	A		HOIST UPTO 30 MT	
		I			NAMSUNG MACHINERY	SOUTH KOREA	A		UP TO 25 MT	
		I			CENTURY CRANES	PALWAL	A		EOT CRANES UP TO 30 MT	
		I			MUKUND	PUNE	A			
		I			Mangla Hoist	India (Greater Noida)	A		UPTO 10 MT	
29	LP CONDENSATE PUMP	I			ITT GOULD	USA	A			
		I			FLOW SERVE	USA	A			
		I			SULZER	NAVI MUMBAI	A			
		I			CLYDE PUMPS	GHAZIABAD	A			
		I			PUMPSENSE FLUID ENGG. PVT. LTD	HOWRAH	A			
30	SCANNER AIR FAN	I			ANDREW YULE CO. LTD	NADIA	A			
		I			ACCEL	AHMEDABAD	A			
		I			PATEL AIRTEMP (I) LTD	GANDHINAGAR	A			
		I			BHEL	RANIPET	A			
		I			CB DOCTOR(IMM)	AHMEDABAD	A			
		I			AIROCHEM ENGINEERING COMPANY	KOLHAPUR	A			
		I			FLAKEWOOD INDIA	CHENNAI	A			
		I			TLT ENGG. PVT. LTD.,	MEHSANA	A			
31	SEAL AIR FAN	I			CB DOCTOR & CO.	AHMEDABAD	A			
		I			ACCEL	AHMEDABAD	A			
		I			TLT INDIA PVT. LTD.,	MEHSANA	A			
		I			PATEL AIRTEMP (I) LTD.,	GANDHINAGAR	A			
		I			BHEL	RANIPET	A			
		I			ANDREW YULE CO. LTD.,	KALYANI NADIA	A			
		I			FLAKTWOOD	SWEDEN	A			
		I			FLAKEWOOD INDIA	CHENNAI	A			
		I			DRAFT AIR/CHICAGO BLOWERS	AHMEDABAD	A			
		I			REITZ INDIA	CHENNAI	A			

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S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
		I			Howden Solyvent (India) Pvt. Ltd	Kanchipuram	A			
		I			NADI AIR TECH P LTD	CHENNAI	A			
32	FURNACE MAINTENANCE PLATFORM(SKY CLIMBER)	I			NY SKYMAN INT. SA	BELGIUM	A			
		I			NV SKCLIMBER EUROPE SA	BELGIUM	A			
		I			DAEO PRECISION IND CO LTD	SOUTH KOREA	A			
33	QUICK ERECT FURNACE SCAFFOLDING	II			BSL	UK	A			
		II			INSTANT UPRIGHT	IRELAND	A			
		II			EASTMAN IMPEX	LUDHIANA	A		CARBON STEEL SCAFFOLDING	
		II			BSL	HARIDWAR	A			
		II			ARUFASE	SPAIN	A			
34	METALLIC EXPANSION JOINT FOR DUCTS	I			FLEXATHERM EXPANLOW PVT LTD	VADODARA	A			
		I			FLEXICAN BELLOWS & HOSES PVT LTD	VADODARA	A			
		I			KAY ENGINEERING WORKS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			RAVI STRUCTURALS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			MARUTI FABRICATORS	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			K B TECHNOLOGIES	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			AURORA SHAPERS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW) Package/ पैकेज: EPC PACKAGES Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.: REVISION NO : 00 DATE/ तिथि : 02.05.2023 SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
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		I			FLEXICAN DURGA FAB(P) LTD	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			SRI DURGA STRUCTURALS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			REGIONAL ENGINEERING ENTERPRISES	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			SRI RANGA INDUSTRIES	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			ANNAI VAILANKANNI ENGINEERING INDUSTRIES	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			ANNAI VAILANKANNI FABRICATORS UNIT-II	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			ANNAI VAILANKANNI FABRICATORS UNIT-II	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	
		I			MECHWELL INDUSTRIES	NASHIK	A			
35	METALLIC EXPANSION JOINT FOR PIPES	I			METALLIC BELLOWS	CHENNAI	A		UP TO 2200 NB	
		I			LONESTAR	CHENNAI	A		UP TO 2200 NB	
		I			FLEXICON BELLOWS & HOSES	VADODARA	A		UP TO 2200 NB	
		I			FLEXATHERM EXPANLLOW PVT LTD	VADODARA	A		UPTO 2000 NB	
36	LIGHT BONDED MINERAL WOOL	II			PUNJSTAR INSULATION FIBRE COMPANY	BHILAI	A			
		II			SHREERAM EQUITECH	DURG	A			
		II			GOENKA ROCKWOOL (INDIA) LTD	RAIPUR	A			
		II			LLOYDS INSULATION	BHILAI	A			

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		II			THERMOCARE ROCKWOOL PVT LTD	RAJNANDGAON	A			
		II			MINWOOL ROCK FIBRES LTD	RAJNANDGAON	A			
		II			LAPINUS ROCKWOOL LTD	GWALIOR	A			
		II			ROCKWOOL INDIA	MEDAK AP	A			
		II			DHANBAD ROCKWOOL INSULATION PVT LTD	DHANBAD	A			
		II			MINSULATE MFG CO. LTD	JAMSHEDPUR	A			
		II			POLYBOND PROJECTS PVT LTD	DURG	A			
		II			HI-TECH ROCK FIBRE LTD	RAJNANDGAON	A			
		II			ROCKWOOL INDUSTRIES	BHILAI	A			
		II			JAMSHEDPUR MINERAL WOOL	JAMSHEDPUR	A			
		II			ROXUL ROCKWOOL	DAHEJ	A			
37	CLH & VLH	I			BHEL	TRICHY	A			
		I			MID AMERICA	USA	A			
		I			MANNESMANN	GERMANY	A			
		I			ITT	GERMANY	A			
		I			PIPE SUPPORTS	UK / THAILAND	A			
		I			UNISON	SOUTH KOREA	A			
		I			PIPE HANGER SUPPORTS PVT LTD	TANJAVORE	A			
		I			GILLARDINI	ITALY	A			
		I			LISEGA	GERMANY	A			
		I			WOOKWANG	SOUTH KOREA	A			
		I			BERGEN PIPE SUPPORTS INDIA	CHITTOR	A		CLH UP TO C8-32 RANGE(MAXIMUM LOAD 39.70T). IN CASE OF CLH BEYOND THE RANGE OF C7-27(OF SUPPLIER CATALOGUE) THE SAME SHALL BE SOURCED FROM M/S PIPE SUPORTS, UK/THAILAND.	
		I			SANWA TAKI	JAPAN	A			
		I			MH	SPAIN	A			
		I			BROWICK	UK	A			
		I			CARPENTER PATTERSON	UK	A			

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		I			CARPENTER PATTERSON INDIA PVT LTD	VELLORE	A		MAXIMUM LOAD: 23877 KG AND MAXIMUM DISPLACEMENT: 220 MM AND UNDER THE SUPERVISION OF M/S CARPENTER PATERSON, UK.	
		I			AAA SUPPORTS PVT LTD	VADODARA	A		MAXIMUM LOAD: 1.5MT AND MAXIMUM DISPLACEMENT: 250MM	
		I			CARPENTER & PATTERSON	RANIPET	A		SUBJECT TO CONDITIONS AND THE INVOLVEMENT OF THEIR PRINCIPALS	
38	CONVENTIONAL VALVES (GATE, GLOBE & CHECK)	I			VELAN INC.	CANADA	A		SINGLE STAGE DRAIN VALVES (FORGED), SIZE UPTO 50MM NB, CLASS UPTO 2680 FOR POWER CYCLE PIPING APPLICATION.	
		I			LEADER VALVES LTD.	JALANDHAR	A		CC NRV UP NB 800, 150# FOR STG PKG.	
		I			BHEL	TRICHY	A			
		I			CRESCENT VALVES	MUMBAI	A		UPTO NB 300 CL 600	
		I			VELAND VALVE CORP.	USA	A		GATE V/V 2-34" CL 900-4500 CAST STEEL GATE V/V 18-48" CH50-800	
		I			VELAN	UK	A		1) GLOBE V/V 1/4"-2" C14500 (2) BONNETLESS GLOBE V/V 1/2-2.5" CI 150-500)	
		I			L&T VALVES	COIMBATORE	A		UP TO CLASS 4500 & GRADE 91	
		I			TRILLIUM FLOW	HUBLI	A		UPTO NB 300 & CL-600, FORGED UPTO NB 50 CL 800	
		I			FOURESS ENGG. INDIA LTD.,	THANE	A		(1) 10"X600 # GATE/GLOBE/CHECK VALVES (2) 16"X300# GATE/GLOBE/CHECK VALVES (3) 24"X150# GATE/GLOBE/CHECK VALVE (4) 2"X800 # FS GATE/GLOBE/CHECK (LIST) AS PER BS5352 (B) GATE GLOBE/CHECK VALVES FOR 700# TO 1500#	
		I			NITTON VALVES INDIA PVT. LTD.,	AURANGABAD	A		(1) GATE VALVE: UPTO36" CLASS 600 WCB/WCC (2) GLUBE VALVE: UPTO 16" CLASS 300 WCB/WCC (3) CHECK VALVE : UPTO 12" CLASS 600 WCB/WCC & WC6	

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		Package/ पैकेज: EPC PACKAGES				AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची			REVISION NO : 00	
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		I			SAMSHIN LTD.,	SOUTH KOREA	A		(1) GATE - 450 NB 3900 SPL CL SA 217 C12A (GR 91) (2) GLOBE (CAST) - 200 NB 3900 SPL, CL FOR SA 217C12 (G 91) (3) GLOBE (FORGED GR 92) - 50 NB 4500 CL GR SA182 F 92 (4) CHECK (CAST) - 200 NB 3500 SPL CL FOR SA 217C12A (GR91) (5) CHECK (FORGED GR 92) - 50 NB 4500 CL GR SA 182 F 92 (5) ANGLE (FORGED80 NB)	
		I			TOA VALVE ENGGINERING INC.	JAPAN	A		CONVENTIONAL VALVES (1) GATE VALVES UPTO SIZE 16", CLASS 4500 UPTO C12A/F91 (2) GATE VALVES UPTO SIZE 26" CLASS 2500 UPTO C12A (3) CHECK VALVES UPTO SIZE 14" CLASS 2500 UPTO C12A (4) GLOBE VALVES UPTO SIZE 3" CLASS 4500 UPTO C12A (5) GLOBE VALVES UPTO SIZE 10" CLASS 1500 & 4" CLASS 2500 UPTO F91	
		I			FOURESS ENGG. INDIA LTD.	THANE	A		(1) 10"X600 # GATE/GLOBE/CHECK VALVES (2) 16"X300# GATE/GLOBE/CHECK VALVES (3) 24"X150# GATE/GLOBE/CHECK VALVE (4) 2"X800 # FS GATE/GLOBE/CHECK (LIST) AS PER BS5352 (B) GATE GLOBE/CHECK VALVES FOR 700# TO 1500#	
		I			BABCOCK VALVES	SPAIN	A		(1)CAST GATE VALVE (CS) VALVE CLASS UPTO 2500SPL & SIZE UPTO 10" (2)CAST GLOBE VALVE (CS) CLASS UPTO 2500SPL & SIZE UPTO 3 INCH (3) FORGED GLOBE VALVE (CS) CLASS UPTO 1500 & SIZE UPTO 1" (4) FORGED GLOBE VALVE (CS) CLASS UPTO TO 800 & SIZE UPTO 1.5"	

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		I			FORBES MARSHALL PVT LTD	PUNE	A		CONVENTIONAL VALVES :CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH	
		I			BABCOCK WILCOX ESPANOLA	SPAIN	A		CONVENTIONAL VALVES -CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH	
		I			HP VALVES OLDENZAAL B V	NETHERLAND	A		CONVENTIONAL VALVES -CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH	
		I			Aruna Industrial Products Pvt. Ltd.	MADURAI	A		REFER APPROVAL CONDITION	
39	SAFETY VALVES(SPRING TYPE)	I			DRESSER INDUSTRIES	USA	A			
		I			SAMPELL AG	GERMANY	A			
		I			TYCO (PENTAIR VALVES & CONTROLS	USA	A			
		I			FUKUI SEISAKUSHO CO LTD	JAPAN	A			
		I			RIENEKE GMBH	GERMANY	A		HYDRAULIC TYPE	
		I			BOPP & REUTHER	GERMANY	A		HYDRAULIC TYPE	
		I			MIEWA CORPORATION	JAPAN	A		(1) SAFETY VALVE SIZE 1/2" TO 6" & 150 TO 4500 CLASS	
		I			BHEL	TRICHY	A			
		I			PENTAIR SANMAR LTD	PUDUKOTTAI	A		AUX STEAM SYSTEM: UP TO 6" SIZE AND CLASS UP TO 600	
		I			FAINGER LESER VALVES P LTD	AURANGABAD	A		SIZE(INELT/OUTLET): 200/300 MM APPLICABLE TO MAX DESIGN TEMPERATURE:474 DEG C & PRESSURE:47 KG	
40	ELECTROMATIC RELIEF VALVE (ERV)	I			VALVES TECHNOLOGIES	USA	A		(A) 1.5"X3" CLASS 3100- F91 MATERIAL (B) 2.5"X4", CLASS 1500-F91 MATERIAL	
		I			FUKUI SEISAKUSHO CO LTD	JAPAN	A			

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		I			SAMPELL AG	GERMANY	A			
		I			DRESSER INDUSTRIES	USA	A			
		I			MIEWA CORPORATION	JAPAN	A		SIZE UPTO 65MM & UPTO 4500 CLASS	
41	PLUG VALVE	I			FLOW SERVE INDIA CONTROLS	KANCHIPURAM	A		SIZE: 25 TO 300 MM, CLASS 150 & 300	
		I			3Z CORP.	SOUTH KOREA	A			
		I			HAWA VALVES	MUMBAI	A		UP TO 10" SIZE AND 300 CLASS	
42	BOILER STRUCTURE & FABRICATION ITEMS(MAIN & AUX COLUMNS, CEILING GIRDERS, BUILT-UP BEAMS, BRACINGS & BUCKSTAY), COAL BUNKER	I			M/S. BHEL	TIRUCHIRAPALLI	A		MAIN & AUX COLUMNS, CEILING GIRDERS, BUILT-UP BEAMS	
		I			CAPACITE	WADA, PALGHAR	A		(WELDED & BOLTED TYPE)BOILER PRIMARY STRUCTURES (CEILING GIRDER, MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACING, MILL BAY STRUCTURE APH SUPPORT STRUCTURE ETC.)	
		I			SALEM AUTOMECH (INDIA) PVT. LTD.,	SALEM	A		BOILER STRUCTURES, I.E. CEILING GIRDER	
		I			DIAMOND ENGINEERING (CHENNAI) PVT LTD., CHENNAI	KANCHIPURAM	A		FABRICATION OF BOILER STRUCTURES -AWB UNIT-2 FABRICATION OF BOILER STRUCTURES-CEILINER GIRDER, AWB, COLMNS ETC. - BOILER STURCTURES-FABRICATION, TRIAL ASSEMBLY, BLASTING(AWB, COLUMNS, CEILING GIRDER ETC.)	
		I			SALEM AUTOMECH UNIT-I & UNIT-II	SALEM	A		CEILING GIRDERS	
		I			QUALITY ENGG.WORKS	TRICHY	A		CEILING GIRDERS	
		I			INDOFAB	TRICHY	A		CEILING GIRDERS	
		I			SANTHI ENGG. UNIT-II	PUDUKKUDI	A		CEILING GIRDERS	
		I			MASTERFAB UNIT-II	DEVARAYANERI	A		CEILING GIRDERS	

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S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
		I			ARCEOR MITTAL DHAMM PROCESSING PVT LTD	RANIPET	A		(WELDED & BOLTED TYPE)BOILER PRIMARY STRUCTURES (WITHOUT CEILING GIRDER) I.E.MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC.)	
		I			JSW SEVERFIELD STRUCTURES LTD	BELLARY	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITH OUT CEILING GIRDER) I.E. MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC.)	
		I			ATMASTCO (P) LTD	DURG	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITHOUT CEILING GIRDER) I.E.MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC. DUCTS)	
		I			ANG INDUSTRIES	SITARGANJ	A		FABRICATION AND SUPPLY WELDED TYPE BOILER STRUCTURES I.E. MAIN COLUMNS (PLUS AND BOX), AUTO WELDED BEAMS AND BRACINGS.	
		I			INDIANA GRATINGS PVT LTD	PURANDAR	A		FACTORY FABRICATED CIVIL STRUCTURE POWER HOUSE (TG BUILDING) STRUCTURAL ITEM (MAX SINGLE PIECE SIZE UPTO 15MT) (WELDED & BOLTED TYPE)	
		I			ESSAR HEAVY ENGINEERING SERVICES, (A UNIT OF ESSAR PROJECTS INDIA LTD)	SURAT	A		FABRICATION AND SUPPLY OF BUCKSTAYS	
		I			SIMPLEX ENGINEERING & FOUNDRY WORKS PVT LTD	BHILAI	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITH OUT CEILING GIRDER) I.E. MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, AP	

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		I			SIMPLEX ENGG & FOUNDRY WORKS	UNIT 2, BHILAI	A		CEILING GIRDERS	
		I			SEAM INDUSTRIES LIMITED	NAGPUR	A		WELDED STRUCTURE UPTO 15T.FABRICATION AND SUPPLY OF BUNKERS & BUNKER STRUCTURES, BUCKSTAYS AND DUCTS.	
		I			SHIVAM HITECH STEELS PVT. LTD	BHILAI	A		HORIZONTAL BRACE/CIRCULAR HOLLOW SECTION ,BUCKSTAY,DUCTS	
		I			ENESTEE ENGINEERING LTD.,	NAGPUR	A		FABRICATION & SUPPLY OF BUNKERS & BUNKER STRUCTURES ,BUCKSTAY,DUCTS	
		I			SSV ENGINEERS PVT. LTD.,	PUNE	A		COAL SILOS, BUCKSTAY, DUCTS	
		I			ALLIANCE INTEGRATED METALIKS LTD.,	RAJPURA	A		BOILER PRIMARY STRUCTURES (EXCLUDING CEILING GIRDER)	
		I			TECHNOFAB MANUFACTURING LTD.	CHENNAI	A		FABRICATION AND SUPPLY OF BUNKER, BUNKER STRUCTURE, TP'S & CONVEYER GALLERIES,DUCTS	
		I			BABY ENGINEERING PVT. LTD.,	THUVAKUDI	A		BOILER PRIMARY STRUCTURES (EXCLUDING CEILING GIRDER) (WELDED & BOLTED TYPE)	
		I			COREFAB PROJECTS PVT LTD.,	BHILAI	A		FABRICATION & SUPPLY OF BOILER PRIMARY STRUCTURES - MAIN & AUX. COLUMNS, BUILT UP BEAM, BUCKSTAYS, BRACINGS, MILL BAY STRUCTURE AND APH SUPPORT STRUCTURE (EXCLUDING CEILING GIRDERS),DUCTS (WELDED & BOLTED TYPE)	
		I			MIURA INFRASTRUCTURE PVT. LTD	BHILAI-	A		BOILER PRIMARY STRUCTURE - MAIN & AUX. COLUMNS, BUILT UP BEAMS, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE (EXCLUDING CEILING GIRDERS) UPTO MAXIMUM SINGLE PIECE WEIGHT OF 30 MT (WELDED & BOLTED TYPE)	

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		I			METALFAB HIGHTECH PVT LTD.	NAGPUR	A		FABRICATION AND SUPPLY OF BUCKSTAYS ,DUCTS,(WELDED & BOLTED TYPE), COAL BUNKER	
		I			WHEELS INDIA LTD.	WARDHA	A		MANUFACTURING OF WELDED TYPE STRUCTURES I.E. AUTOWELDED BEAMS BRACING AND COLUMNS (UPTO 15T) ,BUCKSTAY,DUCTS(WELDED & BOLTED TYPE)	
		I			NOVOTECH PROJECTS (I) PVT LTD	KOLKATA	A		BUNKER STRUCTURE, TPS & TRESTLES	
		I			JINDAL STEEL & POWER LTD. (JSPL)	RAIGARH	A		PRIMARY STRUCTURE & CEILING GIRDER (WELDED & BOLTED TYPE)	
		I			AJANTHA FABRICATOR WORKSUNIT-II	PUDUKKOTTAI	A		BOILER PRIMARY STRUCTURES- COLUMNS, BEAMS, BRACINGS AND CEILING GIRDERS (WELDED & BOLTED TYPE)	
		I			FEEDERS LIOYDS	SIKANDRABAD	A		PRIMARY STRUCTURE - MAIN COLUMNS, AUX COLUMNS, BUILT UP BEAMS, BOXES, BUCKSTAY (WELDED & BOLTED TYPE)	
		I			L&T HEAVY FORGING & SPECIAL STEEL	HAZIRA	A		CEILING GIRDER	
		I			VASAN INDUSTRIES	PUDUKKOTTAI	A		BOILER PRIMARY STRUCTURES(WELDED AND BOLTED TYPE)	
		I			REGIONAL ENGINEERING WORKS	THUVVAKKUDY	A		BOILER PRIMARY STRUCTURE(WELDED AND BOLTED TYPE)	
		I			VRINDA ENGINEERS	PANAGARH, WB	A		COAL BUNKERS	
		I			GREAT INDIA FABRICATORS	YAMUNANAGAR	A		BOILER PRIMARY STRUCTURES EXCLUDING CEILING GIRDER(WELDED AND BOLTED TYPE), LIMITATIONS AS PER APPROVAL CONDITIONS	
		I			Goodluck Steel Tubes	Sikenderabad	A		Buckstay	
		I			GEW	Sikenderabad	A		Buckstay	
		I			JSPL	Angul	A		Boiler Primary Structure (Excluding Ceiling Girder)	
		I			L&T Limited ECC Workshop	Kanchheepuram	A		Boiler Primary Structure (Excluding Ceiling Girder)	

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		I			JSPL	Raipur	A		Primary Structure -Ceiling Girder -Sub to approval condition	
		I			Steel Infra Solutions Private Limited(SISCOL)	Bhilai	A		Boiler Primary Structure (Excluding Ceiling Girder) and column directly supporting ceiling girders-Sub to approval condition	
43	ELECTRO FORGED GRATINGS	II			INDIANA GRATINGS PVT. LTD	PUNE	A			
		II			KARDEANAND UDYOG	PUNE	A			
		II			PREMIER POWER PRODUCTS LTD	HOWRAH	A			
		II			BHOLA RAM STEEL PVT. LTD	PATNA	A			
		II			PINAX STEEL INDUSTRIES PVT LTD	PATNA	A			
		II			GREATWELD STEEL GRATING PVT. LTD	PUNE	A			
		II			VIN FAB ENGG. PVT LTD.,	MUMBAI	A			
		II			Ratan Project & Engineering	Howrah	A			
44	TANKS & VESSELS(IBD, CBD, FLASH TANK ETC)	I			KPHE	SOUTH KOREA	A			
		I			SV TANKS & VESSELS	MUMBAI	A			
		I			PROGEN SYS TECH LTD	CHENNAI	A		UP TO 4 KSC PR	
		I			FAB TECH	PUNE	A			
		I			UNITECH MACHINES LTD	SAHARANPUR	A		UP TO 10 KSC PR	
		I			SEAM IND P LTD	NAGPUR	A		UP TO 10 KSC PR	
		I			SHAKTI HI TECH CONST PVT LTD	CHENNAI	A		UP TO 10 KSC PR	
		I			SOUTHERN HEAVY ENGG & FAB PVT LTD	CHENNAI	A		UP TO 10 KSC PR	
		I			ALTECH INFRASTRUCTURE(I) PVT LTD	ALWAR	A		UP TO 16 KSC PR	
		I			SEAM INDUSTRIES PVT LTD	NAGPUR	A		UP TO 16 KSC PR	
45	SOOT BLOWER PRESSURE REDUCING VALVES & BLOCK	I			REFER QA C&I LIST		A			
46	FITTINGS(GRADE 91/92)	I			PETROL RACCORD SPA	ITALY	A		FORMED AND FORGED FITTINGS 91/92 GRADE	

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		I			BOKOYOUNG METAL CO.	SOUTH KOREA	A		FORGED FITTINGS AS PER SA-182 F92 GRADE (REDUCERS, NOZZLE, HALF COUPLING ETC.)	
		I			TF TECH CO. LTD	SOUTH KOREA	A		FORGED FITTINGS AS PER SA-182 F92 GRADE (REDUCERS, NOZZLE, HALF COUPLING ETC.)	
		I			FLASH FORGE	VIZAG	A		P91 FORMED/FORGED UPTO DIA 273MM & THICK 30MM	
		I			BGH EDELSTAHL SIEGEN GMBH	GERMANY	A		MANUFACTURE AND SUPPLY OF FORGED FITTINGS OF CS, AS AND SS GRADES	
		I			ERNE FITTINGS GMBH	AUSTRIA	A		P-91 FORMED	
		I			GAM RACCORDI SPA	ITALY	A		P-91 FORMED	
		I			TECHNO FORGE SPA	ITALY	A		P-91 FORMED	
		I			MEGA SPA	ITALY	A		92 GRADE FITTINGS (FORGED)	
		I			BASSI LLUIGI SPA	ITALY	A		P-91 FORGED/WELDED	
		I			IBF SPA	ITALY	A		FORMED AND FORGED FITTINGS/P92 GRADE	
		I			ALLIED INT. (TACTUBI RACCORDI SPA, VIA ROMA 150, 29027 PODENZANO)	ITALY	A		P-91 FORMED	
		I			BRUCK STRASSE 16 ENSHEIM	GERMANY	A		P-91 FORGED/WELDED	
		I			SUNGKWANG BEND CO. LTD.,	SOUTH KOREA	A		FITTINGS OF P91 AND OF MTERIAL OTHER THAN P91 OF BOILER	
		I			TK CORPN. FORGITAL	S KOREA	A		FORMED FITTINGS (ELBOW, TEES, REDUCERS ETC.) OF 92 GRADE.	
		I			FORGITAL	ITALY	A		MANUFACTURING AND SUPPLY OF GRADE 91 FORTGINGS (HOLLOW FORGINGS/MATCHING PIECES WITH 508MM DIA X 75MM THICKNESS STUBS WITH OD 245MM.	
		I			DEE DEVELOPMENT	PALWAL	A		GRADE 91 WITH SIZE/TYPE LIMITATIONS	
		I			CHW FORGE	GHAZIABAD	A		GRADE 92 WITH SIZE/TYPE LIMITATIONS	
		I			FORGIATURA MORANDINI SRL	ITALY	A		GRADE 92 FORGED FITTINGS(REDUCERS, TEES & Y-PIECES)	

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		I			BHARAT FORGE, PUNE	PUNE	A		GRADE 92 FORGED FITTINGS(REDCERS, TEES & Y-PIECES)	
		I			BOKYOUNG METAL CO.LTD	SOUTH KOREA	A		GRADE 92 FORGED FITTINGS(REDCERS, NOZZLE, HALF COUPLING)	
		I			VIAR SPA	ITALY	A		SEAMLESS FORGED Y-PIECE UP TO GRADE 91	
		I			DEE DEVELOPMENT	PALWAL	A		GRADE 92 WITH SIZE/TYPE LIMITATIONS	
		I			Goodluck Engineering Co.	Dadri	A		Forged Fittings (91/92 grade)	
47	AUX PRDS SYSTEM (INCLUDING CONTROL VALVE)	I			REFER C&I LIST					
48	CHEMICAL DOSING SYSTEM (SKID ASSY) FOR SG SCOPE INCLUDING AUX BOILER	I			POWER PIPING	TRICHY	A			
		I			V K PUMPS	MUMBAI	A			
		I			MILTON ROY	CHENNAI	A			
		I			TECHNO CONSULTANTS	MUMBAI	A			
		I			POSITIVE METERING SYSTEM	NASIK	A			
		I			PSI ENGG SYSTEM	CHENNAI	A			
		I			Prorites Equipments Pvt. Ltd.	Pune	A		LP Chemical Dosing System (NaOH/Ammonia/Hydrazine)	
49	SG CW BOOSTER PUMP/ ECW PUMP	I			KBL	WADI	A			
		I			WPIL LTD	GHAZIABAD	A			
		I			SAM TURBO	COIMBATORE	A			
		I			KSB	PUNE	A			
		I			BEST & CROMPTON ENGG LTD	CHENNAI	A			
		I			JYOTI LTD	BARODA	A			
		I			FLOWMORE	GHAZIABAD	A			
50	COAL BUNKER	I					A		REFER BOILER STRUCTURE LIST	
51	LUBE OIL SYSTEM FOR MILLS	I			LINCOLN HELIOS	BANGALORE	A			
		I			T A HYDRAULICS	HYDERABAD	A			
		I			CENLUB INDUSTRIES	FARIDABAD	A			
		I			BHEL	HYDERABAD	A			

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		I			BIJUR DELIMON INDIA PVT LTD	PUNE	A			
		I			UNIQUE ENGINEERING ENTERPRISE P LTD	HYDERABAD	A			
		I			SOUTHERN LUB	BANGALORE	A			
52	CERAMIC LINED BEND COAL PIPES	II			BHEL EDN	BANGALORE	A			
		II			BMW	HATHRAS/ROURKEE	A			
		II			CARBORANDUM UNIVERSAL	HOSUR	A			
		II			BHEL IP	JAGDISHPUR	A			
53	KNIFE EDGE GATE VALVES AT MILL OUTLET AND BURNER INLET	II			GALAXY CONTROLS PVT LTD	CHENNAI	A		UP TO SIZE 26'	
		II			ORBINOX INDIA PVT LTD	COIMBATORE	A		UP TO SIZE 30"	
		II			BRAY CONTROLS	CHENNAI	A		UP TO SIZE 28"	
		II			JASH ENGG LTD	INDORE	A		UP TO SIZE 30"	
54	VIS FOR FANS	I			GERB	BANGALORE	A			
55	LOS FOR FD, PA & ID FANS	I			PSI ENGG	CHENNAI	A			
		I			CENLUB	FARIDABAD	A			
		I			LINCOLN HELIOS	BANGALORE	A			
		I			BHEL	RANIPET	A			
		I			SOUTHERN LUBRICATION	BANGALORE	A			
		I			TA HYDRAULICS	HYDERABAD	A			
56	GATES AND DAMPERS	I			BACHMANN	FARIDABAD	A			
		I			FOURESS INDIA	BANGALORE	A			
		I			INDIRA DAMPERS	RANIPET	A			
		I			KAMAL ENGG	YAMUNANAGAR	A			
		I			BACHMANN	CHENNAI	A		GUILLOTINE GATE(2700 MM HEIGHT)	
		I			DAMPER TECHNOLOGY INDIA PVT LTD	COIMBATORE	A			
		I			Flexatherm Expanllow Pvt.Ltd	Block No-400/B, Karjan, Vadodara	A		Gates & Dampers(Flow Area/Cross-sectional area upto 5600mm X 5600mm)	
57	PA Fans	I			Bharat Heavy Electrical Limited	Ranipet	A			
		I			L&T- Howden Private limited	Hazia	A			

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW) Package/ पैकेज: EPC PACKAGES Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.: REVISION NO : 00 DATE/ तिथि : 02.05.2023 SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
		I			TLT-Turbo GmBH	Germany	A			
		I			Howden	Denmark	A			
58	ID Fans	I			Bharat Heavy Electrical Limited	Ranipet	A			
		I			TLT Turbo GmBH	Germany	A			
		I			L&T Howden Private Limited	Hazira	A			
		I			Howden	Denmark	A			
59	FD Fan	I			Bharat Heavy Electrical Limited	Ranipet	A			
		I			L&T Howden Private Limited	Hazira	A			
		I			TLT-Turbo GmBH	Germany	A			
		I			Howden	Denmark	A			
60	Coal Pulverisers	I			BHEL	Hyderabad	A			
		I			L&T MHPS Boilers Pvt. Ltd.(LMB) (Incl. Manufacturing Facility of L&T)	Hazira	A			
		I			Loesche Energy system India pvt ltd.	Chennai	A			
		I			Doosan Heavy Industries & Construction Co. Ltd	South Korea	A			
61	Raw Coal Feeders	I			Bharat Heavy Electricals Limited	Trichy	A			
		I			Schenck Process (Stock Redler India Private Limited, India)	Bengaluru	A			
		I			Merrick Industries Pvt. Ltd., India	Bengaluru	A			
		I			Yamato Scale	Japan	A			
		I			FLSmith	Haryana	A			
62	Boiler Start Up Drain Re-Circulation Pump	I			Torishima Pump Mfg Co. Ltd.,	Japan	A			
		I			Hayward Tyler Limited	UK	A			
		I			KSB AG	Germany	A			
63	Air Pre-Heaters	I			Bharat Heavy Electricals Limited	Ranipet	A			
		I			L&T Howden Private Limited	Hazira	A			
		I			Arvos India Pvt.LTD.	Chennai	A			
64	Auxiliary Boiler	I			ISGEC John Thompson (IJT)	Yamuna Nagar	A			
		I			Thermax Babcock & Wilcox Ltd.	Pune	A			

		Project/ परियोजना :SIPAT SUPER THERMAL POWER PROJECT STAGE - III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.:		
		Package/ पैकेज: EPC PACKAGES							REVISION NO : 00		
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 02.05.2023		
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)		
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)	
		I			Bharat Heavy Electricals Limited & BHEL (HVPB)	Trichy, Vizag	A				
65	ESP	I			Bharat Heavy Electricals Limited	Ranipet	A				
		I			Larsen & Toubro Limited	India	A				
		I			GE Power India	India	A				
	Main Contractor approved sources										
1	ALUMUNUM CLADDING	III			Main Contractor approved sources						
2	NON IBR PIPING / LP PIPING - PRESSURE UP TO 10 KSC	III			Main Contractor approved sources						
3	CASTABLE REFRACTORY	III			Main Contractor approved sources						
4	POURABLE INSULATION	III			Main Contractor approved sources						
5	STEEL STRUCTURE FOR DUCTS, FURNACE ENCLOSURE, GUIDE, STAIRS & LADDERS, HANDRAILS, PLATFORMS	III			Main Contractor approved sources						
6	SILENCERS	III			Main Contractor approved sources						
7	COAL PIPES & BENDS (WITHOUT CERAMIC LINERS)	III			Main Contractor approved sources						
8	FITTINGS(CS, SS & AS UP TO GRADE 22)	III			Main Contractor approved sources						
9	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE < 05 TON CAPACITY	III			Main Contractor approved sources						
10	DUCTS	III			Main Contractor approved sources						
11	AIR RECEIVER TANK	III			Main Contractor approved sources						
12	COUPLING FOR FANS	III			Main Contractor approved sources						
13	SCAPH	III			Main Contractor approved sources						
14	OXYGEN DOSING SYSTEM	III			Main Contractor approved sources						
15	CE & DE SUSPENSION ASSEMBLY WITH RAPPING(MECHANICAL) MECHANISM	III			Main Contractor approved sources						
16	PERFORATED GD PLATE/SCREEN	III			Main Contractor approved sources						
17	ESP SUPPORT STRUCTURE (COLUMNS & ROOF BEAMS MANUFACTURED FROM ROLLED SECTIONS), CASING	III			Main Contractor approved sources						
18	ESP- MECH SAFETY INTERLOCK	III			Main Contractor approved sources						
19	Spray header for FGD	III			Main Contractor approved sources						
20	Mist eliminators for FGD	III			Main Contractor approved sources						

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		Package/ पैकेज: EPC PACKAGES							REVISION NO : 00	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 02.05.2023	
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)	
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)
21	STEEL STRUCTURE FOR DUCTS, FURNACE ENCLOSURE, GUIDE, STAIRS & LADDERS, HANDRAILS, PLATFORMS	III			Main Contractor approved sources					
22	HANGER & SUPPORTS(OTHER THAN CLH & VLH) RIGID HANGERS	III			Main Contractor approved sources					
23	SNUBBERS	III			Main Contractor approved sources					
24	Oil Preheater & Pressuring Skid	III			Main Contractor approved sources					
NOTE -1 : For final Sub-QR approval , document required to be submitted as per Sub-QR requirements given in the specification.										
NOTE-2: Vendors under 'A' are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.										
NOTE-3: Predespatch inspection for Alloy/SS Grades needs to be tied up by Main contractor or Third-party inspection agency as required.										
NOTE-4 : (\$) Review of Mill TC for Raw Material to be done by NTPC and shall be included in the QP of corresponding equipment.										
NOTE-5: Raw Material for 91 and above Grade Material Fittings to be from NTPC approved sources as per Raw Material vendor List.										
NOTE-6:For Motorized/Pneumatic actuated valves the suppliers for actuators shall be from NTPC approved list, Refer NTPC C&I list.										
LEGENDS/ संकेतिका										
SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY /प्रणाली आपूर्तिकर्ता / सब -वेंडर की स्वीकृति की स्थिति की श्रेणी (SHALL BE FILLED BY NTPC एनटीपीसी द्वारा भरा जाएगा)										
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त , यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए ।										
DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत ब्योरे की आवश्यकता" होगी। सूची में "DR" पत्र में इंगित किया जाना चाहिए।										
QP/INSPN CATEGORY: क्यूपी / निरीक्षण की श्रेणी:										
CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी।										
CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है। हालाँकि एनटीपीसी द्वारा कोई भौतिक निरीक्षण नहीं किया जाएगा। एनटीपीसी द्वारा अंतिम स्वीकृति अनुमोदित क्यूपी के अनुसार दस्तावेजों की समीक्षा के आधार पर दी जाएगी।										
CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.										
UNITS/WORKS इकाईयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाईयाँ / कार्यों के मुख्य सप्लायर का स्थान.										

		PROJECT : SIPAT-III (1X800MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00		
PACKAGE : EPC PACKAGES					DATE :02.05.2023								
CONTRACTOR:					SUB SECTION: QA-TG(MECH)								
CONTRACT NO :													
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status	SS Detail Sub.SCH	SS Approval SCH	Remark	Package Applicable	Provenness Clause (Refer Note-1)
1	HP/IP Outer Casing Casting (1.25Cr & 2.25Cr)	I				Voestalpine	Austria	A					
						JCFC	Japan	A					
						JSW	Japan	A					
						GE	Poland	A					
						Kobe Steel	Japan	A					
						Starwire	Faridabad	A					
						Sande Stahlguss GmbH	Germany	A					
						ISGEC	Muzaffarnagar	A			Weight upto 38 T, 1.25 Cr Grade		
2	HP/IP Inner Casing Casting including Turbine admission valves (9 Cr)	I				LMB Heavy Casting Unit	Hazira	A					
						BHEL-CFFP	Haridwar	A					
						Voestalpine	Austria	A					
						JCFC	Japan	A					
						JSW	Japan	A					
						GE	Poland	A					
						Kobe Steel	Japan	A					
						Starwire	Ballabgarh	A			Weight Upto 22T		
3	HP/IP Inner & Outer Casing including Turbine admission valves Machining	I				Sande Stahlguss GmbH	Germany	A					
						Gruppo Cividale	Italy	A			Weight Upto 20T		
						LMB Heavy Casting Unit	Hazira	A					
						BHEL-CFFP	Haridwar	A					
						Sande Groditz	Germany	A			Weight Upto 20T		
						LMTG	Hazira	A					
						MHPS	Japan	A					
						FUZI ELECTRIC	Japan	A					
						ROSSEL DUSO	Venice	A					
						Toshiba works	Japan	A					
						TJPS	Chennai	A					
						GE	Sanand	A					
						BRUNO PRESEZZI	Italy	A					
						NUGO ROMANO	Italy	A					
4	HP/IP/LP Turbine shaft Forging	I				BHEL (HEEP)	Haridwar	A					
						Siemens	Germany	A					
						GMW	Germany	A					
						Sharp	Pune	A			HP/IP Inner Casing		
						BILFINGER MAS.GMBH	Austria	A			Previous Name:MCE		
						JCFC (Japan Casting & Forging Corp.)	Japan	A					
						SAARSCHMIEDE	Germany	A					
						JSW	Japan	A					
						Pacific Steel Mfg Co Ltd	Japan	A					
						Schmiedewerke Gröditz	Germany	A					
						Buderus Edelstahl	Germany	A					
						Cruesot Forge	France	A					
						Kobe Steel	Japan	A					
						SDF	Italy	A					
						Siemens	Germany	A					
						Franco Tosi	Italy	A			HP/IP		
						BHEL (HEEP)	Haridwar	A					
						ROSSEL DUSO	Italy	A					

 एक महारत्न कम्पनी		PROJECT : SIPAT-III (1X800MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00		
		PACKAGE : EPC PACKAGES									DATE :02.05.2023		
		CONTRACTOR:									SUB SECTION: QA-TG(MECH)		
		CONTRACT NO :											
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status	SS Detail Sub.SCH	SS Approval SCH	Remark	Package Applicable	Provenness Clause (Refer Note-1)
5	Turbine shaft machining	I				BRUNO PRESEZZI	Italy	A			HP/IP		
						NUGO ROMANO	Italy	A					
						MCE MAP (Voist Alpine)	Austria	A			HP		
						GE	Poland/ Switzerland/ France/ Sanand	A					
						Toshiba	Japan	A					
						TJPS	Chennai	A					
						MHPS	Japan	A					
						LMTG	Hazira	A					
6	HP/IP/LP Stationary & Moving Blades Bar stock	I				FUZI ELECTRIC	Japan	A					
						Böhler	Austria	A					
						Bohler Schmiedetechnik	Germany	A					
						WELZEWERKE REVENE	Germany	A					
						DIODO	Japan	A					
						Hitachi	Japan	A					
						Starwire	Ballabgarh	A					
						Gloria Material Technology Corp	Taiwan						
							A						
						Acciaierie Valbruna S.p.a.	Italy	A					
						BGH Edelstahl GmbH	Germany	A					
						Carpenter Technology Co.	USA	A					
						Daido	Japan	A					
						Sz-metal Ravne D.o.o.	Slovenia	A					
7	HP/IP/LP Stationary & Moving Blades Machining(From Bar)	I				Einsal	Germany	A					
						Walzwerke Einsal	Switzerland	A					
						Nichia Tanko Co Ltd	Japan	A			LP Blades		
						SET	Hungary	A					
						MHPS	Japan	A					
						Leistritz-Numberg	Germany	A					
						Energietechnik Einsal	Germany	A					
						Prawest	Germany	A			FOR LP STATIONARY BLADES		
						ZEMA	Italy	A			FOR LP STATIONARY BLADES		
						LMTG	Hazira	A					
						GE	Switzerland/ Germany/ Sanand	A					
						Enem Excel	Hyderabad	A					
						TJPS	Chennai	A					
						Toshiba	Japan	A					
8	LP Forged Blades(Drop)-Material	II				BHEL (HEEP)	Haridwar	A					
						Siemens	Germany	A					
						QTPL	Bangalore	A			For Guide Blades		
						AZAD ENGG	Hyderabad	A					
						MHPS	Japan	A					
						GE	Switzerland	A					
						Leistritz Turbinenkomponenten	Germany	A					
						SMB SA	Switzerland	A			For L1 stage(Last but one) blades		
						C-BLADE SPA	Italy	A					

 एक महारत्न कम्पनी		PROJECT : SIPAT-III (1X800MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00		
		PACKAGE : EPC PACKAGES									DATE :02.05.2023		
		CONTRACTOR:									SUB SECTION: QA-TG(MECH)		
		CONTRACT NO :											
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status	SS Detail Sub.SCH	SS Approval SCH	Remark	Package Applicable	Provenness Clause (Refer Note-1)
						BOHLER	Austria	A					
						PIETRO ROSA	Italy	A					
9	LP Forged Blades(Drop) Machining	I				MHPS	Japan	A					
						C Blade	Italy	A					
						Sumitomo (Manfg. by Sumiju Precision Forgings)	Japan	A					
						PIETRO ROSA	Italy	A					
						Leistritz Turbinenkomponenten	Germany	A					
						Bohler	Austria	A					
						Toshiba	Japan	A					
						ALSTOM	Switzerland	A					
						AZAD ENGG	Hyderabad	A					
10	LP Cast Blades(material) & Machining	I				Zollem	Germany	A					
						Consolidated Precision Product	Belgium	A			Previous Name:ESCO		
						Formetal (cismocisco)	Italy	A			For casting		
						Juergens	Germany	A			For casting		
						GE Power Systems	Germany	A					
						IPCL	Bhavnagar	A					
						EXCEL HITECH	Ghaziabad	A			For casting		
						AK ALLOYS	Ahmedabad	A					
						PTC	Lucknow/ Mehsana	A					
11	LP Hollow Blades	I				AMBE ENGG-	Ghaziabad	A			For Machining only		
						Binder	Switzerland	A					
12	LP Inner/Outer casing Fabrication	I				Prime Hi-Tech Engineering Limited	Naidupet, AP	A					
						LMTG	Hazira	A					
						BHEL (HEEP)	Haridwar	A					
						SHARP	Pune	A					
						Shape Engg.	Haridwar	A					
						GE	Croatia/ Shahabad	A					
						D&N	Germany	A					
13	LP Inner casing Casting (GGG40)	I				KCP	Chennai	A					
						ISGEC(Weight upto 38T)	Yamunanagar	A					
						GE Power sp. Z.o.o	Poland	A					
						L&T	Kansbahal	A					
						FWH Freidrich Wilhems-Hute GmBH	Germany	A					
14	LP Inner/Outer casing Machining	I				Heidenheimer Giessen GmBH	Germany	A					
						Pilsen Steel	Czech	A					
						Buderus Spezialguss GmBH	Germany	A					
						LMTG	Hazira	A					
						BHEL (HEEP)	Haridwar	A					
			TJPS	Chennai	A								
			MHPS	Japan	A								
			SHARP	Pune	A								
						LONE STAR	Chennai/ Cheyyar	A					

 एक महारत्न कम्पनी		PROJECT : SIPAT-III (1X800MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00		
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		CONTRACTOR:									SUB SECTION: QA-TG(MECH)		
		CONTRACT NO :											
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status	SS Detail Sub.SCH	SS Approval SCH	Remark	Package Applicable	Provenness Clause (Refer Note-1)
15	LP Crossover Pipe	I				Hatec	Germany	A					
						Rohr-und Anlagenbau (ROBA)	Germany	A					
						Seonghwa	S Korea	A					
						Dee Development	Ballabgarh	A					
						HKR	S Korea	A					
						Babylon	Germany	A					
						Eichhoff	Germany	A					
16	Electro-Hydraulic Actuators	I				LMTG	Hazira	A					
						Mech engineers	Valsad	A					
						MHPS	Japan	A					
						GE	Germany	A					
						Horst Thiele	Germany	A					
						Bosch Rexroth	Germany	A					
						MOOG	Japan	A					
17	Hydraulic Power Pack Unit	I				Bosch Rexroth	Germany	A					
						Bosch Rexroth	Ahmedabad	A					
						Hydac	Germany	A					
						Hydac	Coimbatore	A					
18	Actuator & Valve For CRH-NRV & QC-NRV	I				Weir	USA	A					
						Cesare Bonetti	Italy	A					
						BABCOCK	Spain	A					
						ADAMS	Germany	A					
						BHEL	Trichy	A			Upto 850NB & Class upto 900 special		
						SEMPELL	Germany	A					
19	HP/IP/LP Shaft Seals	II				TPT	S Korea	A					
						Starwire	Ballabgarh	A			For INGOTS		
						Kolhapur Steel	Kolhapur	A					
						Silbitz Guss	Germany	A					
						StahlgussSaar	Germany	A					
						GE	Sanand	A					
						PMT	Pune	A					
						Wellbore	Ahmedabad	A					
						Bharat Forge	Pune	A					
						Indo air	Ahmedabad	A					
20	TG Bearings	I				Toshiba	Japan	A					
						GE	Germany	A			For Thrust Bearing		
						Kingburry	USA	A					
						Omega	Bhopal	A					
						Eurobearing	Italy	A					
						John Crane Bearing	Germany	A					
						BHEL (HEEP)	Haridwar	A					
						Wuakesha Bearing	UK	A					
						Euro Bearings	Faridabad	A					
21	MOP/EOP	I				Kingsburry	USA	A					
						Allweiler	Germany	A					
						ABB	Switzerland	A					
						Bosch Rexroth	Germany/ Switzerland	A					
						Toshiba	Japan	A					

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						Ebara Yoshikura Hydrotec Ltd.	Japan	A					
22	Jacking Oil Pump	I				Bosch Rexroth	Germany /Switzerland	A					
						Allweiler	Germany	A					
						Leistritz	Germany	A					
						MITTEN MANUFACTURING, INC	USA	A					
						PARKER HANIFIN	Japan	A					
						Allweiler	Daman	A					
23	Oil Purification Unit	I				Facet	Spain	A			Coalescer Type		
						Pall Corporation	USA	A			For control fluids		
						Alfa Laval	Pune	A			Centrifuge Type		
						Hilliard	USA	A			Coalescer Type		
						Kaydon Filtration	USA	A			Coalescer Type		
						Westfalia Separator India Pvt.Ltd.	Germany/ Bangalore	A					
						Rotring	Germany	A					
						Rockfin Group	Poland	A					
24	Duplex Oil Filter With Oil Changeover Valve	I				Hydac	Germany	A					
						Boll & Kirch	Germany	A					
25	Turbine Integral Piping	I				Rockfin	Poland	A					
						BHEL Piping Center	Chennai	A					
						Unitech	Saharanpur	A					
						Bend Joints	Bhopal	A					
						Pal Engineering	Yamunanagar	A					
						Seonghwa	S Korea	A					
						L&T Piping Center	Hazira	A					
						Dee Development	Ballabgarh	A					
26	Oil Module including Central Lubrication System	I				Kelag	Switzerland	A					
						VDL Delmas	Germany	A					
						Hydac India Pvt. Ltd.	Coimbatore	A					
						AEL	Germany	A					
						Flenco	Italy	A					
						Hydac	Germany	A					
						King Dynamics	Switzerland	A					
						Southern Lubrication	Bangalore	A					
27	Thermal Insulation	II				ENPRO	Pune	A					
						Eugen Arnold GmbH	Germany	A					
						Heinrich Tapp GmbH	Germany	A					
						Lloyds Insulation	India	A					
						Minwool Rock Fibre	Bhilai	A					
						Thermocare	Rajnandgaon	A					
						Dhanbad Rockwool Insulation	Dhanbad	A					
						Minsulate Manufacturing Co.	Jamshed	A					
						MHI	Japan	A					
						THERMAL ENGG INTERNATIONAL (TEI)	USA	A					
						TJPS	Chennai	A					

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28	Condenser (water cooled) (Sub QR Item)	I				TOSHIBA CORPORATION LTD	Japan	A					
						LMTG	Surat	A					
						BHEL	Haridwar	A					
						ABFPL	Sanand	A					
						GE	Switzerland	A					
29	Condenser Fabricator (water cooled)	I				ISGEC	Yamunanagar	A					
						GE Power india Ltd.	Durgapur	A					
						Godrej & Boyce Manufacturing Company Ltd.	Mumbai	A					
						TEMA India Ltd.,	Thane	A					
30	HP Heaters (Sub QR Item)	I				TOSHIBA CORPORATION LTD	Japan	A					
						TJPS	Chennai	A					
						SPX Heat Transfer Inc. (Erstwhile Yuba Heat Transfer)	USA	A					
						GE	France	A					
						ABFPL	Sanand	A					
						BHI	S Korea	A					
						THERMAL ENGG INTERNATIONAL	USA	A					
						HOLTEC	USA	A					
						L&T	Hazira	A					
						BHEL	Hyderabad	A					
31	LP/HP Heater Fabricator	I				ISGEC	Yamunanagar	A					
						Godrej & Boyce Manufacturing Company Ltd.	Mumbai	A					
						TEMA India Ltd.,	Thane	A					
32	LP Heaters (Sub QR Item)	I				TOSHIBA CORPORATION LTD	Japan	A					
						TJPS	Chennai	A					
						SPX Heat Transfer Inc. (Erstwhile Yuba Heat Transfer)	USA	A					
						GE	Switzerland	A					
						ABFPL	Sanand	A					
						BHI	S Korea	A					
						THERMAL ENGG INTERNATIONAL	USA	A					
						BHEL	Hyderabad	A					
						L&T	Hazira	A					
						HOLTEC	USA	A					
33	Condensate Extraction Pump (CEP) (Sub QR Item)	I				KSB	Chinchwad, Pune	A					
						BHEL	Hyderabad	A					
						SULZER Pumps	Mumbai	A					
						Clyde Pumps India pvt. Ltd.	Ghaziabad	A					
34	Condenser Air Evacuation Pumps (Sub QR Item)	I				GARDNER Denver/Nash	Germany	A					
						GARDNER Denver/Nash	Pune	A					
						Tsurumi pumps	Japan	A					

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						Edwards	UK	A					
35	Deaerator (Sub QR Item)	I				TJPS	Chennai	A					
						BHEL	Hyderabad	A					
						BGR	Chennai	A					
36	Deaerator Fabricator	I				Godrej	Mumbai	A					
						ISGEC	Yamunagar	A					
						Altech	Bhiwadi	A					
						TEMA India Ltd.,	Mumbai	A					
						BGR Energy System Ltd.	Chennai	A					
37	Booster Pump	I				KSB	Germany	A					
						KSB	Pune	A					
						Sulzer Pumps	Mumbai	A					
						Sulzer	UK	A					
						Flowserve	Switzerland	A					
						FLOWSERVE	Coimbatore	A					
						Flowserve	Spain	A					
						Hitachi	Japan	A					
						Ebara Corporation	Japan	A					
						MHI	Japan	A					
						BHEL	Hyderabad	A					
			38	Boiler Feed Pump (BFP) (Sub QR Item)	I				Ebara Corporation	Japan	A		
						Flowserve	Spain	A					
						KSB	Germany	A					
						KSB	Pune	A					
						Mitsubishi Heavy Industry	Japan	A					
						HITACHI PLANT TECHNOLOGY	Japan	A					
						BHEL	Hyderabad	A					
						Sulzer Pumps	Mumbai	A					
40	Drive Turbine for BFP	I				SULZER	UK	A					
						Siemens	Germany	A					
						Hitachi	Japan	A					
						GE Thermodyne	France	A					
						GE India Industrial Pvt. Ltd.	Pune	A					
						Toshiba	Japan	A					
						TJPS	Chennai	A					
						Power machines(Kaluga)	Russia	A					
						BHEL	Hyderabad	A					
						MHI	Japan	A					
41	HP Bypass Valves (Sub QR Item)	I				Skoda	Czech republic	A					
						CCI	Sweden/ Switzerland/ Czech Republic	A					
						CCI	Chittor,AP	A					
						Bomafa	Germany	A					
42	HP Bypass Valves (Sub QR Item)	I				Bomafa	Ahmedabad	A					
						CCI	Sweden/ Switzerland/ Czech Republic	A					

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42	Dr. Bypass Valves (Sub QR Item)	I				CCI	Chittor,AP	A					
						BOMAFa	Ahmedabad	A					
						BOMAFa	Germany	A					
43	Condensor On-load Tube cleaning system (COLTCS) (Sub QR Item)	I				GEA BGR	Chennai	A					
44	Hydraulic Coupling for BFP	I				Multitex Filtration	Greater Noida	A					
						Voith	Hyderabad	A					
						Voith	Germany	A					
45	Hangers & Supports; Pipe Support components including Spring Hangers	I				Pipe Support	Chennai	A					
						Lisega	Germany	A					
						Lisega	Ahmedabad	A			Load upto 100KN		
						Seonghwa	S Korea	A					
						Pipe supports	UK	A					
						GILLARDINI	Italy	A					
						BERJEN	Chittor,AP	A					
						NHK SPRING	Japan	A					
						Yamashita Seisakusho Co. Ltd	Japan	A					
						MHI	Japan	A					
						SANWA TEKKI CORPORATION	Japan	A					
						CARPENTER AND PETERSON	UK	A			CLH Upto 30 T AND VLH Upto 32 T		
						CARPENTER & PATERSON INDIA PRIVATE LTD.	Vellore	A			CLH Upto 23.8T & VLH Upto 20.7T		
						AAA Supports Private Limited	Vadodara	A			For CLH, VLH and Rigid supports Max. Load 1.5 MT		
						Carpentor & Patterson	USA/Thailand	A					
46	Metallic Expansion Joint	I				Lonestar	Chennai	A			For size up to NB9200		
						Flexicon	Vadodara	A			For size upto 2200NB		
						Witzemann	Germany	A					
						Munro & Miller	UK	A					
						Flexatherm	Vadodara	A			For size upto 2200NB		
						Bird Precision	UK	A					
						Metallic Bellows	Chennai	A			For size up to 1600 NB		
						M B Metallic Bellows	Chennai	A			For size upto 2200NB		
						Athulya Bellows and Engineering Pvt. Ltd	Vadodara	A			For size up to NB 3400		
47	HP Piping -Fabrication (Based on Design and Drawings of Qualified Vendor)	I				HKR	S Korea	A					
						BHR	Germany	A					
						Seonghwa	S Korea	A					
						Finow	Germany	A					
						TOSHIBA	Japan	A					
						BHEL	Piping Center, Chennai &Thirumayam	A					
						L&T	Hazira	A					
						Dee development	Ballabgarh	A					
						Bendtec	USA	A					
			Wyman-Gordon	USA	A								

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48	HP Pipes and Fittings (Mills)	II				Sumitomo	Japan	A					
						Tenaris	Italy	A					
						V&M	Germany	A					
						V&M	France	A					
						IBF	Italy	A					
						SUNGWANG BEND	S Korea	A			UP TO 24INCH IN CS/AS MATERIAL		
						Productos Tubulares	Spain	A					
						JFE	Japan	A					
						Bentler	Germany	A					
						TK CORPORATION	S Korea	A			UP TO 24INCH IN CS MATERIAL		
						TUBOS REUNIDOS	Spain	A					
						MEGA	Italy	A			For Fittings Only		
			Petrol Raccord,	Italy				UP TO 24INCH IN CS MATERIAL & UP TO 18 INCH IN AS MATERIAL					
			Benkan Japan KK	Japan	A			UP TO 24INCH IN CS MATERIAL					
49	Elastomer Large Bellows or Flexibles Rubber Bellows	I				Cori Engineers Pvt. Ltd.	Chennai	A			UP TO 2700 NB		
						SRM Ecoflex	Kolkata	A			UP TO 2700 NB		
50	Heater Drains Recovery Pumps (Drip Pump)	I				KSB	Germany	A					
						Nasosenergomash	Ukraine	A					
						Sulzer Pumps	Mumbai	A					
						KSB	Pune	A					
						Hyundai	S Korea	A					
						KBL	Pune	A					
51	Debris Filter/ Self Cleaning Strainer	I				Flowserve	Coimbatore	A					
						GEA-BGR	Chennai	A					
52	LP Pipes & Fittings (CS & SS)	I				Multitex	Gr.Noida	A					
						Remi	Tarapur,India	A			SS		
						Apex	Alwar	A			SS (up to 150NB)		
						Ratnamani	Ahmedabad	A			SS		
						ISMT	India	A			CS (up to 400 NB)		
						Maharashtra Seamless Ltd.	Maharashtra	A			CS (up to 400 NB)		
						Tube Products Incorporate	Ahmedabad	A					
						TK Corporation	S Korea	A					
						Dee development	Palwal	A					
						Jindal Saw	India	A			CS (up to 400 NB)		
						Tata	India	A			ERW		
						Surya	India	A			ERW		
						JINDAL PIPES LTD	India	A			ERW		
						WELSPUN	India	A			ERW		
53	Butterfly Valves (* Also for steam services)	I				Lalit Pipes & pipes Ltd.,	Thane	A			EFW Pipes		
						Ratnamni Metals and Tubes Ltd.,	Gandhinagar	A			EFW Pipes		
						Fouress Engg. *	Bangalore	A			upto 2600 NB		
						IL *	Palakkad	A			upto 2200 NB		
						BHEL *	Bhopal, India	A					
						Kriloskar Bros. Ltd	Pune	A					
						L&T	Chennai	A					
						Trillium Flow	Hubli	A					
			Tyco	Halol	A								

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						L&T	Coimbatore	A								
						Intervalve	Pune	A								
54	Valves (gate/ globe/check) for LP application	I				L&T	Chennai/Coimbatore	A								
						Velan	Canada/Coimbatore	A								
						KSB	Germany/Coimabtores	A								
						ToA	Japan	A								
						Fouress Engg	Aurangabad	A								
						Trillium Flow	Hubli	A								
						Crane	USA	A								
						Samshin	S Korea	A								
						KBL	Pune	A								
						Weir	UK	A								
						Leader	Jalandhar	A								
						BHEL	Trichy	A								
						Pentair (Tyco Sempel)	Trichy	A								
						HP Valves(Key Valves Technology)	Netherlands	A								
						IL	Palakkad	A								
55	HP Feedwater Heaters Automatic (String Bypass) Isolation Valves	I				Steel Strong	Mumbai	A								
						KSB	Germany	A								
						Tyco Sempell	Germany	A								
						Strack	Germany	A								
						BHEL	Trichy	A								
			Weir Valves & Controls UK Ltd.	UK	A											
56	Water Steam Cycle HP Valves	I				KSB	Germany /Coimbatore	A								
						L&T	Chennai	A								
						L&T	Coimbatore	A								
						Velan	Coimbatore	A			up to 2inch, #4500 (up to P92 grade)					
						HP Valves	Netherlands	A			Previous Name:Key Valves Technology					
						Weir Valves & Controls UK Ltd.	UK	A								
						BHEL	Trichy	A								
						Crane	USA	A								
						Samshin	S Korea	A								
						Pentair(Tyco Sempell)	Germany	A								
						Velan	Canada	A								
						ToA	Japan	A								
						Tyco	USA	A								
			57	Safety Valves	I				BHEL	Trichy	A					
									Dresser	USA	A					
						Tyco	USA	A								
						Babcock	Spain	A								
						Flainger	Germany	A								
						Bopp & Reuther	Germany	A								

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						Flainger	Nasik	A								
						Reineke	Germany	A								
						Valve Technology	USA	A								
58	Forged Seel Valves up to 2" , Class 800 (FCS/FSS)	I				KSB	Coimbatore	A								
						Leader	Jalandhar	A								
						L&T	Chennai	A								
						Velan	Canada	A								
						Fouress Engg	Ahmadnagar	A								
						Trillium Flow	Hubli	A								
						Velan	Canada	A								
						Steel Strong	Mumbai	A								
						L&T	Coimbatore	A								
			59	Condenser Tubes	I				Plymouth	USA	A					
						Ratnamani	Kutchh	A								
						Neotiss Limited	Medak,AP	A			Remarks:Formerly Vallourec Heat exchanger Tubes Ltd/ CST Valinox Ltd.					
						REMI Edelstahl Tubulars Ltd.	Tarapur	A								
						Shin han Metal	S Korea	A								
						Valtimat	France	A								
						Nippon Steel Corp.	Japan	A								
						Ratnadeep Metal & Tubes Ltd	Mehsana	A								
						Maxim Tubes	Gandhinagar	A								
						Scholler Werke GmbH	Germany	A								
60	HP/LP Heater tubes	I				Plymouth	USA	A								
						Ratnamani	Kutchh	A								
						Ratnamani	Mehsana	A								
						Valtimat	France	A								
						Nippon Steel Corp.	Japan	A								
						Scholler Werke	Germany	A								
						Heavy Metals and Tubes	Gandhinagar	A								
						Shin han Metal	S Korea	A			LP Heater					
						Apex	Alwar	A			LP Heater					
						Ratnadeep Metal & Tubes Ltd	Mehsana	A			LP Heater					
						REMI Edelstahl Tubulars Ltd.	Tarapur	A								
						Neotiss Limited	Medak,AP	A			Remarks:Formerly Vallourec Heat exchanger Tubes Ltd/ CST Valinox Ltd.					
			61	Hydrogen Generation Plant (Sub-QR Item)	I				Proton Energy Systems	USA	A					
									MVS ENGINEERING LIMITED	New Delhi	A			Bi-polar type, 2x6NM3/Hr		
						SUKAN ENGG. PVT. LTD	Mumbai	A			Bi-polar type, 2x6NM3/Hr					
						Eastern Electrolyzer Limited	Noida	A			Bi-polar type, 2x6NM3/Hr					
						Teledyne Energy System Inc.	USA	A								
						AIROX NIGEN EQUIPMENTS LTD	Ahmedabad	A			Bi-polar type, 2x6NM3/Hr					
						Electrolyser Corporation	Canada	A								
						BOC	Kolkata	A								
Main Contractor Approved Sources(Note-3)																
1	Turbine Bearing Pedestal	I				Main Contractor Approved Sources										

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2	Chemical Dosing System	I				Main Contractor Approved Sources							
3	Vapour Exhauster With Motor	II				Main Contractor Approved Sources							
4	Drain Cooler & Misc Tanks	II				Main Contractor Approved Sources							
5	Oxygen/NAOH Dosing System	II				Main Contractor Approved Sources							
6	Misc Items like Internals of equipments(if not covered in MQP) & Consumables like paints, gaskets etc.	III				Main Contractor Approved Sources							
NOTE - 1 : For final Sub-QR approval , document required to be submitted as per Sub-QR requirements given in the specification.													
NOTE-2: Vendors under ‘A’ are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.													
NOTE-3:	Main contractor approved sub vendors evaluated / assessed as per Main contractor Quality Management System is acceptable.												
Note-4:	The items not covered in the above list shall be mutually discussed & agreed for Item categorisation & sub-vendor control.												
LEGENDS/ संकेतिका													
* - Inspection category will be decided during vendor evaluation.													
1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY प्रणाली आपूर्तिकर्ता / सब -वेंडर की स्वीकृति की स्थिति की श्रेणी													
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, , यदि कोई हो, के साथ-साथ पत्र "A" में इंगित किया जाए ।													
2.0 QP INSPECTION CATEGORY : क्यूपी / निरीक्षण की श्रेणी:													
CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer.इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी।													
CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है। हालांकि एनटीपीसी द्वारा कोई भीतिक निरीक्षण नहीं किया जाएगा। एनटीपीसी द्वारा अंतिम स्वीकृति अनुमोदित क्यूपी के अनुसार दस्तावेजों की समीक्षा के आधार पर दी जाएगी।													
CAT - III :For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.													
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.													



Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL प्रवालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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1	AIR BLOWERS -LOBE TYPE >= 5KW	I			SWAM PNEUMATIC	NOIDA	A			WTP,CPU,AHP
					EVEREST BLOWERS PVT LTD	BAHADURGARH	A		UP TO 40 HP (APPROX 1600 CUM/HR)	
					KAY INTERNATIONAL	SONEPAT	A		UP TO 4800 CUM/HR	
					KULKARNI POWER TOOLS	SHIROL	A		UP TO 2500CUM/HR	
					USHA COMPRESSORS	AHMEDABAD	A		UP TO 60 HP (APPROX 2000CUM/HR)	
2.A	EOT CRANE & ELECTRIC HOIST >5 MT	I (> 10T) / III (>5T UP TO 10T)			REVA INDUSTRIES	FARIDABAD	A		UP TO 60 MT	WTP,CT.AC&VENTIL ATION,CHP,LHP&GH P,AHP, CW , FDPS
					EDDY CRANE	PUNE	A		UPTO 10 MT	
					CONSOLIDATED HOIST	SATARA /PUNE *	A		SATARA UP TO 20 MT,*PUNE FOR ELECTRIC HOIST UPTO 15 MT	
					ELECTROTHERAPHY	RISHRA	A		UPTO 15 MT FOR ELECTRIC HOIST ONLY	
					HERCULES HOIST	RAIGAD	A		UPTO 15 MT FOR ELECTRIC HOIST ONLY	
					TUBRO FERGUSSON	KOLKATA	A		UP TO 20MT FOR EOT, UP TO 5 MT FOR FOR ELECTRIC HOIST	
					PRAYAS ENGG (PBL)	V V NAGAR	A		UPTO 10 MT FOR ELECTRIC HOIST ONLY	
					ALPHA SERVICES	ALWAR	A		SINGLE GIRDER EOT CRANE & ELECTRIC HOIST UPTO 15 MT ONLY. GEARBOX FROM NTPC APPROVED SOURCES FOR EOT CRANE.	
					CENTURY CRANE ENGINEERS PVT. LTD	BALLABHGARH	A		UP TO 25 MT	



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

प्रचालित होने तथा सब-वेंडर के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

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					ARMSEL	BANGALORE	A		UPTO 10 MT EOT & UPTO 15 MT ELECTRIC HOIST	
					TRACTEL TIRFOR	PALWAL	A		UPTO 15 MT FOR ELECTRIC HOIST AND UPTO 10 MT FOR EOT	
					MILLARS INDIA	KARAMSAD	A		UP TO 25 MT	
					AVON CRANES	GURGAON	A		UP TO 25 MT	
					GRIP ENGINEERS	HYDERABAD	A		50 MT (GEARBOX FROM NTPC APPROVED SOURCES FOR EOT CRANE).	
					GRIP ENGINEERS	FARIDABAD	A		UPTO 20 MT ELECTRIC HOIST ONLY	
					CRANEX	GHAZIABAD	A		UP TO 140 MT FOR EOT ONLY	
2.B	GANTRY CRANE >5T	I (> 10T) / III (>5T UP TO 10T)			REVA INDUSTRIES	FARIDABAD	A		UP TO 60 MT	CW
					UNIQUE INDUSTRIAL HANDLERS	NASHIK	A		UP TO 165 MT	
					PVT LTD ANUPAM INDUSTRIES LTD.	ANAND	A		UP TO 60MT	
					SMACO ENGINEERING PVT. LTD	THANE	A		UP TO 60MT	
					MANGLA HOIST	GREATER NOIDA	A		UP TO 10MT	
					CB DOCTOR VENTILLATOR PVT LTD	AHMEDABAD	A		up to 50000 CMH	WTP,CT.AC&VENTIL ATION,CHP,LHP&GH P,AHP
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		up to 125000 CMH	



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
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**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

स्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

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3	FAN- AXIAL TYPE > = 5KW	I			C DOCTOR &CO PVT LTD	KOLKATA	A		up to 50000 CMH	
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	SHAHPUR, THANE	A		Up to 6000 CMH	
					NADI AIRTECHNICS PVT LTD	CHENNAI	A		Up to 15000 CMH	
					ADVANCE VENTILATION PVT LTD	KUNDALI. SONEPAT	A		up to 40000 CMH	
					SK SYSTEMS PVT LTD	KUNDALI PHASE-II, SONEPAT, HARYANA	A		up to 50000 CMH	
					Patel Airflow	Ahemdabad	A		up to 40000 CMH	
					ALMONAROD (P) LIMITED	CHENNAI	A		Up to 14000 CMH	
					STEEL AUTHORITY OF INDIA LIMITED	ROURKELA	A			CW,CT,MUW
					WELSPUN	ANJAR	A		SAW UPTO 2600 NB	
					WELSPUN	BHARUCH	A		SAW UPTO 1300 NB	
					MAN INDUSTRIES	INDORE	A		SAW UPTO 1400 NB	
					SAMSHI	VADODARA	A		SAW 450 TO 2540 NB	
					MUKAT TANKS & VESSELS	TARAPUR	A		SAW 200 TO 1200 NB	
					MUKAT PIPES	RAJPURA	A		SAW UPTO 1800 NB	



एनटीपीसी NTPC	Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:	INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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4	PIPES-MS- (BLACK/ GI) AS PER IS IS:3589 >1000NB	I			LALIT PIPES AND PIPES LTD	THANE	A		SAW 350 TO 1400 NB	
					RATNAMANI	CHATRAL	A		SAW 600 TO 2600 NB	
					RATNAMANI	KUTCH	A		SAW 400 TO 3600 NB	
					PSL HOLDINGS LIMITED	DAMAN	A		SAW 450 TO 1600 NB	
					PSL INTERNATIONAL LTD.	CHENNAI	A		SAW 450 TO 1600 NB	
					PSL LIMITED	KUTCH	A		SAW 450 TO 1600 NB	
					PSL LIMITED	VISAKHAPATNAM	A		SAW 450 TO 1600 NB	
					JCO PIPES	CHHINDWARA	A		SAW UPTO 1600 NB	
					SURYA GLOBAL STEEL TUBE LTD	ANJAR	A		SAW UP TO 2032 OD	
					JINDAL SAW LTD	BELLARY	A		SAW UP TO 3632 OD , THICKNESS 16 MM	
		CAPACITE STRUCURES PVT LTD	THANE	A		406.4 MM TO 3874 MM OD				
5	PIPES & FITTINGS-GRP	I			EPP COMPOSITES PVT LTD	RAJKOT	A		UP TO 900MM	WTP,CT
					GRAPHITE INDIA	NASIK	A		UP TO 1000MM	
					SHRIRAM SEPL COMPOSITES LTD	CHENNAI	A		UP TO 1100MM	



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					BALAJI FIBER REINFORCE PVT LIMITED	VADODARA	A		UP TO 650MM	
					MEGHA FIBRE GLASS INDUSTRIES PVT LTD	MEDAK	A		UP TO 900MM	
6	SERVICE VESSEL-CPU & OTHER PR VESSELS >= 10 BAR WORKING PRESSURE	I			DRIPLEX WATER ENGINEERING INTERNATIONAL PVT LIMITED	BHADARBAD	A			WTP,CPU,CAS,CHP, LHP&GHP,AHP
					BGR ENERGY SYSTEMS LTD (ENVIRONMENTAL ENGG. DIV.)	PONNERI	A		UPTO 3000MM DIA & THICKNESS UPTO 28 MM	
					ISHAN EQUIPMENTS PRIVATE LIMITED	VADODARA	A		UPTO 2900 MM DIA & THICKNESS UPTO 28 MM	
					JASMINO POLYMERTECH PVT LTD	TALOJA	A		DIA 2800MM, THICKNESS 25MM DESIGN PRESSURE UP TO 47.5 KSC	
					MAHIMA UDYOG	HARIDWAR	A		DIA UP TO 2900 MM , THICKNESS UPTO 29 MM	
					BELCO POLLUTION CONTROL PVT LTD	GREATER NOIDA	A		UPTO 3200MM DIA & THICKNESS UPTO 30 MM	
					KIRLOSKAR BROTHERS LTD	KIRLOSKARWADI	A			WTP,CW, CPU,FDPS,CHP, LHP &GHP,AC & VENTILATION,MUW, AHP
					WILO MATHER & PLATT	PUNE	A			
					WILO MATHER & PLATT	KOLHAPUR	A			
					SAM TURBO	COIMBATORE	A		FLOW UP TO 1500 CUM/HR AND POWER RATING UP TO 425 KW	
					FLOWMORE LTD	GHAZIABAD	A			
					BEST AND CROMPTON	CHENNAI	A			



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7	PUMPS- HORIZONTAL & VERTICAL CENTRIFUGAL -UP TO 300KW	(UP TO 60 KW CAT-II , ABOVE 60 KW CAT-I)			JYOTI LTD	VADODARA	A			
					WPIL	GHAZIABAD	A			
					KISHORE PUMPS	PUNE	A		UPTO 500M3/HR ONLY RUBBERLINED PUMPS ALSO	
					GRUNDFOS PUMPS INDIA PVT LTD	CHENNAI	A		HORIZONTAL UP TO 30 KW ONLY AND VERTICAL UP TO 45 KW ONLY (FOR APPLICATIONS WHERE NPSH IS NOT PROBLEM)	
					SINTECH PRECISION	GHAZIABAD	A		HORIZONTAL UP TO 400 KW MOTOR RATING AND VERTICAL UP TO 30 KW MOTOR RATING	
					KSB	PUNE	A			
					KSB	NASHIK	A			
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		HOIZONTAL CENTRIFUGAL PUMP UP TO 75 KW ONLY	
					SU MOTOR	MUMBAI	A		HORIZONATL UPTO 500M3/HR ONLY RUBBERLINED PUMPS AND VERTICAL CENTRIFUGAL PUMPS UP TO 100CMH ONLY	
					BHARAT PUMPS AND COMPRESSORS	NAINI	A		FLOW UP TO 2200 M3/HR AND HEAD UP TO 60 MWC	
					FLOWMORE LTD	GHAZIABAD	A			WTP, CW
					KIRLOSKAR BROTHERS LIMITED	KIRLOSKARWADI	A			
					WPIL LTD	KOLKATA	A			
					WPIL LTD	GHAZIABAD	A			



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8	PUMPS -VT -UP TO 300KW	I			JYOTI LTD	VADODARA	A			
					XYLEM WATER SOLUTIONS INDIA	VADODARA	A			
					PVT LTD					
					FLOWSERVE INDIA CONTROLS	COIMBATORE	A		UP TO 1025 KW	
					PVT LTD					
					SINTECH PRECISION	GHAZIABAD	A			
					WILO MATHER & PLATT	PUNE	A			
9.A	VALVE-DUAL PLATE CHECK > 600MM OR CLASS > 300 (VALVE- DUAL PLATE CHECK UP TO 600MM & CLASS 300: CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			ADVANCE VALVE PVT LTD	GR. NOIDA	A		DUAL PLATE CHECK VALVES CI UPTO 1000 NB CLASS 125, DUPLEX SS UP TO 600NB CLASS 600.	WTP,CW, CPU,FDPS,CAS,LP PIPING
					LEADER VALVES	JALANDHAR	A		UP TO 900MM CLASS 150 , SS 200NB CLASS#300	
					R & D MULTIPLE	VALSAD	A		CI/ CS UP TO 800NB PN 10	
9.B	VALVE-BALL > 100 MM OR CLASS > 800; (VALVE- BALL UP TO 100 MM & CLASS 800:CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			SWIMS TECHNOLOGIES	HUBLI	A		SS BALL VALVES UP TO 500MM AND CLASS #600, CS BALL VALVES UP TO 250 MM AND CLASS# 900, CS/ SS BALL UP TO 100 NB CLASS 150, AND UP TO 100 NB CLASS#300	WTP, CPU,FDPS,CAS,FOH,C HP,LHP&GHP,AHP
					MICRO FINISH VALVES PVT. LTD.	HUBLI	A		400NB CLASS#600 AND UP TO 600NB CLASS#300	
					FLOW CHEM INDUSTRIES	KALOL	A		100NB CLASS#600,200NB CLASS#300, 50 NB CLASS#800	
					L&T VALVES LIMITED	COIMBATORE	A		UPTO 150NB, CLASS #150/300, AND UPTO 50NB, CLASS #800	
					PRECISSION ENGG CO VALVES PVT LTD	NASIK	A		FCS UP TO 50NB CLASS 800, CCS UP TO 400NB CLASS 150.	
					BELGAUM AQUA VALVE PVT LTD	BELGAON	A		FCS UP TO 50NB CLASS 800, CCS UP TO 200NB CLASS 150.	



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					G M ENGINEERING PRIVATE LTD	RAJKOT	A		UP TO 400 NB AND CLASS #600	
9.C	VALVE-BUTTERFLY > 600MM OR CLASS>150 (VALVE-BUTTERFLY UP TO 600MM & CLASS 150::CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			INTERVALVE POONAWALA LTD	PUNE	A		SGI / CI / D2 1400MM PN10, SGI / CI 1000MM PN16,CS/SS 500MM PN16, SS 400MM CLASS#300, MS FABRICATED	WTP, CW,CT,CPU,FDPS,CAS , AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					SWIMS TECHNOLOGIES	HUBLI	A		CI/ DI BUTTERFLY VALVE UP TO 1000MM AND PN16 AND UP TO 1800MM AND PN10,CCS UP TO	
					PENTAIR VALVES	HALOL	A		FOR SS UP TO 500 NB PN-10, CI- UP TO 900NB PN-10, UP TO 500NB PN-16, 450MM CLASS#300., MS FABRICATED	
					FOURES ENGINEERING	BANGALORE	A		CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16 ,2400 MM PN6/CLASS150	
					KIRLOSKAR BROTHERS LTD	KONDHAPURI	A		CAST SGI/CI/CS 1400 MM PN16 , SS 300 MM PN16 , 1800MM CLASS 150, MS FABRICATED 900 NB PN40,MS	
					R & D MULTIPLE	VALSAD	A		CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75 ,1100MM PN25,1400MM CLASS#150 ,MS	
					ADVANCE VALVES PVT LTD	GREATER NOIDA	A		METAL SEATED, TRIPLE ECCENTRIC, SS BFV OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300.	
					BRAY CONTROLS INDIA PVT. LTD	KANCHIPURAM	A		UPTO 450 MM AND CLASS#600	
					INSTRUMENTATION LTD.	PALAKKAD	A		UPTO 2200NB CLASS # 75	
					HAWA ENGINEERS	AHMEDABAD	A		CI/ CS & FABRICATED UPTO 1200MM, CLASS #150, SS UPTO 250MM, CLASS#150	
					CRANE PROCESS FLOW	SATARA	A		UP TO 900MM PN10	
					L & T VALVES LIMITED	COIMBATORE	A		UP TO 900MM CLASS 150	
					DEMBLA VALVES	THANE	A		UP TO 2200MM CLASS#75	



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9.D	VALVE-CONVENTIONAL GATE / GLOBE / CHECK > 600NB OR CLASS > 300	II			LEADER VALVES	JALANDHAR	A		CS GATE 600MM CLASS#600, SS GLOBE 600MM CLASS#600, CS CHECK 600MM AND CLASS#600	WTP, CW,CT,CPU,FDPS,CAS , AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					HAWA ENGINEERS	AHMEDABAD	A		FCS / FSS 50 NB CLASS 800.	
					FOURES ENGINEERINGS	THANE	A		400NB CLASS 600 AND 50NB CLASS 800.	
					BHEL IVP	GOINDWAL	A		GATE UP TO 300 NB CLASS 600. GLOBE 250 NB CLASS 400, CHECK 150NB CLASS 600.	
					HITECH ENGG PVT LTD	AHEMDABAD	A		50 NB CLASS 800.	
					KSB PUMPS LTD	COIMBATORE	A		300NB CLASS 2500.	
					NITON VALVES INDIA PVT LTD	NAVI MUMBAI / AURANGABAD	A		CS GATE 900 NB CLASS 600, CHECK 300 NB CLASS 600.	
					L&T VALVES LIMITED	COIMBATORE	A		650 MM CLASS 600, 50 NB CLASS 800.	
					SWIMS TECHNOLOGIES	HUBLI	A		CONVENTIONAL CCS GATE / GLOBE / CHECK VALVES UP TO 600MM AND CLASS # 1500, CSS GATE/ GLOBE/ CHECK VALVES UP TO 600MM AND CLASS # 1500, CSS GATE/ GLOBE/ CHECK VALVES UP TO 300NB PN10	
9.E	VALVE- DIAPHRAGM TYPE	I			CRANE PROCESS FLOW	SATARA	A		UP TO 300NB PN10	WTP,CPU
					SWIMS TECHNOLOGIES	HUBLI	A		UPTO 250 NB - PN 10, 350MM PN6	
					PROCON ENGINEERS	MUMBAI	A		UPTO 200 NB AND PN 10/CLASS #150	
9.F	VALVE-PLUG > 100 MM OR CLASS > 800(VALVE- PLUG UP TO 100 MM & CLASS 800:CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			SWIMS TECHNOLOGIES	HUBLI	A		SOFT SEATED 400MM AND CLASS #150, 300NB CLASS#300	WTP,CPU,CHP, LHP&GHP, FOH,AHP
					XOMOX SANMAR	TRICHY	A		UP TO 600MM AND CLASS#300	

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						FLOWSERVE INDIA CONTROLS	CHENNAI	A		METALLIC SEATED 400NB CLASS#150, 300NB CLASS #300, 50NB CLASS #800	
10	PUMP -SUBMERSIBLE>= 30KW	I			KSB	NASHIK	A			130 KW	WTP,CT, CPU,CHP, LHP&GHP, FOH,AHP.LP PIPING,FDPS
					KIRLOSKAR BROTHERS LTD	KIRLOSKARWADI	A				
					AQUA MACHINERY	AHMEDABAD	A		UP TO 235 KW		
					WPIL	GHAZIABAD	A				
11	RUBBER EXPANSION JOINT>=1600NB (RUBBER EXPANSION JOINT < 1600NB: CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			CORI ENGINEERS PVT LTD	CHENNAI	A		UPTO 2800 MM	ACW, ECW, CW,CT	
					SRM EXOFLEX PVT LTD	KOLKATA	A		UPTO 2800 MM		
11.A	DRIFT ELIMINATOR-PVC	I			M/s Cooldeck	Daman	A				CT
		I			M/s MM Aqua	Gurgaon	A				CT
11.B	FILLS (Trickle Grid /Moduler/Splash)	I			M/s Enexio Power cooling solutions ,	Thiruvallur(TN)	A			NF20	CT
12	FAN ASSEMBLY-COOLING TOWER	I			PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A			WITH SOLID FAN BLADES 288" AND 336 " DIA, WITH FOAM CORED FAN BLADES WITH 10METERS AND 10.97 METERS	CT
					PAHARPUR COOLING TOWERS LTD	BHASA	A		60" TO 288" FAN DIA		
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A		60" TO 288" FAN DIA		



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					M/s MAYA FANS AIR ENGG PVT LTD,	DEWAS	A		UP TO 11 METER FAN DIA	
					AMALGAMATED INDUSTRIAL COMPOSITES PVT LTD	NASHIK	A		UP TO 11 METER FAN DIA	
13	GEAR BOX -COOLING TOWER	I			PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A			CT
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A			
					NEW ALLENBERRY WORKS	KOLKATA	A			
					ELECON ENGINEERING	VALLABH VIDYANAGAR	A			
					PREMIUM ENERGY TRANSMISSION LTD.	FALTA	A			
14	DRIVE SHAFT-CARBON FIBRE -COOLING TOWER	II			M/S EUROFLEX TRANSMISSION (INDIA) PVT LTD	HYDERABAD	A			CT
					PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A			
					M/s AMALGAMATED INDUSTRIAL COMPOSITES PVT LTD	NASHIK	A			
					NORTH STREET COOLING TOWERS	GHAZIABAD	A			
15	DRIVE SHAFT SS-COOLING TOWER	II			PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A			CT
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A			
					NORTH STREET COOLING TOWER	GHAZIABAD	A			



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16	PUMP-CW PUMP	I			KIRLOSKAR BROTHER'S LIMITED	KIRLOSKARWADI	A		BOTH CV & VT TYPE VT Upto 43000 CUM/H and VT Upto 30000 CUM/H	CW
					WPIL LTD	KOLKATA	A		BOTH CV & VT TYPE	
					FLOWSERVE INDIA CONTROLS	COIMBATORE	A		CV TYPE ONLY	
					PVT LTD		A			
					FLOWMORE LTD	GHAZIABAD	A		VT TYPE ONLY	
					XYLEM WATER SOLUTIONS INDIA	VADODARA	A		VT TYPE ONLY	
17	ELECTRO HYDRAULIC ACTUATOR FOR CW PUMP DISCHARGE BUTTERFLY VALVE	I			BOSCH REXROTH (INDIA) PVT LTD	SANAND	A		HYDRAULIC POWER PACK AND HYDRAULIC CYLINDER (320 MMM BORE DIA) , ACCUMUATOR FORM	CW
					HYDAC (INDIA) PVT. LTD	COIMBATORE	A		HYDRAULIC POWER PACK-HYDAC COIMBATORE, HYDRAULIC CYLINDER - HYDAC BANGLORE, ACCU MULATOR	
18	IMPELLER CASTING - CW PUMP	II			ISGEC	MUZAFAER NAGAR	A		FINISHED CASTING UP TO 4.0 MT	CW
									APPROX	
					THE KOLHAPUR STEEL LTD,	KOLHAPUR	A		FINISHED CASTING UP TO 4.0 MT	
									APPROX	
					WESTERN PRECAST PVT LTD	SANGLI	A		FINISHED CASTING UP TO 3.5 MT	
									APPROX	
					HINDUSTAN UDYOG LIMITED	NAGPUR	A		FINISHED CASTING UP TO 3.0 MT	
									APPROX	
					HI-MET CORPORATION	S.KOREA	A		FINISHED CASTING UP TO 3.0 MT	
									APPROX	
					TULIP CASTING	KOHLAPUR	A		WEIGHT UPTO 3.0 MT , DIA 1600 MM	



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				MATHER FOUNDARY LTD	UK	A		FINISHED CASTING UP TO 3.6 MT APPROX	
SHAFT-FORGING -CW PUMP	II			GORADIA SPECIAL STEELS LTD	KHAPOLI	A			CW
				BHARAT FORGE	PUNE	A			
				CFFP,BHEL	HARIDWAR	A		UP TO DIAMETER 290MM AND LENGTH APPROX. 3000MM, GRADE SS410	
THRUST BEARING FOR CW PUMP	I			MICHEL	BANGLORE	A			CW
				KMP	GREATER NOIDA	A			
DELUGE VALVE WITH TRIMS	I			HD FIRE	THANE/JALGAON	A			FDPS
				CARRIER	GURGAON	A		FOR PISTON TYPE DELUGE VALVE ONLY	
INERT GAS EXTINGUISHING SYSTEM	II			ANSUL	USA	A			FDPS
				KIDDE (GINGEKERR)	UK	A			
				NAFFCO	UAE	A			
				MINIMAX Gmbh & Co. KG	GERMANY	A			
				TOTAL WALTHER	GERMANY	A			
				NOHMI BOSAI	JAPAN	A			



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23	ALARM VALVE WITH TRIMS	II			HD FIRE	THANE	A			FDPS
					HD FIRE	JALGAON	A			
24	FOAM SYSTEM(BLADDER TYPE)	I			HD FIRE	JALGAON	A			FDPS
					FIRETECH	RATNAGIRI	A			
25	FIRE TENDER	I			WADIA BODY BUILDERS	AHEMDABAD	A			FDPS
					AAREL INDUSTRIES	INDORE	A			
					AMBALA COACH	AMBALA	A			
					VIJAY FIRE	UMBERGAON	A			
					MARATHON ELECTRIC MOTOR(I) LTD	KOLKATA	A		UP TO 50000 CMH	AC& VENTILATION, CHP, LHP&GHP,,AHP
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		UP TO 200000 CMH	
					ALMONAROD (P) LIMITED	CHENNAI	A		UP TO 60000 CMH	
					PATEL AIRFLOW	VATWA, AHMEDABAD	A		UP TO 250000 CMH	
					CB DOCTOR VENTILATOR PVT LTD	AHMEDABAD	A		UP TO 150000 CMH	
					WOLTER VENTILATORS INDIA (P) LTD	BHIWADI,	A		UP TO 200000 CMH	



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INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL

प्रचालित होने तथा सब-वेंडर के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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26	CENTRIFUGAL FAN (≥ 5KW) MOTOR FROM NTPC ACCEPTED SOURCE	I			C DOCTOR &CO PVT LTD	KOLKATA	A		UP TO 250000 CMH	
					SUVIDHA AIR ENGINEERS	AHMEDABAD	A		UP TO 190000 CMH	
					SUBURBAN INDUSTRIAL WORKS PVT. LTD	KOLKATA	A		UP TO 100000 CMH	
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	THANE	A		UP TO 90000 CMH	
					SOLYVENT FLAKT	KOLKATA	A		UP TO 200000 CMH	
					ADVANCE VENTILATION PVT LTD	SONEPAT	A		UP TO 250000 CMH	
					SK SYSTEMS PVT LTD	SONEPAT	A		UP TO 250000 CMH	
27	DIESEL ENGINE	I			CUMMINS	PUNE	A		Up to 2000 KVA	DG SET,FDPS
					PERKINS	AURANGABAD	A		UP to 313 HP	
					GREAVESS COTTON	AURANGABAD	A		Up to 1750 KVA	
28	3 LPE COATED PIPE	I			SAIL	ROURKELA	A			MUW
					RATNAMANI	KUTCH	A		UP TO 1100 NB	
					PSL LTD	KUTCH/ VIZAC	A		UP TO 1100 NB	
					TRANTER INDIA	PUNE	A		HT PLATES & GASKETS FROM TRANTER SWIDEN/USA.HT PLATES FROM HISKA JAPAN	ECW

 Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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29	PLATE HEAT EXCHANGER	I			ALPHA LAVAL	SATARA	A		HT PLATES & GASKETS FROM ALPHA LAVAL SWIDEN	
					IDMC	ANAND	A		HT PLATES & GASKETS FROM SONDEX DENMARK	
					SONDEX INDIA	VADODARA	A		HT PLATES FROM SONDEX DENMARK/INDIA (MODEL S188)	
30	DI(Ductile Iron) PIPE & FITTINGS	I			JINDAL SAW(J161)	KUTCH	A		UP TO DN 900 CLASS K7 & K9	MUW
					JAI BALAJI(J156)	BARDWAN	A		UP TO DN 900 CLASS K7 & K9	
					ELETRO STEEL	KOLKATA	A			
31	AIR COPMRESSOR: OIL FREE CENTRIFUGAL COMPRESSOR	I			NGERSOLL RAND INDIA	AHEMDABAD	A		Capacity Upto 60 NM3/Minute @ Pr 8 bar	CAS
					KIRLOSKAR PNEUMATIC COMPANY LTD	PUNE	A		Capacity up to 45.3 Nm3/min and pressure rating up to 9.3 kg/cm2	
32	SCREW TYPE AIR COMPRESSORS	I			ATLAS COPCO	Pune (Dapodi)	A			CAS, CHP, LHP, GHP, MRHS, AHP
		I			INGERSOL RAND INDIA	AHMEDABAD	A		UPTO MODEL SH 300 (36 NM3/MIN) . AIR ENDS FROM GHH RAND - GERMANY & OTHER COMPONENTS FROM IR'S GLOBAL SOURCES ASSEMBLY & TESTING AT INGERSOL- AHMEDABAD	
		I			ELGI	COIMBATORE	A		UPTO 2830 CFM, AIR ENDS FROM HITACHI- JAPAN. ASSEMBLY AND TESTING AT ELGI COIMBATORE.	
		I			KIRLOSKER PNEUMATIC COMP LTD	PUNE	A		FLOW CAPACITY 45.3 NM3/MIN , AND PRESSURE RATING 9.3 KG/CM2	



Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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33	AIR DRYER	I			SUMMITS HYGRONICS	COIMBATORE	A		FOR REFRIGERANT DRYER, 11893 M3/HR , REGENERATIVE DRYERS BLOWER REACTIVATED TYPE 2123 M3/HR AND REGENERATIVE DRYERS HOC TYPE 5820 M3/HR	CAS
					MELLCON ENGRS PVT LTD	GR NOIDA	A		Refrigerant type 60 m3/hr & REGENERATIVE DRYERS HOC TYPE 2548 M3/HR	
					DELAIR INDIA LTD	GURGAON	A		Refrigerant type 7500 m3/hr & REGENERATIVE DRYERS HOC TYPE 3000 M3/HR	
					SUMESH PETROLEUM	VADODARA	A		100 CFM(169 M3/HR) & 7 KG/CM2	
					TRIDENT PNEUMATIC PVT LTD	COIMBATORE	A		Refrigerant type 10000 m3/hr & REGENERATIVE DRYERS BHR TYPE 1000 M3/HR	
34	SCREW CHILLER	II			KIRLOSKAR CHILLER	PUNE	A		UP TO 350TR	AC& VENTILATION
					DAIKIN	NEEMRANA	A		UP TO 185 TR	
					BLUE STAR (COMPRESSOR FROM HANBEL-TAIWAN)	WADA	A		SCREW CHILLER UP TO 282TR	
35	Mettalic Expansion Bellows	II			MB METTALIC BELLOWS	CHENNAI	A			MRHS
					SUR Industries	KOLKATA	A			
					LONE STAR	CHENNAI	A			
36	Conveying Compressor (Reciprocating)	I			KIRLOSKAR PNEUMATICS	PUNE	A			MRHS
					INGERSOLL RAND	AHEMDABAD	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
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INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL

प्रस्तावित उप-प्रदाताओं के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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					ATLAS COPCO(CHICAGO PNEUMATIC BRAND)	PUNE	A			
37	ALLOY CAST IRON PIPE, FITTINGS AND LINER	I			CRAWLEY & RAY	KOLKATA	A			MRHS, AHP
					ALLIED FOUNDRIES	BELGAUM	A			
					PARAMOUNT CASTINGS	NAGPUR	A			
					NORTHERN ALLOY	BHAVNAGAR	A			
					MENON METALLIK	KOLHAPUR	A			
					KOLHAPUR STEEL	KOLHAPUR	A			
					AQUA ALLOY	KOLHAPUR	A			
					MARTO PEARL	HYDERABAD	A			
					R.R.L	HOWRAH	A			
					CONCAST ENGINEERING	BURDWAN, WB	A			
					NATRAJ IRON & CASTINGS	DHANBAD	A			
					ABHIPRIYA BUSINESS	PANT NAGAR	A			
					MELCO	FARIDABAD	A			



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प्रस्तावित प्लान तथा सब-वेंडर के अनुमोदन सहित मदों की सूची

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38	DRY ASH UNLOADING CHUTE	I			MACAWBER BEEKAY	KESHWANA	A			AHP
					MINING AND MATERIAL HANDLING EQUIPMENT	KOLKATA	A			
					DCL	HYDERABAD	A			
39	BAG FILTER / SILO VENT FILTER	II			FLAKT	KOLKATA	A			AHP,MRHS
					ORIENT FANS (ACCO)	KOLKATA	A			
					THERMAX	PUNE	A			
					RIECO	PUNE	A			
					MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
					TAP ENGINEERING	KANCHEEPURAM	A			
40	REFRIGERANT TYPE DRYER	I			SUMMITS HYGRONICS	COIMBATORE	A		Upto 11893 m3/hr	AHP
					TRIDENT	COIMBATORE	A		Upto 10000 m3/hr	
					MELLCON	GREATER NOIDA	A		Upto 7250 m3/hr	



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प्रचालित होने तथा सब-वेंडर के अनुमोदन सहित मदों की सूची

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					DELAIR	GURGAON	A		Upto 7500 m3/hr	
					ATLAS COPCO	BELGIUM	A		Upto model FD 1200. ASSEMBLY AND TESTING AT PUNE	
41	VACUUM PUMP [WATER SEAL RING TYPE]	I			KAKATI KARSHAK	HYDERABAD	A			AHP
					AEROMATIC	AHEMDABAD	A		Size Upto 200 MM , Capacity 3924 m3/hr	
42	BASALT LINE PIPE & FITTING	I			DECCAN MECHANICAL & CHEMICAL	BARAMATI	A			AHP
					ENVIRO ABRASION	PUNE	A		CAST BASALT LINERS FROM SCHOLTEN GmbH-GERMANY	
					TURBO ENGINEERS	COIMBATORE	A		CAST BASALT LINERS FROM KALENBORN - GERMANY/POLAND OR EUTIT - Czech Republic	
					GOENKA CAST ENGINEERING(I) PVT LTD	DURG	A		UP TO 350 NB	
					BMW STEEL	ROORKEE	A		UP TO 550 NB	
43	SLURRY DUTY KNIFE GATE VALVE	I			BRAY CONTROLS INDIA PVT LTD, VAAS KNIFE GATE VALVE DIVISION	CHENNAI	A		UPTO PN 10 RATING	AHP
					FOURESS ENGINEERING	BANGALORE	A		UPTO PN 10 RATING	
					ORBINOX	COIMBATORE	A		UPTO PN 16 RATING	
					WEIR MINERALS	BANGALORE	A		UPTO 12" PN 10 RATING	
					BRAY CONTROLS INDIA PVT LTD, VAAS KNIFE GATE VALVE DIVISION	CHENNAI	A			



Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL प्रस्तावित उप-सप्लायर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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44	FLY ASH DUTY KNIFE GATE VALVE	I			FOURESS ENGINEERING	BANGALORE	A			AHP
					ORBINOX	COIMBATORE	A			
					JASH SCHUTTE	INDORE	A			
45	CAST IRON PIPE	II			ELECTROSTEEL	CHENNAI	A		UPTO 450 NB	AHP
					KESORAM	KOLKATA	A		UPTO 350 NB	
					IISCO	KULTI	A			
					KAPILANSH DHATU UDYOG	NAGPUR	A		APPROVED UPTO 300 NB.	
					KUSHA LAVA	VIJAYWADA	A		FOR NON STD. SIZE	
46	ASH SLURRY PUMP	I			SAM INDUSTRIAL PUMPS	COIMBATORE	A			AHP
					WEIR MINERALS	AUSTRALIA	A		MANUFACTURING AT WEIR MINERALS BANGALORE	
47	AIR LOCK FEEDER VESSEL / BOTTOM ASH OVERFLOW TANK/MIXING TANK/COARSE ASH TANK/ AIR OIL CONVERTOR TANK, AIR INTAKE VALVE	II			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		AIR OIL TANK- ASANSOLE , AIR INTAKE VALVE - KUMARDUBHI	
					MACAWBER BEEKAY	KESHWANA	A			
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
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**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

प्रस्तावित उप-सप्लायरों के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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48	BOTTOM ASH HOPPER / BUFFER HOPPER/DUST COLLECTOR	I			MELCO	FARIDABAD	A		ONLY FOR BUFFER HOPPER AND DUST COLLECTOR	AHP
					MACAWBER BEEKAY	KESHWANA	A			
49	CLINKER GRINDER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
50	FLY ASH HOPPERVALVE/ASH INTAKE VALVE/FLY ASH DIFFUSER / DRIVE ARRANGEMENT FOR CLINKER GRINDER	II			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
51	FLUIDIZING PAD / FLUSHING APPARATUS	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			



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52	FLY ASH STORAGE SILO/HCSO SILO	I			MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			AHP
					MACAWBER BEEKAY	KESHWANA	A			
53	FEED SUMP / VACUUM BREAKER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
54	FLY ASH HEADER VALVE/BRANCH HEADER VALVE / AIR INTAKE VALVE /EQUALISING VALVE /PLUG GATE FOR SUMP ISOLATION	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	KUMARDHUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
55	HYDROMIX DUST CONDITIONER/ROTARY FEEDER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
					L&T	KANSBAHAL	A			
					EXPONENTIAL ENGINEERING	PUNE	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
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**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

प्रचालित प्रान तथा सब –वेडर के अनुमोदन सहित मदों की सूची

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56	JET PUMP / JETTING NOZZLE	I			MELCO	FARIDABAD	A		JET PUMP / JETTING NOZZLE	AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		JET PUMP / JETTING NOZZLE	
					L&T	KANSBAHAL	A		JET PUMP	
					MACAWBER BEEKAY	KESHWANA	A		JET PUMP / JETTING NOZZLE	
57	COLLECTOR TANK / AIR WASHER / WETTING HEAD / SURGE / SETTLING TANK	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
58	PLATE VALVE AT DYKE END	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
59	DESSICANT TYPE AIR DRYER	I			DELAIR	GURGAON	A			AHP
					INDCON	DELHI	A			
					MELLCON	GREATER NOIDA	A			
					SUMMIT'S HYGRONICS	COIMBATORE	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL

प्रस्तावित उप-प्रदाताओं के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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					TRIDENT	COIMBATORE	A			
60	STACKER RECLAIMER & RECLAIMER	I			MCNALLY	KUMARDHUBI / ASA	A			CHP
					L&T	KANCHEEPURAM	A			
					THYSENKRUPP	PUNE	A			
					ELECON	V V NAGAR	A			
					TRF	JAMSHEDPUR	A			
					SANDVIK	PUNE	A			
					PROMAC	BANGALORE	A			
					THYSENKRUPP	HYDERABAD	A		* Hyderabad works approved for some of assemblies for Stacker Reclaimer - Counter Weight Boom, Box and Bucket	
61	WAGON TIPPLER & SIDE ARM CHARGER	I			ELECON	V V NAGAR	A			CHP
					FAMAK S.A. (IN ASSOCIATION WITH	POLAND	A			
					L & T	KANSBAHAL	A			
					THYSENKRUPP	PUNE	A			
					TRF	JAMSHEDPUR	A			



Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL प्रस्तावित उप-आपूर्तिकर्ताओं के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
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					PROMAC	BANGALORE	A			
62	APRON FEEDER WITH DRIBBLE CONVEYOR (	I			THYSSENKRUPP	HYDERABAD	A		UPTO 2400 TPH	CHP
					L&T	KANSBAHL	A		UPTO 2200 TPH	
					ELECON	VV NAGAR	A		UPTO 2200 TPH	
					TRF	JAMSHEDPUR	A		UPTO 2400 TPH Extended Warranty of 3 years over & above of contractual warranty on parts	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 2200 TPH	
63	RING GRANULATOR	I			PENNSYLVANIA CRUSHERCORPORATION	USA	A		UP TO 1760 TPH	CHP
					AMERICAN PULVERISER	USA	A		UPTO 1875 TPH	
					THYSSENKRUPP	PUNE	A		UP TO 2035 TPH	
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual	
					L&T	KANSBAHAL	A		UP TO 1600 TPH	
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1000 TPH	
					TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	



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64.A	VIBRATING SCREEN FEEDER	I			ELECON	V V NAGAR	A		UP TO 1320 TPH	CHP
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH	
					THYSENKRUPP	PUNE	A		UP TO 2035 TPH	
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1210 TPH	
64.B	VIBRATING FEEDER	I			TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	CHP
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH	
					THYSENKRUPP	PUNE	A			
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1210 TPH	
					INTERNATIONAL COMBUSTION	NAGPUR	A			
					Electro Zavod	Kolkata	A		UPTO 400TPH	
					Elektromag Joest	Vapi	A		UP TO 750 TPH	



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65	TRAVELLING TRIPPER	I			BENGAL TOOLS	KOLKATA	A			CHP
					THYSSENKRUPP	PUNE / HYDERABAD	A			
					ELECON	V V NAGAR	A			
					MBE	KUMARDHUBI	A			
					TRF	JAMSHEDPUR	A			
					HMTC	KOLKATA	A			
					L & T - MACNIL	CHENNAI	A			
					L & T	KANSBAHAL	A			
					L & T - EWL	KANCHEEPURAM	A			
					PHOENIX CONVEYOR BELT	KOLKATA	A		FABRIC BELT UPTO 2200 MM WIDTH, STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH)	
					IMASS S.A	GREECE	A		FABRIC BELT UPTO 2400 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH	
					MRF	CHENNAI	A		FABRIC BELT UPTO 1600 MM WIDTH	
					SEMPELTRAN NIRLON	MUMBAI	A		FABRIC BELT UPTO 1600 MM WIDTH	
					HINDUSTAN RUBBER	SILVASA	A		FABRIC BELT UPTO 1600 MM WIDTH	



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66	FABRIC BELTING(FR GRADE) / STEEL CORD BELTING(FR GRADE)	I			NORTHLAND RUBBER	SONEPAT	A		FABRIC BELT UPTO 2200 MM WIDTH.	CHP, LHP/GHP
					SOMI CONVEYOR	JODHPUR	A		FABRIC BELT UPTO 2000 MM WIDTH	
					RAVASCO TRANSMISSION LTD.	VAPI	A		FABRIC BELT UPTO 2200 MM WIDTH	
					ORIENTAL RUBBER	PUNE	A		FABRIC BELT UPTO 2200 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2000 MM WIDTH)	
					FORECH	CHENNAI	A		FABRIC BELT UPTO 2000 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2200 MM WIDTH)	
					CAMOPLAST	KOREA	A		STEEL CORD FR GRADE UPTO 2400 MM WIDTH	
					YOKOHAMA	JAPAN	A		FABRIC BELT UPTO 2400 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH)	
67	IDLERS	I			ELECON	V V NAGAR	A			CHP , LHP/GHP
					MBE	KUMARDHUBI	A			
					KALI	KUMBAKONAM	A			
					AMPS	JAMSHEDPUR	A			
					A.ADAK	HOWRAH	A			
					BTL EPC	KOLKATA	A			
					V V N MFG	V V NAGAR	A		Upto 150 NB Dia	



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INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
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प्रचालित प्रान तथा सब –वेडर के अनुमोदन सहित मदों की सूची

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					THYSSENKRUPP	HYDERABAD / PUNE	A			
					PROMAC	BANGALORE	A			
					L & T - EWL	KANCHEEPURAM	A			
					ROLLWELL	HINDUPUR	A			
					TRF	JAMSHEDPUR	A			
68	PULLEYS	I			ELECON	V V NAGAR	A			CHP, LHP/GHP
					PROMAC	BANGALORE	A			
					MBE	KUMARDHUBI	A			
					BTL EPC	KOLKATA	A			
					TNS HEAVY	CHENNAI	A			
					KALI	THIRUBUVANAM	A			
					THYSSENKRUPP	HYDERABAD / PUNE	A			
					L & T - EWL	KANCHEEPURAM	A			
					V V N MFG	V V NAGAR	A		Upto 800 NB Dia	



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					ROLLWELL	HINDUPUR	A			
					TRF	JAMSHEDPUR	A			
69	HELICAL GEARBOX	I			SHANTI GEARS	COIMBATORE	A		Upto size 560	CHP, LHP/GHP
					ELECON	V V NAGAR	A			
					SIEMENS (FLENDER)	KHARAGPUR	A			
					PREMIUM TRANSMISSION LTD	PUNE/FALTA	A		Up to size 710 / 450	
					SIEMENS (FLENDER)	GERMANY	A			
					NEW ALLENBURY WORKS	KOLKATA	A			
70	PLANETARY GEARBOX	I			ELECON	V V NAGAR	A			CHP,LHP/GHP
					SIEMENS (FLENDER)	GERMANY	A			
					MOVENTAS	GERMANY	A			
					DANA MOTION SYSTEMS ITALIA S.p.A	ITALY	A		(Earlier name - BREVINI)	
					MAGTORQ	HOSUR	A		Upto 11 KW	
					SEW EURODRIVE GMBH & CO.	GERMANY	A			



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71	FLUID COUPLING (SCOOP AND TRACTION TYPE)	I			FLUIDOMAT	DEWAS	A		Scoop type upto SC-1330	CHP,LHP/GHP
					PTL	AURANGABAD	A		SCOOP TYPE UPTO PST 1150	
					ELECON	V V NAGAR	A		Scoop type upto model ESC 760. 1. As part of Type test M/s Elecon will demonstrate Scoop tube in & Scoop tube out test.	
					VOITH	HYDERABAD	A		SCOOP TYPE UPTO SVNL 1330	
72	SLEW RING	III			TITANUS	SOUTH AFRICA	A			CHP, LHP/GHP
					IMO	GERMANY	A			
					SKF	FRANCE	A			
					ROTHERDE	GERMANY	A			
					LIEBHERR	GERMANY	A			
73.A	COAL SAMPLER SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	CHP
					ERIEZ MAG EUROPE LTD	UK	A			
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AND BOTTLE COLLECTOR AT MULTOTEC SA	
					THERMO RAMSAY INC	USA	A			
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER	



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73.B	LIMESTONE SAMPLING SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	LHP/GHP
					ERIEZ MAG EUROPE LTD	UK	A			
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTLLE COLLECTOR AT MULTOTEC SA	
					THERMO RAMSAY INC	USA	A			
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER	
74	HYDRAULIC POWER PACK	I			EATON POWER	PUNE	A			CHP, LHP/GHP
					BOSCH-REXROTH	AHMEDABAD	A			
					MAHA HYDRAULICS	CHENNAI	A			
					L & T HYDRAULICS	BANGALORE	A		EXCEPT FOR STACKER RECLAIMER	
					Hydac	COIMBATORE	A			
75	HYDRAULIC CYLINDER	I			VELJAN	HYDERABAD	A			CHP, LHP/GHP
					WIPRO	BANGALORE	A			
					EATON POWER	PUNE	A			
					L & T HYDRAULICS	BANGALORE	A			



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					BOSCH-REXROTH	AHMEDABAD	A			
					Hydac	COIMBATORE	A			
76	HYDRAULIC MOTOR	I			POCLAIN HYDRAULICS	FRANCE	A			CHP , LHP/GHP
					BOSCH-REXROTH AB (FORMERLY H	SWEDEN	A			
					PARKER CALZONI	ITALY	A			
					MAHA HYDRAULICS	CHENNAI	A		UP TO 100 LITRE CAPACITY	
					KAWASAKI	UK	A			
77	HAMMER MILL CRUSHER FOR LIME STONE HANDLING SYSTEM	I			INTERNATIONAL COMBUSTION	NAGPUR	A			LHP/GHP
					MCNALLY SAYAJI	BARODA	A			
					MCNALLY SAYAJI	KUMARDHUBI	A			
					ELECON	V V NAGAR	A			
					THYSSENKRUPP INDUSTRIES INDIA	PUNE	A			
					ECOMAN	BARODA	A		UPTO 150TPH	
					INDIANA GRATINGS PVT. LTD.	PUNE	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

प्रस्तावित उप-प्रदाताओं के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

REV. NO.:

DATE/ तिथि : 26.06.2023

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					JINDAL STEEL & POWER LTD.	RAIGARH	A			
					BABY ENGG. PVT. LTD.	TRICHY	A			
					REGIONAL ENGG. WORKS	TRICHY	A			
					AJANTHA FABS	MATHURA	A			
					CAPACITE STRUCTURES LTD.	THANE	A			
					MIURA INFRASTRUCTURE PVT. LTD.	BHILAI	A			
					SHIVAM HITECH STEELS PVT. LTD	BHILAI	A			
					TECHNOFAB MANUFACTURING LTD.	CHENNAI	A			
					JSW SEVERFIELD STRUCTURES LTD(JSSL)	BELLARY	A			
					ALLIANCE INTEGRATED METALIKS LTD(AIML)	RAJPURA	A			
					ATMASTCO PVT LTD	DURGAPUR	A			
					APEX BUILDSYS LTD	NAGPUR	A			
					COREFAB PROJECTS PVT LTD	BHILAI	A			
					KOTHARI CHEMICALS	BHILAI	A			



Project/ परियोजना : SIPAT-III (1X800 MW)
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

**INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL**

प्रस्तावित प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची

SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

REV. NO.:

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78	SHOP FABRICATED STRUCTURE	I			FEDDERS LLOYD CORPORATION LTD	SIKANDRABAD	A			CHP/LHP/GHP
					ARCELOR MITTAL DHAMM PROCESSING PVT LTD	RANIPET	A			
					ARTSON ENGINEERING	NASIK	A			
					ARTSON ENGINEERING	NAGPUR	A			
					HEAVY ENGINEERING WORKS	REWA, MP	A			
					ARCELORMITTAL NIPPON STEEL INDIA LTD	CHENNAI	A			
					TRIDENT FABRICATORS PVT LTD	ROURKELA	A			
					GREAT INDIA STEEL FABRICATORS	YAMUNA NAGAR	A			
					METALFAB HITECH	NAGPUR	A			
					SUPERTECH INDIA	G.NOIDA	A			
					GOODLUCK STEEL	SIKANDRABAD	A			
					BTL	KOLKATA	A			
					BTL	DURGAPUR	A			
					AMIYA COMMERCE	KOLKATA	A			



Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL प्रस्तावित उप-आपूर्तिकर्ता SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप. अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप-आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप-आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप-आपूर्तिकर्ता के विवरण	Remarks/ टिप्पणी	Applicable Systems
					NAMDHARI INDUSTRIAL	LUDHIANA	A			
					THYSSENKRUPP INDUSTRIES INDIA	HYDERABAD	A			
79	Steel Cord Pipe Conveyor (FR Grade)	I			Phonix Cnoveyor belt	Kolkata	A		Upto 2400 MM B/w	
					Oriental Rubber	Pune	A		Upto 2000 MM B/w	
					Forech India Pvt Ltd	Cheyar	A		Upto 2200 MM B/w	
80	PIPE-SS ASTM A 312	II			REMI	TARAPUR	A		ERW UPTO 400 NB,SEAMLESS UP TO 200NB	
					RATNAMANI	MEHSANA	A		ERW UPTO 500 NB, SEAMLESS UPTO 50 NB ONLY	
					RATNAMANI	KUTCH	A		ERW UPTO 400 NB, SEAMLESS UPTO 50 NB ONLY, ARC WELDED UP TO 450NB	
					BHANDARI FOILS & TUBES LIMITED	DEWAS	A		ERW UP TO 300NB	
					APEX	BEHRORE	A		ERW UPTO 400 NB, SEAMLESS UPTO 50 NB.	
					PRAKASH STEELAGE	SILVASA	A		ERW UP TO 203NB	
					SHUBHLAXMI METALS AND TUBES	UMBERGAON	A		SEAMLESS UP TO 150MM and ERW UP to 250 NB Sch 40S	
81	PIPE-SS SEAMLESS ASTM A 106	II			ISMT	AHMADNAGAR	A		UPTO 273 MM OD	
					ISMT	BARAMATI	A		UPTO 273 MM OD	



	Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्रवालिटि प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
	S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण	Remarks/ टिप्पणी	Applicable Systems
81	PIPE-SS SEAMLESS ASTM A106	II			REMI	BHARUCH	A		UPTO 177.8 MM OD		
					MAHARASHTRA SEAMLESS	RAIGAD	A		UPTO 500 NB		
82	HCSD PUMP	I			WEIR MINERALS	NETHERLANDS	A				
					ABEL	GERMANY	A				
					FELUWA	GERMANY	A				
ITEM WITH MAIN CONTRACTOR / BIS APPROVED SOURCES.											
1	BRANCH PIPE , COUPLING & NOZZLE (SS & GM)	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS	
2	FIRE EXTINGUISHER	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS	
3	WATER MONITOR	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE						
4	PIPES-MS- (BLACK/ GI) AS PER IS:1239 & IS:3589 UPTO 1000 NB	II			(BIS MARKED, MANUFACTURERS WITH VALID BIS LICENSE)					WTP,CW,CT,CPU,FDP S,AC&VENTILATION, CHP,LHP&GHP,AHP	
5	FIRE HOSE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS	
6	HYDRANT VALVE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS	
7	PIPES FOR IDLERS IS 9295	III			BIS APPROVED SOURCES WITH VALID BIS LICENSE						
8	BLOWERS -CENTRIFUGAL >=5KW	II			MAIN CONTRACTOR APPROVED SOURCES					WTP	

	Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:	INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची				DOC. NO./ दस्तावेज सं.:				
		SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण	Remarks/ टिप्पणी	Applicable Systems
9	CIO2 GENERATOR	II			MAIN CONTRACTOR APPROVED SOURCES					WTP
10	JOINT /FITTING COATING MATERIAL(SLEEVE) FOR 3 LPE PIPES	II			MAIN CONTRACTOR TO PROPOSED VENDOR FOR NTPC APPROVAL					MUW
11	PIPING FABRICATION -HP>300PSI	II			MAIN CONTRACTOR APPROVED SOURCES					WTP,CPU
12	PUMP-METERING/DOSING	II			MAIN CONTRACTOR APPROVED SOURCES					WTP,CPU
13	PUMP - PP- ACID/ ALKALI UNLOADING	II			MAIN CONTRACTOR APPROVED SOURCES					WTP,CPU
14	PUMPS-SCREW TYPE	II			MAIN CONTRACTOR APPROVED SOURCES					WTP,CPU,FOH
15	RUBBER LINING OF TANKS/ VESSELS/ PIPES/ VALVES/FITTINGS	II			MAIN CONTRACTOR APPROVED SOURCES					WTP,CPU
16	RO PRESSURE TUBE	II			MAIN CONTRACTOR APPROVED SOURCES					WTP
17	TUBE SETTLER MEDIA	II			MAIN CONTRACTOR APPROVED SOURCES					WTP
18	WRAPPING & COATING MATERIAL -ANTI CORROSIVE TAPE	II			MAIN CONTRACTOR APPROVED SOURCES					CW,CT,LP PIPING, FDPS
19	FAN CYLINDER SEGMENTS-FRP-COOLING TOWER	II			MAIN CONTRACTOR APPROVED SOURCES					CT
20	FILLS (PVC)	II			MAIN CONTRACTOR APPROVED SOURCES					CT
21	SHAFT-CARDON TYPE-CW PUMP	II			MAIN CONTRACTOR APPROVED SOURCES					CW
22	DUST EXTRACTION SYSTEM	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP

	Project/ परियोजना : SIPAT-III (1X800 MW) Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:	INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL त्र्यालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 26.06.2023 PAGE/ पृष्ठ :				
	S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण	Remarks/ टिप्पणी
23	DUST SUPPRESSION SYSTEM (PLAIN WATER)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP
24	DUST SUPPRESSION SYSTEM (DRY FOG)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP
Note-1 Items for which Sub-QR is envisaged, vendors are accepted subject to Sub-QR clearance from NTPC Engg.										
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त , यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए।										
DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत ब्यौरे की आवश्यकता" होगी। सूची में "DR" पत्र में इंगित किया जाना चाहिए।										
QP / INSPECTION CATEGORY:										
CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी।										
CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है। हालाँकि एनटीपीसी द्वारा कोई भौतिक निरीक्षण नहीं किया जाएगा। एनटीपीसी द्वारा अंतिम स्वीकृति अनुमोदित क्यूपी के अनुसार दस्तावेजों की समीक्षा के आधार पर दी जाएगी।										
CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.										
UNITS/WORKS इकाईयां / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयों / कार्यों के मुख्य सप्लायर का स्थान.										
FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0										Engg. Div. / QA&I

		Project/ परियोजना : SIPAT-III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL इवालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.:	
		Package/ पैकेज: EPC PACKAGES							REVISION NO : 00	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 09.05.2023	
		Contract No./ अनुबंध सं.:							SUB-SYSTEM उप-प्रणाली: QA-ELEC	
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	
1	GENERATOR	CAT I								
					BHEL	Haridwar	A			
					Siemens	Germany	A			
					GE	Sanand	A			
					GE	POLAND	A			
					MELCO	JAPAN	A			
					LMTG	Hazira	A			
					Hitachi	Japan	A			
					Toshiba	Japan	A			
					TJPS	Chennai	A			
2	IPBD	CAT I								
					BHEL	Rudrapur	A			
					C&S ELECTRIC	Haridwar	A			
3	Power Transformers	CAT I								
					ABB	Sweden	A		Up to 765 KV Class	
					ABB	Vadodara	A		Up to 765 KV Class	
					Toshiba	Japan	A		Up to 765 KV Class	
					CG Power & Industrial Solutions Ltd	Mandideep	A		Up to 765 KV class	
					BHEL	Bhopal	A		Up to 400 KV Class	
					Siemens	Mumbai	A		Up to 400 KV Class	
					GE T&D India Limited	Naini	A		Up to 400 KV Class	
					GE T&D India Limited	Vadodara	A		Up to 765 KV Class	
					TELK	Angamally	A		Up to 400 KV Class	
4	Shunt Reactor	CAT I								
					ABB	Sweden	A		Up to 765 KV Class	
					ABB	Vadodara	A		Up to 765 KV Class	
					Toshiba	Japan	A		Up to 765 KV Class	
					CG Power & Industrial Solutions Ltd	Mandideep	A		Up to 765 KV class	
					BHEL	Bhopal	A		Up to 400 KV Class	
					Siemens	Mumbai	A		Up to 400 KV Class	
					GE T&D India Limited	Vadodara	A		Up to 765 KV Class	
					GE T&D India Limited	Naini	A		Up to 400 KV Class	
5	Auxiliary Oil Filled Transformers	CAT I								
					BHEL	Jhansi	A		Up to 220 KV Class	
					Indotech Transformers	Chennai	A		Up to 16 MVA, 11 KV Class	
					Kanohar	Meerut	A		Upto 16 MVA, 33 KV Class	
					Kirloskar Electric Company Limited	Mysore	A		Up to 16 MVA, 33 KV Class	
					Schneider	Vadodara	A		Up to 50MVA, 132 KV Class	
					Transformers & Rectifiers Ltd.	Ahmedabad	A		Upto 90 MVA, 132 KV Class	
					Voltamp	Savli	A		Up to 3.5 MVA, 33 KV Class	
6	LT Switchgear -Floor mounted Draw out type indoor switchgear Panel (MCC etc.)	CAT I								
					Schneider (formerly L&T)	Mumbai / Coimbatore/ Ahmednagar	A			
					C&S Electric	Noida / Haridwar	A			
					Schneider	Nasik	A		ACB from Schneider, France	
					Siemens	Kalwa	A		Conditions apply	
					Schneider	Vadodara	A			
7	LT Switchgear - Floor mounted Fixed type indoor LT Switchgear Panel (ACDB / DCDB)	CAT I								
					Schneider (formerly L&T)	Mumbai / Coimbatore/Ahmednagar	A			
					C&S Electric	Noida/ Haridwar	A			
					Schneider	Nasik	A			

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					Siemens	Kalwa	A			
					Schneider	Vadodara	A			
8	11KV/3.3KV Switchgear- (MV Switchgear Panel)	CAT I								
					BHEL	Bhopal	A		Upto 33KV	
					Megawin	Salem	A		Upto 33KV	
					Schneider Electric India (Formerly L&T)	Ahmednagar	A		Upto 33KV	
					Siemens	Mumbai	A		Upto 33KV	
					ABB	Nasik	A		Upto 33KV	
					Schneider (Salt lake works)	Kolkata	A		Upto 11KV	
					Schneider	Vadodara	A		Upto 11KV	
8.1	Fast Bus Transfer panel along with relay	CAT I								
					Aartech	Parwanoo	A		conditions apply	
					ABB	Vadodara	A		conditions apply	
					SEL	Delhi	A		conditions apply	
9	HT Motor									
9.1	HT Motors (CW PUMP MOTOR)	CAT I								
					WEG	BRAZIL	A		UPTO 3405KW,11KV	
					HYOSUNG	S.KOREA	A		UPTO 2800KW,6.6KV	
					BHEL	BHOPAL	A			
9.2	HT MOTORS (BFP Motor)	CAT I								
					HYOSUNG	SOUTH KOREA	A		UPTO 11KV 13.5 MW	
					BHEL	BHOPAL	A		RQP	
					HYUNDAI	SOUTH KOREA	A		UPTO 11KV 17 MW	
9.3	HT MOTORS (ID Fan Motors)	CAT I								
					HYOSUNG	SOUTH KOREA	A		UPTO 11KV 13.5 MW	
					WEG	HOSUR	A		UPTO 11KV 14 MW	
					BHEL	BHOPAL	A		RQP	
					HYUNDAI	SOUTH KOREA	A		UPTO 11KV 17 MW	
					TMEIC	BENGALURU	A		UPTO 11 KV 5000 KW	
9.4	HT MOTOR FOR OTHER EQUIPMENTS	CAT - I								
					HYOSUNG	KOREA	A		UPTO 11KV 13.5 MW	
					WEG	BRAZIL	A		UPTO 11KV 2150 KW	
					WEG	HOSUR	A		UPTO 11KV 14 MW	
					BHEL	BHOPAL	A		RQP	
					HYUNDAI	KOREA	A		UPTO 11KV 17 MW	
					TECO	TAIWAN	A		UPTO 11KV 12 MW	
					TMEIC	JAPAN	A		UPTO 11KV 14 MW	
					CONVERTEAM	FRANCE	A		UPTO 11KV 18 MW (*DOCUMENTS FOR NAME CHANGE TO GE CONVERTEAM SHALL BE SUBMITTED FOR APPROVAL)	
					ABB	VADODARA	A		UPTO 6.6KV 2500 KW 11KV 2000 KW FOR PUMP/ FAN/ COMPRESSOR UPTO 6.6KV 750KW FOR MILL, UPTO 6.6 KV 1300KW FOR CRUSHER WITH SCOOP COUPLING	
					IJLIN	KOREA	A		UPTO 11KV 2900 KW, 6.6KV 2500 KW	
					JYOTI	VADODARA	A		UPTO 6.6 KV 2250 KW EXCEPT CRUSHER & MILL APPLICATION	
					MARATHON	KOLKATA	A		RQP, UPTO 6.6 KV 1300 KW FOR CRUSHER WITH SCOOP COUPLING & 11 KV 1600 KW FOR OTHER APPLICATION EXCEPT CRUSHER & MILL	
					CGL (D5 INDUSTRIAL AREA)	MANDIDEEP	A		UPTO 1650 KW 6.6 KV, 1350 KW 11 KV FOR PUMP, FAN, COMPRESSOR. UPTO 3.3 kV 335 kW WITH FLEXIBLE COUPLING FOR MILL APPLICATION	
					CGL(PLOT 9)	MANDIDEEP	A		UPTO 11 KV 4MW FOR PUMP/FAN/COMPRESSOR	
					CG ELECTRIC SYSTEM	HUNGARY	A		UPTO 3.3 KV 1100 KW	

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10	H.T. CABLE upto 33KV	CAT I			TMEIC	BENGALURU	A		UPTO 11 KV 5000 KW	
					Apar Industries	Umbergaon	A			
				Gemscab	Bhiwadi	A				
				Gupta Power	Kashipur	A				
				Havells India Ltd.	Alwar	A				
				KEC International	Vadodara	A				
				KEI Industries	Bhiwadi	A				
				Krishna Electrical Industries Ltd	Gwalior	A		Up to 11KV only		
				Polycab Wires Pvt. Ltd	Daman	A				
				Sri ram Cables	Bhiwadi	A		Up to 11KV only		
				Tirupati Plastomatics	Jaipur	A		Up to 11KV only		
				Torrent Cable Ltd	Nadaid	A				
				CMI	Baddi	A				
				Universal Cable Ltd.	Satna	A				
11	1.1 KV LT Power Cables (Type- XLPE Insulated, PVC sheathed (incl FRLS)	CAT I								
					Advance Cable	Bengaluru	A			
				Apar Industries Ltd	Umbergaon	A				
				Cords Cables	Bhiwadi	A				
				CMI	Baddi	A				
				Delton Cable Ltd	Faridabad	A				
				Dynamic Cables	Jaipur	A				
				Gemscabs Industries	Bhiwadi	A				
				Gupta Power Cables	Khurda	A				
				Havells India Ltd.	Alwar	A				
				KEC International	Silvassa , Mysore	A				
				KEI Industries	Bhiwadi	A				
				Paramount Cable	Khushkhhera	A				
				Polycab Wires Pvt. Ltd	Daman	A				
				Ravin Cables	Pune	A				
				Special Cables	Rudrapur	A				
				Suyog Cables	Vadodara	A				
				Thermocables	Hyderabad	A				
				Tirupati Plastomatics	Jaipur	A				
				Torrent Cable Ltd	Nadiad	A				
				Universal Cable Ltd.	Satna	A				
12	LT Control Cable 1.1 KV, Type - PVC (incl FRLS)	CAT II							For cable total quantity above 10 km per size/type- Cat-III	
					Advance Cable	Bengaluru	A			
				Apar Industries Ltd	Umbergaon	A				
				Cords Cables	Bhiwadi	A				
				CMI	Faridabad	A				
				CMI	Baddi	A				
				Delton Cable Ltd	Faridabad	A				
				Elkay Telelink	Faridabad	A				
				Gemscabs Industries	Bhiwadi	A				
				Goyoline Fibres (I) Ltd	Daman	A				
				Gupta Power Cables	Khurda	A				
				Havells India Ltd.	Alwar	A				
				KEC International	Silvassa , Mysore	A				
				KEI Industries	Bhiwadi	A				
				Paramount Cable	Khushkhhera	A				
				Polycab Wires Pvt. Ltd	Daman	A				
				Ravin Cables	Pune	A				
				Special Cables	Rudrapur	A				

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					Suyog Cables	Vadodara	A			
					Thermocables	Hyderabad	A			
					Tirupati Plastomatics	Jaipur	A			
					Torrent Cable Ltd	Nadiad	A			
					Universal Cable Ltd.	Satna	A			
13	EHV Cables	CAT I								
					Iljin Electric	South Korea	A		For 132KV & 220 KV only	
					KEC International	Vadodara	A		Upto 220KV	
					KEI Industries	Bhiwadi	A		Upto 132KV , 220KV	
					Phelps Dodge	Bangkok	A		For 132 KV only	
					LS CABLE & SYSTEM LTD	South Korea	A		Up to 400 KV	
					LS CABLE & SYSTEM LTD	BHIWADI	A		Up to 132 KV	
					Universal Cable Ltd.	Satna	A		Upto 132KV only	
14	DG SET(ASSMEBLER & TESTING)	CAT I								
					Kohler	Singapore	A		Up to 1500 KVA ,11KV	
					CLLS	Singapore	A		Up to 1250 KVA, 415 V,	
					Powerica	Silvasa	A		Up to 2000 KVA, 415 V & 1500 KVA, 11 KV	
					Jakson Unit-II	Kathua	A		Up to 11KV, 1500KVA	
					Jakson	Kathua	A		Up to 415 V, 2000 KVA	
					Sterling Generators Pvt Ltd	Silvasa	A		Up to 415 V 2000 KVA	
					Supernova	Rajpur	A		Up to 415 V 2000 KVA	
14.1	ALTERNATOR	CAT I								
					Kirloskar Electric	Bangalore	A		415 V alternators	
					Cummins Generator Technology (Stamford)	U.K	A		415 V & 11 KV alternators	
					Leroy Somer	France	A		Up to 11KV alternator 3500 kW	
					Marathan	USA	A		Alternators for up to 415 V, 1500 KVA DG SET	
					Cummins Generator Technology (Stamford)	Ahmednagar	A		415 V Alternators up to 1600 KVA	
					Toyo Denki Power System	Bangalore	A		11 KV, 1500 KVA	
14.2	DG Set Control panel / Synchronising panel	CAT I								
					L&T	Mumbai / Coimbatore/ Ahmednagar	A			
					GE	Bangalore	A			
					Siemens	Mumbai	A			
					C&S Electric	Noida / HARIDWAR	A			
					Schneider	Nasik	A			
					Unilec	Gurgaon	A			
					Nitya Electrocontrols	Noida	A			
					Switching Circuits	Kolkata	A			
					Tricolite	Sahibabad / Manesar	A			
		I			Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur	
					Maktel	Vadodara	A			
					Jakson	Greater Noida	A			
					Vidyut Control	Gaziabad	A			
					Adlec Power	Rohad (Jhajjar)	A			
					Pyrotech	Udaipur	A			
					Anand Power Ltd.	Noida	A			
					Positronics	Vadodara	A			
					Control & Schematics	Hyderabad	A			
					Sterling Generators Pvt Ltd	Silvasa	A			
					Jackson	Kathua	A		11 KV, 1500 KVA	
					Supernova	Rajpur	A			
15	DC Batteries (Ni-Cd type BATTERY)	CAT I								

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					HBL-Power System	Hyderabad	A		Up to 990 Ah with conditions	
					Saft India	Bangalore	A		8Ah to 990Ah- KPH type	
							A		10Ah to 1365 Ah- KPM type	
16	BATTERY CHARGER (48V/110V/220V)	CAT I					A		11Ah to 1550Ah – KPL type	
					Amararaja	Tirupati	A			
					HBL- Power System	Hyderabad	A			
					Chhabi electrical	Jalgaon	A			
					Chloride Power	Kolkatta	A			
					Statcon	Hapur	A		Up to 220 V, 850 A	
					Dubas	Bangalore	A		Up to 220 V, 800 A	
17	Dry Type Transformer	CAT I								
					ABB	Savli	A		Up to 8 MVA, 24 KV Class	
					Raychem	Pune	A		Up to 3.5 MVA, 33 KV Class	
					Toshiba	Hyderabad	A		Up to 2.0 MVA, 33 KV Class	
					BHEL	Jhansi	A		Up to 6.3 MVA, 33 KV Class	
					Kirloskar Electric Company Limited	Pune	A		Up to 4.0 MVA, 33 KV Class	
					Voltamp	Savli	A		Up to 3.25 MVA, 33 KV Class	
					Sudhir Power Ltd	Silvassa	A		Up to 1 MVA, 11 KV Class	
					Hammond Power Solutions	Hyderabad	A		Up to 95 KVA, 33KV Class	
18	OIP/RIP BUSHING	CAT I								
		I			BHEL	Bhopal	A		Up to 400 KV class	
					Crompton Greaves Ltd	Nasik	A		Up to 400 KV class	
					Crompton Greaves Ltd	Aurangabad	A			
					ABB Ltd.	Vadodara	A		Up to 245 KV Class (excluding GT)	
18.1	OIP/CONDENSER BUSHING	II			ABB Switzerland Ltd. MICAFIL Bushings	Switzerland	A		Up to 400 KV class	
					TELK	Angamaly	A		Up to 400 KV class	
					GE T&D India Limited	Hosur	A		Up to 400 KV class	
					Alstom-Passion Villa	Italy	A		Up to 400 KV class	
					ABB Power Tech.Products	Sweden	A		Up to 400 KV class	
					Trench	France	A		Up to 400 KV class	
18.2	RIP Bushing	CAT I								
					ABB AB Components	Sweden	A		Up to 420 KV Class	
					ABB Micafil	SwitzerLand	A		Up to 420 KV Class	
					Izolytor	Rusia	A		Up to 420 KV Class	
					HSP	Germany	A		Up to 420 KV Class	
					Yash High Voltage	Vadodara	A		Up to 145 KV Class	
19	INSULATING OIL	CAT I								
					Apar Industries	Rabale/Silvassa	A			
					Power Oil Petroleum Products	Silvassa	A			
					NYNAS NAPTHENICS AB	SWEEDEN / USA	A			
					Kanden Engg Corp Ltd	Japan	A			
					Nynas Ltd	Hongkong	A			
					Raj Petro Specialities	Chennai/Silvassa	A			
					Savita Oil Technologies	Mumbai/ Silvassa	A			
20	ON LINE DGA ANALYZER	CAT III								
					GE Kelmen Ltd	UK	A			
					GE GRID SOLUTIONS LTD	LISBURN, UK	A			
					Serveron	USA	A			
					CIC	Vadodara	A		Approval Conditions apply	
					Morgan Scchaffer	Canada	A			
21	GIS	CAT I			GE T&D	CHENNAI	A		765 KV	
					ABB	BARODA	A		400 KV	

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22	CAPACITIVE VOLTAGE TRANSFORMER (CVT)	CAT I								
					ABB	VADODARA	A		UP TO 400KV	
					GE T&D	HOSUR	A		UP TO 765 KV	
					BHEL	JHANSI	A		UP TO 400KV	
					MEHRU ELECTRICALS	BHIWADI	A		UP TO 132 KV	
					CGL	NASHIK	A		UP TO 400KV	
23	CURRENT TRANSFORMER	CAT I								
					Mehru Electrical	Bhiwadi	A		UP TO 132 KV	
					GE T&D	Hosur	A		UP TO 765 KV	
					ABB	Vadodara	A		UP TO 400KV	
					CGL	Nasik	A		UP TO 400KV	
					BHEL	Bhopal	A		UP TO 400KV	
					BHEL	Jhansi	A		UP TO 220 KV	
					Vishal Transformer	Meerut	A		UP TO 132 KV	
					Heptacare	Meerut	A		UP TO 33KV	
24	CIRCUIT BREAKER	CAT I								
					GE T&D	KANCHIPURAM	A		UP TO 765 KV	
					ABB	VADODARA	A		UP TO 400 KV	
					SIEMENS	AURANGABAD	A		UP TO 400 KV	
					BHEL	Hyderabad	A		UP TO 400 KV	
					CGL	NASHIK	A		UP TO 400 KV	
25	ISOLATOR	CAT I								
					GR POWER	HYDERABAD	A		UP TO 400KV	
					HIVELM	CHENNAI	A		UP TO 400KV	
					S&S POWER	PONDICHERRY	A		UP TO 400KV	
					SIEMENS	HYDERABAD	A		UP TO 765 KV	
					ELEKTROLITES	JAIPUR	A		UP TO 33 KV	
					SWITCHGEAR & STRUCTURALS	HYDERABAD	A		UP TO 765 KV	
26	'SURGE ARRESTOR	CAT I								
					CGL	NASIK	A		UP TO 400KV	
					ELEKTROLITES	JAIPUR	A		UP TO 33 KV	
					LAMCO	HYDERABAD	A		UP TO 400KV	
					OBLUM	HYDERABAD	A		UP TO 765 KV	
27	CLAMPS & CONNECTORS & WELDING SLEEVES	CAT I								
					ELCTROMECH TRANSTECH	KOLKATA	A			
					EXALT	MUMBAI	A			
					KLEMMEN ENGG	CHENNAI	A			
					MEGHA ENGG	CHENNAI	A			
					MILIND	MUMBAI	A			
					EMI	MUMBAI	A			
					NOOTAN ENGG	MUMBAI	A			
					TAG CORPORATION	CHENNAI	A			
					ITPL	MUMBAI	A			
					RASHTRA UDYOG	KOLKATA	A			
					Premier Power Products	Chennai	A			
					PEE VEE ENGG	BANGALORE	A			
27.1	ACSR CONDUCTOR	CAT I								
					APAR INDUSTRIES	SILVASSA	A			
					CABCON	KOLKATA	A			
					DIAMOND	VADODARA	A			
					GALAXY	SANGLI	A			
					GUPTA POWER INFRA	BHUBANESWAR	A			
					HIRA CABLES	HIRAKUD	A			

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					JSK	SILVASSA	A			
					LUMINO	KOLKATA	A			
					SARAVATHY	BANGALORE	A			
					HIREN ALUMINIUM	SILVASSA	A			
					SMITA	GHAZIABAD	A			
27.2	ALUMINIUM TUBE	CAT I								
					ALOM EXTRUSIONS UNIT-II	BALASORE	A			
					BANCO	VADODARA	A			
					CENTURY EXTRUSION	KOLKATA	A			
					HINDALCO	RENUKOOT	A			
					HINDALCO	ALUPURAM	A			
					JINDAL ALUMINIUM	BANGALORE	A			
					SUDAL	NASIK	A			
28	SUB STATION AUTOMATION SYSTEM (BCU, GRP, ENERGY METER, NUMERICAL RELAYS, SWITCHYARD PROTECTION)	CAT I								
					GE T&D	CHENNAI	A			
					ABB	PEENYA	A			
					SCHNEIDER	NOIDA	A			
					SIEMENS	KALWA/GOA	A			
					BHEL	BHOPAL	A			
29	AB Tariff energy meter	CAT I								
					SEMS	Udaipur/Solan	A			
					Elster	Mumbai	A			
					L&T	Mysore	A		For Model ER300P With CMS software.	
30	Power Conditioning Unit (PCU)	CAT I								
					Schneider	Bangalore	A		Conditions apply	
					ABB	Bangalore	A		Conditions apply	
					Bongfiglioli	Germany	A		Conditions apply	
					Fecon	Germany	A			
					AEG	Bangalore	A		Conditions apply	
					Hitachi-Hirel	Gandhinagar	A		Conditions apply	
					Hitachi-Hirel	Sananad	A		Conditions apply	
					Vacon	Bangalore	A		Conditions apply	
30.1	String Monitoring Box (SMB)	CAT II								
					Trinity Touch	Palwal	A		Conditions apply	
					Hensel	Sriperumbudur	A		Conditions apply	
					AEG	Bangalore	A		Conditions apply	
					Statcon	Pilkhuwa	A		Conditions apply	
					Weidmuller	Spain	A		Conditions apply	
31	SPV module	CAT I								
					BHEL	Bangalore	A			
					Warree	Surat	A			
					Emmvee	Bangalore	A			
					Vikram Solar	Parganas	A			
					Lanco Solar	Chattisgarh	A			
					Tata Power Solar	Bangalore	A			
					Alpex	Solan	A			
					Synergy	Durgapur	A			
					Photonix	Satara	A			
					HHV Solar	Bangalore	A			
32	Lighting mast with raise & lower type lantern carriage/ Lighting poles polygonal type	CAT I								
					Bajaj	Pune	A			
					BP Projects	Hoogly	A			

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					Skipper	Howrah	A			
					Transrail	Silvsa	A			
33	132 KV cable termination & straight through jointing kits	CAT I								
					Iljin	South Korea	A			
					ABB Kabeldon	Sweden	A			
					Pfisterer AG	Switzerland	A			
					Tycos Electronics Raychem GmbH	Germany	A			
34	Air Insulated Non Segregated phase type LT busduct	CAT I								
					C&S Electric	G.Noida	A			
					C&S Electric	HARIDWAR	A			
					Unilec	Gurgaon	A		Upto 3200 A	
					Stardrive	Chennai	A			
					Spaceage Swgr Ltd	Bawal	A			
					REEP	Chennai	A			
					Enpro	Chennai	A			
					Godrej	Bangalore	A			
					Nitya Electrocontrols	Noida	A			
34.1	Sandwiched type LT Busduct	CAT I								
					Henikwon	Malaysia	A			
					Godrej	Bangalore	A			
					C&S	HARIDWAR	A			
35	SPBD	CAT I								
					BHEL	Rudrapur	A			
					C&S	Greater Noida	A			
					C&S	Haridwar	A			
					GODREJ & BOYCE MANUFACTURING COMPANY LTD	Bangalore	A			
					Powergear	Hindupur	A			
					Powergear	Chennai / Bangalore	A			
					KGS Engg.	Chennai	A			
36	LT MOTOR	CAT I								
					ABB	FARIDABAD	A		UPTO 55KW	
					ABB	BANGALORE	A			
					JYOTI LTD.	VADODARA	A			
					TIPM	JAPAN	A		UPTO 15 KW (NON FLAME PROOF)	
					HYOSUNG	SOUTH KOREA	A			
					WEG	BRAZIL	A			
					HYUNDAI	SOUTH KOREA	A			
					LHP	SOLAPUR	A			
					CGL	AHMEDNAGAR	A		RQP, FOR FLAME PROOF MOTOR	
					TMEIC	JAPAN (NAGASAKHI)	A			
					NGEF	BANGALORE	A		UPTO 15 KW	
					BHARAT BIJLEE	MUMBAI	A		RQP, FOR FLAME PROOF ALSO	
					KEC	BANGALORE/ HUBLI*	A		*UPTO 90KW, RQP, FOR FLAME PROOF ALSO	
					MARATHON	KOLKATA	A		RQP (UPTO 690V & 600 KW) FOR FLAME PROOF ALSO	
					ABB	SWEDEN	A		UPTO 55KW	
					HAVELL	NEEMRANA	A		UP TO 90KW	
					KAWAMATA	JAPAN	A		UP TO 75 KW	
					TIPS	JAPAN	A		UP TO 45KW	
36.1	DC Motor	CAT I								
					CGL	MANDIDEEP	A			
37	LT VFD Control Panel	CAT I								

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					Powertech	Sonepat			Upto 55 KW with following conditions: i) VFD from Schneider- France, upto 415V, 50KW. ii) Enclosure & bought out items shall be from NTPC acceptable makes & iii) Engineering support for integration will be provided by Schneider/ Authorized integrator of Schneider	
					DANFOSS	Oragadam	A		(upto 690V, 1200kW), VFD drives with VFD sourced from Danfoss-Denmark/USA and Panel sourced from Rittal	
					YASAKAWA	Japan	A		VFD from Yasakawa- Japan, Upto 415V, 132KW	
					ROCKWELL AUTOMATION	SAHIBABAD	A		VFD from Rockwell(Allen Bradley)- USA, (Upto 415 V, 600 KW)	
					ABB	BANGALURU	A		VFD from ABB-Finland, Upto 690V, 750 KW	
					SIEMENS	NASIK	A		VFD from SIEMENS- Germany, Upto 690V,900KW	
					VACON	BANGALORE	A		VFD(NXP model) from VACON Finland, upto 400KW,415V and upto 900KW, 690V	
37.1	MV VFD Control Panel	CAT I								
					HITACHI HI REL POWER ELECTRONICS PVT. LTD.	SANAND	A		UP TO 11KV	
					TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED	TUMKUR	A		UP TO 11KV	
38	Elevator (GEAR TYPE)	CAT I								
					ECE INDUSTRIES,	Ghaziabad	A			
					TECHNO INDUSTRIES LTD.,	AHMEDABAD	A			
					BHARAT ELEVATORS ENGG. PVT. LTD.,	KOLKATA	A			
					OTIS	MUMBAI	A			
					KONE ELEVATORS INDIA PVT. LTD.,	CHENNAI	A			
					OMEGA ELEVATORS	AHMEDABAD	A			
					SAMIL ELTEC CO LTD.	SOUTH KOREA	A			
					ORBIS ELEVATOR CO. LTD.,	AHMEDABAD	A			
39	HVR Transformer & EC Panel	CAT I								
					ADOR Powertron	Pune	A			
					BHEL	Jhansi	A			
40	Panel Type Hopper Heater	CAT I								
					HTD	USA	A			
					Hotfoil EHS	USA	A			
					HTD HEAT TRACE(I) Pvt Ltd	Hyderabad	A			
					Thermon	USA	A			
					Thermopads(Unit-II)	Jeedimetla	A			
					Thermon	Pune	A			
41	Neutral Grounding Transformer	CAT II								
					Pragati Electrical Pvt. Ltd.	Mumbai	A			
					Bharat Bijlee Ltd.	Navi Mumbai	A			
					Prayog Electrical Ltd.	Pune	A			
					Andrew Yule	Chennai	A			
42	LT Switchgear - Floor mounted Fixed type indoor LT Switchgear Panel (MLDB)	CAT I								
					Switching Circuits	Kolkata	A			
					Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur	
					Maktel	Vadodara	A		Prior Type Testing	
					Jakson	Greater Noida	A			
					Vidyut Control	Gaziabad	A			

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					Adlec Power	Rohad (Jhajjar)	A			
					Conquerent Control System	Manesar	A		Condition apply ,upto 1250A	
					Control & Schematics	Hyderabad	A			
					Positronics	Vadodara	A			
					Schneider (formerly L&T)	Mumbai / Coimbatore/Ahmednagar	A			
					GE	Bangalore	A			
					C&S Electric	Noida/ Haridwar	A			
					Schneider	Nasik	A			
					Pyrotech	Udaipur	A			
					Siemens	Kalwa	A			
					Tricolite	Sahibabad/Manesar	A			
					Schneider	Vadodara	A			
					Nitya Electrocontrols	Noida	A			
43	Rectifier Panel For Hydrogen Generation Plant	CAT I								
					RUTTONSHA INTERNATIONAL RECTIFIERS LTD	HALOL, GUJRAT	A			
					Hind Rectifier	MUMBAI/NASIK	A			
	A- MAJOR COMPONENTS OF BHEL MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):									
44	STATOR FRAME FABRICATION	CAT I								
44.1	STATOR FRAME MACHINING	CAT II			BHEL-HEEP	HARIDWAR	A			
45	SPRING BASKET	CAT II			BHEL-HEEP	HARIDWAR	A			
45.1	CORE BAR	CAT II			BHEL-HEEP	HARIDWAR	A			
45.2	FLUX TRAP	CAT II			BHEL-HEEP	HARIDWAR	A			
45.3	FLAT SPRINGS AND BASKET ASEMBLY	CAT II			BHEL-HEEP	HARIDWAR	A		STAMPINGS FROM BHEL CSU JAGDISHPUR	
45.4	RIPPLE SPRING	CAT II			BHEL-HEEP	HARIDWAR	A			
45.5	TENSION BOLT FOR STATOR CORE (INSULATED)	CAT II			KREMPAL GMBH	GERMANY	A			
45.6	CORE PRESS RING	CAT II			BHEL-HEEP	HARIDWAR	A			
46	ETS MATERIAL	CAT II			BHEL-HEEP	HARIDWAR	A			
		II			THYSSEN KRUPP ELECTRICAL STEEL	NASIK	A			
		II			ARCELOR MITTAL INTERNATIONAL	LUXAMBOURG	A			
		II			THYSSENKRUPP MATERIAL TRADING	GERMANY	A			
		I			POSCO	RAIGARH	A			
		I			JSW	BELLARY	A			
		II			ALLOVERZE	GERMANY	A			
47	STATOR LAMINATION	CAT II								
48	BUS BAR CONNECTION TUBES	CAT II			BHEL-CSU	JAGDISHPUR	A			
					LUVATA PORI	FINLAND	A			
					BUNT METAL	AUSTRIA	A			
					KME GERMANY GMBH & CO. KG	GERMANY	A			
48.1	CONNECTING BUS BAR	CAT I			BHEL	HARIDWAR	A			

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49	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	CAT I								
		I			PEARL INSULATIONS	BANGLORE	A			
		I			MAHENDRA INDUSTRIES	BANGLORE	A			
		II			VONROLL	SWITZERLAND	A			
		II			GEBAUER & GRILLER	AUSTRIA	A			
49.1	HOLLOW SS CONDUCTOR (STATOR BAR)	CAT II								
		II			FINE TUBES LTD.	ENGLAND	A			
50	OVER HANG SUPPORT RING	CAT II								
					ROECHLING ENGINEERING PLASTICS	GERMANY	A			
					POWER & COMPOSITE TECHNOLOGIES	USA	A			
51	WATER SUPPLY HOSE (INSULATED)	CAT I								
		II			DR SCHNABEL GMBH & CU KG LIMBURG	GERMANY	A			
		II			CRANE RESISTOFLEX	USA	A			
		I			MIL INDUSTRIES LIMITED	CHENNAI	A			
52	BAFFLE RING & BAFFLE RING CARRIER MACHINING	CAT I								
					BHEL-HEEP	HARIDWAR	A			
53	STATOR WINDING BAR	CAT I								
					BHEL-HEEP	HARIDWAR	A			
54	GENERATOR SHAFT FORGING	CAT II								
					BUDERUS EDELSTAHL	GERMANY	A			
					JSW	JAPAN	A			
					SAARSCHMIEDE	GERMANY	A			
					JCFC	JAPAN	A			
					PJSC Energomashpetstal	Ukraine	A			
					DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO. LTD.	SOUTH KOREA	A			
					SDF-TURNI	ITALY	A			
54.1	GENERATOR SHAFT MACHINING	CAT I								
					BHEL-HEEP	HARIDWAR	A			
55	CURRENT CARRYING BOLTS FOR ROTOR	CAT II								
					BHEL HEEP	HARIDWAR	A			
56	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II								
					BUNT METAL	AUSTRIA	A			
					BOASHIDA SWISS METAL	SWITZERLAND	A			
57	ROTOR COIL FORMING	CAT II								
					BHEL HEEP	HARIDWAR	A			
58	ROTOR SLOT ANGLE	CAT II								
					SAHNEY KIRKWOOD PVT. LTD.	NASIK	A			
					ABB SWITZERLAND LTD.	SWITZERLAND	A			
					VON ROLL ISOLA	FRANCE	A			
58.1	WEDGES FOR ROTOR (DAMPER +SLOT)	CAT II								
					KM EUROPA	GERMANY	A			
					BOASHIDA SWISS METAL	SWITZERLAND	A			
					LUVATA (OUTO KUMPU PORI)	FINLAND	A			
					BUNT METAL	AUSTRIA	A			
59	RETAINING RING	CAT II								
					SAARSCHMIEDE	GERMANY	A			
					ENERGIETECHNIK	GERMANY	A			
					JSW	JAPAN	A			

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59.1	RETAINING RING MACHINING	CAT I			BHEL-HEEP	HARIDWAR	A			
60	FAN BLADE FOR COMPRESSOR M/C	CAT I			BHEL-HEEP	HARIDWAR	A			
60.1	FAN BLADE FOR COMPRESSOR (RAW MATERIAL) - HW10786 –X20Cr 13	CAT I			Refer Steam Turbine List for same grade material for blade bars		A			
60.2	COMPRESSOR HUB M/C & ASSEMBLY	CAT I			BHEL-HEEP	HARIDWAR	A			
61	BEARING SHELL FORGING (GENERATOR)	CAT II			BHEL-CFFP	HARIDWAR	A			
62	BEARING COMPLETE (EXCITER)	CAT I			RENK AG	GERMANY	A			
					ZOLLERN	BRAZIL	A			
					EURO BEARINGS	ITALY	A			
63	END SHIELD FABRICATION & MACHINING	CAT I			BHEL-HEEP	HARIDWAR	A			
64	TERMINAL BOX FABRICATION	CAT I			BHEL-HEEP	HARIDWAR	A			
64.1	TERMINAL BOX MACHING	CAT I			BHEL-HEEP	HARIDWAR	A			
65	HYDROGEN COOLER MAIN ITEMS	CAT I			BHEL-HEEP	HARIDWAR	A			
65.1	TUBES FOR COOLERS (BRASS / COPPER TUBES)	CAT II			MULTIMETALS	KOTA	A			
					Mehta Tubes Pvt Ltd	VAPI	A			
					METAL ALLOYS	JAMNAGAR	A			
65.2	FINNING OF COOLER TUBES	CAT I			LAXMI ENGINEERING INDUSTRIES	BHOPAL	A			
					LORD VISHWAKARMA HEAT EXCHANGE	HARIDWAR	A			
					FITWELL CORPORATION	BHOPAL	A			
65.3	HYDROGEN COOLER	CAT I			BHEL-HEEP	HARIDWAR	A			
66	PW COOLER & SEAL OIL COOLER	CAT I			BHEL-HEEP	HARIDWAR	A			
					ALFA LAVAL (INDIA) LIMITED	PUNE	A			
					TRANTER INDIA PVT. LIMITED	PUNE	A			
67	SEAL OIL PUMP & PRIMARY WATER PUMP	CAT I			TUSHACO PUMPS	DAMAN	A			
					KSB INDIA	PUNE	A			
					SULZER INDIA	NAVI MUMBAI	A			
68	PW SYSTEM/SKID	CAT I			BHEL-HEEP	HARIDWAR	A			
69	SEAL OIL SYSTEM/SKID	CAT I			BHEL-HEEP	HARIDWAR	A			
70	TERMINAL BUSHING	CAT II			TRENCH FRANCE SAS	FRANCE	A			
					HSP HOCHSPANNUNGSGERAETE GMBH	GERMANY	A			
71	HYDROGEN DRIER (REFRIGERANT TYPE)	CAT I			JINDAL ELECTRONICS	ROORKEE	A			
					MELLCON ENGS PVT	NEW DELHI	A			
					SPAN	ROORKEE	A			

		Project/ परियोजना : SIPAT-III (1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची			DOC. NO./ दस्तावेज सं.:		
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72	RC BLOCK	CAT I			ZENTRONICS SYSTEMS	HYDERABAD	A				
NOTE	1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN.), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT), EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.										
	B- MAJOR COMPONENTS FOR L&T MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):										
73	STATOR FRAME WITH MAN HOLE COVER FABRICATION & MACHINING (Generator Stator Frame fabrication & Machining)	CAT I									
					MITSUBISHI ELECTRIC	JAPAN	A				
					LMTG	HAZIRA	A				
74	CORE BOLT ASSEMBLY (Core Bolt assembly in stator frame)	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				
		I			LMTG	HAZIRA	A				
75	BORE RING FOR STATOR FABRICATION (Bore ring Fabrication & M/c)	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				
		I			LMTG	HAZIRA	A				
		I			MANJUNATH	BANGALORE	A				
76	END PRESSURE PLATE (CORE PRESSURE RING AND FINGER (Finger Plate)	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				
		I			RV ENGG	BALLABGARH	A				
77	STATOR CORE PUNCHING & SHIELD CORE PUNCHING	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				
		I			PITTI LAMINATION	HYDERABAD	A				
78	TENSION BOLT FOR STATOR CORE(INSULATED)(CORE BOLT)	CAT II									
					MITSUBISHI ELECTRIC	JAPAN	A				
79	LEAD BOX FABRICATION & MACHINING	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				
		I			LMTG	HAZIRA	A				
		I			JSPL	RAIPUR	A				
80	OVER HANG SUPPORT RING(RESIN CONE)	CAT II									
		II			HITACHI CHEM	JAPAN	A				
		II			PCT	USA	A				
		II			ROCHLING	GERMANY/ France	A				
81	CORE TENSION BOLT (UNINSULATED) FOR STATOR (Core bolt)	CAT I									
		II			MITSUBISHI	JAPAN	A				
		I			STAR WIRE	BALLABGARH	A				
82	OVERHANG SLIDING SYSTEM (Part of stator winding Assembly)	CAT I									
		II			MITSUBISHI ELECTRIC	JAPAN	A				

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83	BUS RING FABRICATION (Phase Ring)	I CAT I			LMTG	HAZIRA	A			
		II			mitsubishi electric	JAPAN	A			
84	RIPPLE SPRING	I CAT III			LMTG	HAZIRA	A			
		III			mitsubishi electric	JAPAN	A			
		III			AUGUST KREMPEL	GERMANY	A			
85	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	I CAT I								
		II			mitsubishi electric	JAPAN	A			
		II			UNIMAC	JAPAN	A			
		I			MAHENDRA IND	BANGALORE	A			
		II			GEABUR AND GRILER	AUSTRIA	A			
		II			HITACHI MAGNET WIRE	JAPAN	A			
		I			PEARL INSULATION	BANGALORE	A			
		I			COSMOS	BANGALORE	A			
86	HOLLOW COPPER CONDUCTOR (STATOR BAR)	I CAT I								
		II			UNIMAC	JAPAN	A			
		II			mitsubishi electric	JAPAN	A			
		II			ISOLA	SWITZERLAND	A			
		I			MAHENDRA INDUSTRIES	BANGALORE	A			
		I			PEARL	BANGALORE	A			
		I			COSMOS	BANGALORE	A			
87	TERMINAL BUSHING (CONDENSER TYPE) (Lead Bushing)	I CAT II								
		II			EMIL HAFLEY(TRENCH)	SWITZERLAND	A			
		II			mitsubishi electric	JAPAN	A			
		II			TRENCH	SWITZERLAND	A			
88	SUPPORT BRACKET	I CAT I								
		II			mitsubishi electric	JAPAN	A			
		I			LMB	HAZIRA	A			
89	CONNECTING BUS BAR (PHASE BELTS) FABRICATION	I CAT II								
		II			SUMIKEI COPPER	JAPAN	A			
		II			mitsubishi electric	JAPAN	A			
		II			HITACHI CABLE	JAPAN	A			
		II			ORIENTAL COPPER	THAILAND	A			
90	INSULATING HOSES FOR STATOR (WATER SUPPLY HOSES)	I CAT I								
		II			SAKURA RUBBER	JAPAN	A			
		II			mitsubishi electric	JAPAN	A			
		II			CRANE RESISTOFLEX	USA	A			
					DR SCHNABEL	GERMANY	A			
91	SHIELD PLATES / SHIELD CLAMPER	I CAT I								
		III			mitsubishi electric	JAPAN	A			
		I			RV ENGG	FARIDABAD	A			
		I			AK Multi metal	PUNJAB	A			
92	STATOR WINDING ASSLY	I CAT I							CS Casting for Generator Bracket Hub of Bearing bracket, Ni-alloy casting for Generator Blower Shroud & Shield clammer, nodular cast iron casting for Shroud support.	

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		I			mitsubishi electric	JAPAN	A			
		I			LMTG	HAZIRA	A			
93	GENERATOR SHAFT FORGING	CAT II								
					SAARSCHMIEDE	GERMANY	A			
					Buderus Edelstahl	GERMANY	A			
					JSW	JAPAN	A			
					SDF	ITALY	A			
					CRUIST FORCE	FRANCE	A			
					OMZ	RUSSIA	A			
					FORGE MASTER	UK	A			
					JCFC	JAPAN	A			
94	GENERATOR ROTOR MACHINING	CAT I								
		II			mitsubishi electric	JAPAN	A			
		II			NUGO ROMANO	ITALY	A			
		I			LMTG	HAZIRA	A			
95	ETS MATERIAL (Core material)	CAT I								
		I			THYSSON KRUPP	NASIK	A			
		II			NIPPON	JAPAN	A			
		II			JFE	JAPAN	A			
		I			POSCO	RAIGARH	A			
		I			JSW	BELLARY	A			
		II			mitsubishi	JAPAN	A			
96	RETAINING RING FORGING(MAT- CrMn 1818)	CAT II								
					SAARCSHMIEDE	GERMANY	A			
					JSW	JAPAN	A			
					KOBE STEEL	JAPAN	A			
					FORTEH	FRANCE	A			
97	RETAINING RING MACHINING	CAT I								
		II			mitsubishi electric	JAPAN	A			
		I			LMTG	HAZIRA	A			
98	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II								
					ORIENTAL COPPER	THAILAND	A			
					HITACHI CABLE	JAPAN	A			
					FURUKAWA ELECTRIC	JAPAN	A			
					KM EUROPA	GERMANY	A			
					OTOKUMPUTURI (Luvata)	FINLAND	A			
					GINDRE	FRANCE	A			
99	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD(RAW MATERIAL) (Field lead)	CAT II								
					ORIENTAL COPPER	THAILAND	A			
					BAOSHIDA SWISS METAL	GERMANY	A			
					KME	GERMANY	A			
					Agarwal industries (Fabrication)	Mandideep	A			
					Rachna Metals (Raw material)	GHAZIABAD	A			
					INDIAN METAL & ALLOY	KOLKATA	A			
					HITACHI CABLE	JAPAN	A			
100	CURRENT CARRYING BOLTS FOR ROTOR (Radial Lead)	CAT II								

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101	ROTOR COIL FORMING	CAT I			mitsubishi electric	JAPAN	A			
		II			mitsubishi electric	JAPAN	A			
		I			LMTG	HAZIRA	A			
102	STATOR Coil Manufacturing	CAT I								
					mitsubishi electric	JAPAN	A			
					LMTG	HAZIRA	A			
103	ROTOR SLOT WEDGES & DAMPER WEDGES FABRICATION & MACHINING (Rotor wedge & Damper bar)	CAT II								
					mitsubishi electric	JAPAN	A			
					MURAKAMI	ompress	A			
					FIAV	ITALY	A			
					OTOKUMUPORI (LUVATA)	FINLAND	A			
					METALLURGICA MINOTI	ITALY	A			
					Damper Wedges - Gindre India Components Pvt. Ltd	Gurgaon	A			
104	ROTOR WINDING ASSLY (GEN) INCL ROTOR WEDGES (Rotor winding)	CAT I								
					mitsubishi electric	JAPAN	A			
					LMTG	HAZIRA	A			
105	GENERATOR ROTOR-FINAL assembly & Balancing Process (Rotor final assembly & HSB)	CAT I								
					mitsubishi electric	JAPAN	A			
					LMTG	HAZIRA	A			
106	COMPRESSOR BLADE ASLY ON ROTOR (Part of generator final assembly)	CAT I								
					mitsubishi electric	JAPAN	A			
					LMTG	HAZIRA	A			
107	D LEAD (FL CORE BAR) & CONTACT BOLT FOR SLIP RING (Axial lead)	CAT II								
					mitsubishi electric	JAPAN	A			
108	TUBES FOR CONNECTING BUS BAR (Phase ring tubes)	CAT II								
					ORIENTAL COPPER	THAILAND	A			
					ALCOBEX	JODHPUR	A			
					S H Copper	Japan	A			
					IPCL	BHAVNAGAR	A			
					HITACHI CABLE	JAPAN	A			
109	END SHIELD FABRICATION & MACHINING (Generator Bearing Bracket)	CAT I								
					mitsubishi electric	JAPAN	A		For End Shield Fabrication Only	

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					SHAPE	HARIDWAR	A			
					MANJUNATH	BANGLORE	A			
110	BEARING SHELL(GEN& SLIP RING)- FORGING (part of generator Bearing)	CAT II								
					MITSUBISHI ELECTRIC	JAPAN	A			
					OMEGA THERMIT	BHOPAL	A			
					DUM DUM	KOLKATA	A			
					EURO BEARING	ITALY	A			
111	CENTERING RING FORGING (END PLATE)	CAT I								
		I			GOODLUCK	GHAZIABAD	A			
		II			NISHIMAKI IRON WORKS	JAPAN	A			
		I			BAY FORGE	CHENNAI	A			
112	BEARING SHELL (GEN & SLIP RING) M/C (Generator bearing)	CAT III								
					DSE	KOREA	A			
					DYM	KOREA	A			
					MITSUBISHI ELECTRIC	JAPAN	A			
					OMEGA THERMIT	BHOPAL	A			
					DUM DUM	KOLKATA	A			
					EURO BEARING	ITALY	A			
					WAUKESHA BEARING	USA	A			
113	INTERMEDIATE RING FORGING (Space ring forging)	CAT I								
					Good luck (For forging)	FARIDABAD	A			
					LMTG (For m/c)	Hazira	A			
114	PRIMARY WATER PUMP	CAT I								
					MATHER & PLATT	PUNE	A			
					KSB INDIA	Nasik	A			
					SULZER PUMPS	NAVI MUMBAI	A			
					EBARA SEISAKUSHO	JAPAN	A			
115	HYDROGEN DRIER	CAT I								
		I			JINDAL	ROORKEE	A			
		II			MITSUBISHI ELECTRIC	JAPAN	A			
116	TUBES FOR COOLERS (BRASS/COPPER TUBES) (GENERATOR) (Gas cooler tubes)	CAT I								
					ALCOBEX	JODHPUR	A			
					MULTIMETAL	KOTA	A			
117	PW PUMP & FILTER UNIT ASSEMBLY (SKID)	CAT I								
		II			MITSUBISHI ELECTRIC	JAPAN	A			
		II			JIMC	KOREA	A			
		I			LMTG	HAZIRA	A			
		I			LINCOLN	PUNE	A			
118	PW COOLER & SEAL OIL COOLER	CAT I								
		I			ALFA LAVAL	PUNE	A			
		II			JIMC	KOREA	A			
		I			TRANTER	PUNE	A			

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119	SLIP RING FORGING & MACHINING	CAT II								
					LMTG (For machining)	Hazira	A			
					Good luck (For forging)	FARIDABAD	A			
120	DC LEAD ASSLY FOR SLIP RING (Slip ring lead)	CAT I								
		II			mitsubishi electric	JAPAN	A			
		I			LMTG	HAZIRA	A			
121	SLIP RING ASSLY (Part of Generator Final assembly)	CAT I								
					LMTG	HAZIRA	A			
122	SLIP RING SHAFT ASSLY	CAT II								
					mitsubishi electric	JAPAN	A			
123	AIR COOLER FOR BRUSH GEAR (Slip ring fan)	CAT I								
					LMTG	Hazira	A			
124	SEAL OIL PUMP	CAT I								
		I			TUSHACO PUMP	DAMAN	A			
		II			KOSAKA LABORATORY	JAPAN	A			
		II			SHIMADZU	JAPAN	A			
125	FAN BLADE FORGING & MACHINING (Blade for slip ring fan)	CAT I								
		II			MURAKAMI SEISAKUSHO	JAPAN	A			
		I			STAR WIRE	BALLABHGARH	A			
		II			mitsubishi electric	JAPAN	A			
		I			GOODLUCK ENGG	GHAZIABAD	A			
126	SEAL OIL VALVE RACK	CAT II								
					JIMC	KOREA	A			
127	SEAL OIL STORAGE TANK (LOOP SEAL TANK)	CAT I								
					JIMC	KOREA	A			
					Gujarat infra	Vadodara	A			
					Shree sarjan	Vadodara	A			
128	HYDROGEN COOLER (Gas cooler)	CAT I								
					KITASHIBA ELECTRIC	JAPAN	A			
					ENERGEN	KOREA	A			
					GEA	GERMANY	A			
					LAXMI	BHOPAL	A			
129	CARBON BRUSH	CAT II								
					MORGAN	KOREA	A			
					MERSEN	BANGLORE	A			
					VIDYUT CARBON	HARDWAR	A			
					ASSAM CARBON	KOLKATA	A			
130	EXCITATION SYSTEM	CAT I								
					ALSTOM	FRANCE	A			
					ABB	SWITZERLAND	A			
					SIEMENS	AUSTRIA	A			
					BHEL	BANGLORE	A			
					mitsubishi electric	JAPAN	A			
131	EXCITATION TRANSFORMER	CAT I								
					REFER SEPARATE LIST					
132	EXCITATION AC/DC BUS DUCT	CAT I								

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					REFER SWITCHGEAR AND BUS DUCT LIST					
133	END WINDING VIBRATION SYSTEM	CAT II			IRIS	Canada	A			
					Vibro systems	Canada	A			
134	Rotor slot angle (Slot cell)	CAT II			PCT	USA	A			
					MITSUBISHI ELECTRIC	JAPAN	A			
					VON ROLLA ISOLA	FRANCE	A			
135	CENTRING RING & INTERMEDIATE RING MACHINING (End plate & space ring)	CAT I								
					MITSUBISHI ELECTRIC	JAPAN	A			
					Good luck (For forging only)	Faridabad	A			
					LMTG (For machining)	HAZIRA	A			
136	ROTOR FLUX MONITORING SYSTEM	CAT II								
					GE	USA	A			
					MITSUBISHI ELECTRIC	JAPAN	A			
					Vibro systems	Canada	A			
					IRIS	CANADA	A			
137	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD	CAT II								
					MITSUBISHI ELECTRIC	JAPAN	A			
138	Generator Blower shroud	CAT I								
					RV Casting	Faridabad	A	(M/C by LMTG)		
139	Bearing Bracket Hub casting	CAT I								
					VAISHNOV STEEL	MUZAFFAR NAGAR	A			
					LMTG HCU	Hazira	A			
140	Shroud support	CAT I								
					R V Casting	Faridabad	A	(M/C by LMTG)		
141	Blower hub Forging	CAT I								
					Goodluck	Gaziabad	A	(M/C by LMTG)		
142	Bore ring Forging	CAT I								
					CHW	Greater noida	A	(M/C by LMTG)		
143	Rotor & stator blade	CAT I								
					LMTG (for machining)	Hazira	A			
					Star wire (For Rotating blade raw material)	BALLABHGARH	A			
					As per NTPC approved list (For ST blade raw material also)		A			
144	Center wedge & end wedge machining	CAT I								
					Moldpro	Vadodara	A			
NOTE	1.CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN.), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.									
	C- MAJOR COMPONENTS FOR GE MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):									
145	Stator Frame with manhole cover (Fabrication & Machining)	CAT I								
					ALSTOM Power Sp. z o.o,	Poland	A			

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					Alstom Bharat Forge Power Limited	Sanand	A				
					ISGEC	YAMUNA NAGAR	A				
146	Key Bar (Fabrication & Machining)	CAT I			Bright Steel	UK	A				
		II			Jordan Matcon	Poland	A				
		II			ALSTOM Power Sp. z o.o	Poland	A				
		II			Somet	Poland	A				
		II			Empaz	Poland	A		Only M/c		
		I			Shiv Engineering	vadodara	A		Only M/c		
		I			Alstom Bharat Forge Power Limited	Sanand	A		Only M/c		
		I			Shape Engg	Haridwar	A		Only M/c		
147	Dovetail for Stator (Aluminium key profile)	CAT II									
					Sapa Profiles Kft.	Hungary	A				
					ALSTOM Power Sp. z o.o.,	Poland	A				
					Somet	Poland	A				
148	End Presure Plate (Laminated Press plate)	CAT II			ALSTOM Power Sp. z o.o.,	Poland	A				
					Generpro	Sweden	A				
149	Stator Core Punching	CAT II			ALSTOM	France	A				
					ALSTOM Power Sp. z o.o.,	Poland	A				
					Donako	Poland	A				
					Pitti Laminations	Hyderabad	A				
					BHEL	Jagdishpur	A				
150	Core Tension Bolt for Stator	I			Starwire	Ballabgarh	A				
		II			Boehler Ybbstal Profil	Austria	A				
		II			Energietechnik Essen	Germany	A				
		II			Empaz	Poland	A				
		I			Kalyani carpenter	Pune	A				
151	Insulation of Core Tension Bolt for Stator	CAT II			Empaz	Poland	A				
					ALSTOM Power Sp. z o.o.,	Poland	A				
152	Solid Copper Coductor for Stator Bar	CAT I			VonRoll	Switzerland	A				
					Pearl	Bangalore	A				
					Cosmos	Bangalore	A				
					Mahindra	Bangalore	A				
					Geaber & Greuller	Austria	A				
153	Hollow Stainless Steel Conductor for Stator Bar	CAT II									
					Fine Tubes	UK	A				
					Fischer	Austria	A				
154	Stator Bars	CAT I			ALSTOM Power Sp. z o.o.,	Poland	A				
155	Tubes for Connection Bus Bar	CAT II			KME	Germany	A				
					Luvata Pori	Finland	A				
					Multimetal	Jamnagar	A				
156	Connection Bus Bar (Phase Connector)	CAT II									

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					PPU Wojtera	Poland	A			
					ALSTOM Power Sp. z o.o.,	Poland	A			
157	Insulating Hoses for Stator (Water Supply Hoses)	CAT II								
					Dr. Schnabel	Germany	A			
					Siemens	Germany	A			
					Crane Resistoflex	USA	A			
158	Winding Head Support Ring	CAT II								
					Röchling Permali	Germany	A			
					Kompozyty	Poland	A			
					PCT	USA	A			
					Siemens	Germany	A			
					Texplas	Haridwar	A			
159	Spring for Winding Head Assembly (Console)									
		CAT II			Wolfensberger	Switzerland	A			
		CAT I			R V Engg	Ballabgarh	A			
160	Generator Shaft Forging	CAT II								
					Saarschmiede	Germany	A			
					Buderus	Germany	A			
					JSW	Japan	A			
					JCFC	Japan	A			
					SdF Terni	Italy	A			
					SUMITOMO	JAPAN	A			
					FORGEMASTER	UK	A			
					OMZ	RUSSIA	A			
161	Generator Shaft Machining	CAT I								
					Alstom (Switzerland) Ltd.	Switzerland	A			
					Alstom Bharat Forge Power Limited	Sanand	A			
162	Centering Ring Forging	CAT II								
					Bharat Forge	Pune	A			
					Schmiedewerk Stoss	Switzerland	A			
					FORGITAL SPA VELO D ASTICO	Italy	A			
					LOCALITA					
					Bay Forge	Chennai	A			
163	Centering Ring Machining	CAT II								
					Alstom (Switzerland) Ltd.	Switzerland	A			
					Bharat Forge Limited	Satara	A			
164	Retaining Ring FORGING (Mat.18-18Cr-Mn)	CAT II								
					Energietechnik Essen	Germany	A			
					Saarschmiede	Germany	A			
					JSW	Japan	A			
165	Retaining Ring Machining	CAT II								
					Alstom (Switzerland) Ltd.	Switzerland	A			
					Alstom Bharat Forge Power Limited	Sanand	A			
166	Rotor Copper Profile	CAT II								
					Swissmetall	Switzerland	A			
					Wieland	Germany	A			
					Buntmetall	Austria	A			
167	Field Lead Core Bar for Rotor	CAT II								

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					Swissmetall	Switzerland	A			
					Buntmetall	Austria	A			
					Wieland	Germany	A			
168	Radial Bolt for Rotor	CAT II								
					Alstom	Switzerland	A			
					Starwire	Ballabgarh	A			
					Atals	Hydrabad			only for Machining	
169	Rotor Coil Forming	CAT I								
		CAT II			Alstom (Switzerland) Ltd.	Switzerland	A			
		CAT I			Alstom Bharat Forge Power Limited	Sanand	A			
170	Rotor Slot Wedges & Damper wedges	CAT II								
					Swissmetall	Switzerland	A			
					Wieland	Germany	A			
					Luvata	Finland	A			
					Buntmetall	Austria	A			
171	Generator Rotor Final	CAT I								
					ALSTOM Power Sp. z o.o.,	Poland	A			
					Alstom (Switzerland) Ltd.	Switzerland	A			
172	Hydrogen Blower	CAT II								
					FIMA	Germany	A			
172.1	Hydrogen Blower Assembly	CAT II								
					Alstom (Switzerland) Ltd.	Switzerland	A			
173	Terminal Bushing(Condenser type)	CAT II								
					Trench (Emily new name)	France	A			
					HSP	Germany	A			
174	Terminal Box Fabrication	CAT II								
					ALSTOM Power Sp. z o.o.,	Poland	A			
					ISGEC	Yamunanagr	A			
					Shape Engg	Haridwar	A			
174.1	Terminal Box Machining	CAT II								
					ALSTOM Power Sp. z o.o.,	Poland	A			
					Energy machines	Ahmedabad	A			
175	End Shield Fabrication	CAT I								
					ALSTOM Power Sp. z o.o.,	Poland	A			
					Shape Engg	Haridwar	A			
					ISGEC	Yamunanagr	A			
175.1	End Shield Machining	CAT I								
					ALSTOM Power Sp. z o.o.,	Poland	A			
					ISGEC	Yamunanagr	A			
					Energy Machines	Ahmedabad	A			
176	Seal Assembly (Ring & Housing)	CAT II								
					ALSTOM Power Sp. z o.o.,	Poland	A			
177	Stator water cooler	CAT I								
					Alpha Laval	Sweden	A			
					GEA	Germany	A			
					TRANTER	Pune	A			
					IDMC Ltd	Anand	A			
178	Stator water cooling unit	CAT II								

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179	Stator water cooling pump	CAT II			Rockfin	Poland	A				
					ALWELLER	GERMANY	A				
					KSB	Pune	A				
					Ebera	Japan	A				
					SULZER	Navi Mumbai	A				
180	Slip Ring Shaft Forging	CAT II			See Generator Forging Suppliers						
					Bharat forge	Pune	A				
					BAY FORGE	Chennai	A				
180.1	Slip Ring Shaft Machining	CAT II									
					Alstom (Switzerland) Ltd.	Switzerland	A				
					Euroflex Transmission(india) pvt. Ltd.	Hydrabad	A				
181	DC-Lead Assembly for Slip Ring	CAT II									
					Alstom (Switzerland) Ltd.	Switzerland	A				
181.1	Slip Ring Shaft Assembly	CAT I									
					Alstom (Switzerland) Ltd.	Switzerland	A				
					Euroflex Transmission(india) pvt. Ltd.	Hydrabad	A	Only M/c			
182	Seal Oil Pump	CAT I									
					Allweiler	Germany	A				
					Allweiler	DAMAN	A				
					UT PUMP	FARIDABAD	A				
183	Seal Oil Cooler	CAT I									
					GEA	Germany	A				
					Alpha Level	EUROPE	A				
					Alfa level	Satara	A				
					ALPHA LAVAL	Sweden	A				
					TRANTER	Pune	A				
184	Seal Oil Unit	CAT II									
					Rockfin	Poland	A				
185	Hydrogen Cooler	CAT I									
					GEA	Germany	A				
					Kelvion	Pune	A				
					Laxmi	Bhopal	A				
186	Hydrogen dryer(Refrigrant Type)	CAT I									
					Jindal electrical	Roorkee	A				
					Melcon engg	G. NOIDA	A				
187	Copper connector between main rotor and slip ring shaft(radial stud)	CAT II									
					SWISS METAL	Switzerland	A				
					Pfisterer Sefag AG	Germany	A				
188	Carbon Brush & Holders	CAT III									
					Morgan	Germany	A				
					Vidhyut Carbon	Haridwar	A				
					National Carbon	Kolkata	A				
					G. Dietrich (belongs to CL)	Germany	A				
189	ETS Material	CAT I									
		CAT I			Thyseen Krupp	NASIK	A				

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		CAT II			Mitsubishi	Japan	A			
		CAT II			Arcelor	Luxemburg	A			
		CAT II			Salzgietter	Germany	A			
		CAT II			Alloverze	Germany	A			
		CAT I			JSW	BELLARY	A			
		CAT II			JFE	Japan	A			
190	Radial Leads (Slip Ring Shaft)	CAT II							ALSO FOR SL NO 71	
					Schmelzmetall AG	Switzerland	A			
191	Connection Rod for main Rotor	CAT II								
					Weiland werke	Germany	A			
					Swiss Metal	Switzerland	A			
192	Excitation System	CAT I								
					Alstom Power Sp. z o.o	Poland	A			
					GE power	NOIDA	A			
193	GHM(Generator health monitoring system)	CAT I								
					GE Power	Noida	A			
194	Excitation AC-DC Bus duct	CAT I								
					Etacom	Belgium	A		for Cast Resin	
					REEP	Chennai	A			
					C&S	NOIDA	A			
NOTE	1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN.), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.									
	D- MAJOR COMPONENTS FOR TOSHIBA MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):									
195	STATOR FRAME WITH MAN HOLE COVER FABRICATION & MACHINING	CAT I								
					TOSHIBA	JAPAN	A			
					TJPS	CHENNAI	A			
196	KEY BAR FABRICATION AND MACHINING	CAT I								
					TOSHIBA	CHENNAI	A			
					Kalyani Carpenter (Material)	Pune	A			
					Punj Lloyd (Machining)	Gwalior	A			
197	KEY BAR ASSEMBLY	CAT I								
					TOSHIBA	JAPAN	A			
					TJPS	CHENNAI	A			
198	DOVETAIL FOR STATOR	CAT I								
					TOSHIBA	JAPAN	A			
					TJPS	CHENNAI	A			
199	END PRESSURE PLATE - Fabrication									
		II			TOSHIBA	JAPAN	A			
		I			TJPS	CHENNAI	A			
199.1	End Pressure Plate - Machining	CAT II								
					TJPS	CHENNAI	A			
					Sharp Engineering	Pune	A			
					N.S Engg	Hyderabad	A			
200	STATOR CORE PUNCHING									
		I			TJPS	CHENNAI	A			
		II			TOSHIBA	JAPAN	A			
201	TERMINAL BOX FABRICATION& MACHINING									
		II			TOSHIBA	JAPAN	A			
		I			TJPS	CHENNAI	A			

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		I			Leo Prime	Chennai	A			
202	OVER HANG SUPPORT RING	CAT II			HITACHI CHEMICAL	JAPAN	A			
203	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	CAT II			UNIMAC	JAPAN	A			
204	HOLLOW COPPER CONDUCTOR (FOR STATOR BAR)	CAT II			UNIMAC	JAPAN	A		HOLLOW CONDUCTOR (RAW MATERIAL FROM FURUKAWA-JAPAN)	
205	TERMINAL BUSHING (CONDENSER TYPE)	CAT II			PASSONI & VILLA	ITALY	A			
					Trench	Switzerland	A			
					Toshiba	Japan	A			
206	CONNECTING BUS BAR (PHASE BELTS) FABRICATION	CAT II			SUMIKEI COPPER	JAPAN	A			
					Oriental Copper	Thailand	A			
					Hitachi Cable	JAPAN	A			
207	INSULATING HOSES FOR STATOR (WATER SUPPLY HOSES)	CAT II			SAKURA RUBBER	JAPAN	A			
					CRANE RESISTOFLEX	USA	A			
					MIL	Chennai	A			
208	GENARATOR SHAFT FORGING	CAT II			SAARSCHMIEDE	GERMANY	A			
					SDF ITALY	ITALY	A			
					JCFC	JAPAN	A			
					JSW	JAPAN	A			
					BUDERUS EDESTAHL	GERMANY	A			
					Doosan	Korea	A			
208.1	GENERATOR SHAFT MACHINING	CAT I			TOSHIBA	JAPAN	A			
					TJPS	CHENNAI	A			
209	ETS MATERIAL	CAT II			NIPPON	JAPAN	A			
					JFE	JAPAN	A			
210	RETAININIG RING FORGING (MAT-CrMn 18-18)	CAT II			SAARCSHMIEDE	GERMANY	A			
					JSW	JAPAN	A			
210.1	RETAINING RING MACHINING	CAT II			TOSHIBA	JAPAN	A			
					TJPS	Chennai	A			
211	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II			ORIENTAL COPPER	THAILAND	A			
212	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD	CAT II			KME	GERMANY	A			
					ORIENTAL COPPER	THAILAND	A			
					BAOSHIDA SWISS METAL	GERMANY	A			
213	CURRENT CARRYING BOLTS FOR ROTOR	CAT II			TOYO KOGYO	JAPAN	A			
					TOSHIBA	JAPAN	A			
214	ROTOR COIL FORMING	CAT II			TOSHIBA	JAPAN	A			
					TJPS	Chennai	A			

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215	ROTOR SLOT WEDGES & DAMPER WEDGES FABRICATION & MACHINING	CAT II								
					MURUKAMI	JAPAN	A			
					FLAV	ITALY	A			
					TOSHIBA	JAPAN	A			
216	GENERATOR ROTOR -FINAL	CAT I								
					TOSHIBA	JAPAN	A			
					TJPS	Chennai	A			
217	MOLDED INSULATION RING (FAN NOZZLE RIM)	CAT I								
		II			PCT	USA	A			
		I			PERMALI WALACE	Bhopal	A			
218	FAN BLADE ASLY ON ROTOR									
		II			TOSHIBA	JAPAN	A			
		I			TJPS	Chennai	A			
219	D LEAD (FL CORE BAR)& CONTACT BOLT FOR SLIP RING									
		I			TJPS	Chennai	A			
		II			TOSHIBA	JAPAN	A			
220	END SHIELD FABRICATION & MACHINING	CAT I								
					SHAPE	HARIDWAR	A			
					TJPS	Chennai	A			
221	Bearing (CE & TE)									
		II			DSE	Korea	A			
		I			Omega Renk	Bhopal	A			
		II			DYM	Korea	A			
222	CENTERING RING FORGING									
		I			BAY FORGE	CHENNAI	A			
		II			MINATO KIKO	JAPAN	A			
		II			NISHIMAKI IRON WORKS	JAPAN	A			
		I			GOODLUCK	GHAZIABAD	A			
223	SEAL ASSLY (RING & HOUSING)	CAT II								
					TOSHIBA	JAPAN	A			
224	SLIP RING SHAFT ASSLY									
		I			TJPS	Chennai	A			
		II			TOSHIBA	JAPAN	A			
225	FAN BLADE FORGING & MACHINING									
		II			MURAKAMI SEISAKUSHO	JAPAN	A			
		I			TJPS	Chennai	A			
		I			Azad	Hyderabad	A			
		II			TOSHIBA	JAPAN	A			
226	HYDROGEN COOLER	CAT II								
					ENERGYEN	KOREA	A			
					KITASHIBA ELECTIRC	JAPAN	A			
					Karnataka Gas Coolers	Bangalore	A			
227	AC/DC BUSDUCT	CAT I								
					SPACEAGE	GURGAON	A			
					REEP	CHENNAI	A			
					C&S ELETRIC	NOIDA/HARIDWAR	A			
228	EXCITATION TRANSFORMER (DRY TYPE)	CAT I								
					RITZ	GERMANY	A		UPTO 8 MVA	
					BHEL	JHANSI	A		UPTO 6 MVA	
229	EXCITATION SYSTEM	CAT I								
					TOSHIBA	JAPAN	A			
					ABB	Bangalore	A			
230	HYDROGEN DRIER	CAT I								

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					JINDAL ELECTRONICS	ROORKEE	A			
					MELCON ENGG	GREATER NOIDA	A			
					SPAN MANUFACTURING CO PVT LTD	ROORKEE	A			
NOTE	1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN.), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.									
Items Identified as Main Contractor approved sources										
MC 1	Tubular Type Heater	III								
MC 2	Interlocks for ESP	III								
MC 3	Porcelain Bushing Insulators	III								
MC 4	Continous Cast Copper Rod	III								
MC 5	Unimpregnated Densified Wood	III								
MC 6	Marshalling Box Components	III								
MC 8	Air Cell	III								
MC 9	Terminal Connector	III								
MC 10	Oil Flow Indicator	III								
MC 11	Pressure Relief Valve	III								
MC 12	Magnetic Oil Level Gauge	III								
MC 13	OTI/WTI (RTD Type)	III								
MC 14	Off-Circuit Tap Changer	III								
MC 15	Cooling Fan & Motor Assembly	III								
MC 16	Silica Gel Breather	III								
MC 17	Bushing Metal Parts	III								
MC 18	Copper Conductor Bus Bar	III								
MC 19	Copper Foil/Sheet for Dry Type Transformer	III								
MC 20	Core cheese assembly for Bus Reactor	III								
MC 21	Core Clamps & OLTG Bracket, Core/Tie Bolt, Rods & Nuts	III								
MC 22	Epoxy Casting Material for Dry Type Transformer	III								
MC 23	Fibre Glass Covered Copper Conductor for Dry Type Transformer	III								
MC 24	Fibre Glass Sheet for Dry Type Transformer	III								
MC 25	Gaskets	III								
MC 26	Hardwares	III								
MC 27	Motor for OLTG	III								
MC 28	Sheet Metal Enclosure for Dry Type Transformer	III								
MC 29	Steel Plate & Pipe	III								
MC 30	Tank Fabrication up to 5 MVA	III								
MC 31	Temperature Surveillance Unit for Dry Type Transformer	III								
MC 32	Valves (for Radiator/Gun Metal/CI valves,etc.)	III								
MC 33	Gas Collecting Device	III								
MC 34	Networking of Numerical Relay	*(with Switchgear MQP)								
MC 35	Paint	III								
MC 36	Copper for Copper Flats & Copper strips/flexibles	III								
MC 37	OIL PURIFYING EQUIPMENT	CAT III								
MC 38	VACUUM PUMP WITH MOTOR	CAT III								
MC 39	ON LINE MOISTURE REMOVAL SYSTEM	CAT III								
MC 40	Oil Tanker (wheel mounted),10 kL capacity	CAT III								
MC 41	POST INSULATOR	CAT II								

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MC 42	DISC INSULATOR/ PIN INSULATOR	CAT II								
MC 43	FIBRE OPTIC CABLE	CAT I								
MC 44	EVENT LOGGER	CAT III								
MC 45	GPS TIME SYNCHRONISATION EQUIPMENT	CAT III								
MC 46	RELAY TEST KIT	CAT III								
MC 47	DISTURBANCE RECORDER	CAT III								
MC 48	OPERATIONAL ANALYSER WITH DCRM KIT	CAT III								
MC 49	FOTE	CAT II								
MC 50	OPGW	CAT II								
MC 51	LARGE VIDEO SCREEN (LVS)	CAT III								
MC 52	BELT WEIGHER	CAT II								
MC 53	WEIGH BRIDGE	CAT I								
MC 54	IN LINE MAGNETIC SEPARATOR / SUSPENDED MAGNET	CAT II								
MC 55	METAL DETECTOR	CAT II								
MC 56	CABLE REELING DRUMS	CAT II								
MC 57	PIANO SWITCHES	CAT III								
MC 58	PULL CORD / BELTSWAY / INDICATION SYSTEM	CAT II								
MC 59	ELECTRONIC SPEED SWITCH, ZSS, TILT SWITCH, MAGNETIC SWEITCH, PROXIMITY SWITCH	CAT II								
MC 60	HEAVY DUTY LIMIT SWITCHES	CAT II								
MC 61	UNDER BELT SWITCH	CAT II								
MC 62	GI CABLE TRAYS AND ACCESSORIES (LADDER & PERFORATED TYPE), fitting & accessories including bends	CAT II								
MC 63	GI FLEXIBLE CABLE TRAY SUPPORT SYSTEM	CAT II								
MC 64	Cable termination kits & straight through jointing kit	CAT II								
MC 65	Lighting fixtures with accessories (Filament type)	CAT II								
MC 66	Lighting fixtures with accessories (LED type)	CAT II								
MC 67	VFD MOTOR	CAT I								
MC 68	HFTR SET (Power Plus)	CAT I								
MC 69	Insulators for ESP (Bushing, Support , Shaft)	CAT III								
MC 70	Fire sealing system - Type A Material supplier	CAT II								
MC 71	Fire sealing system - Type B Material supplier	CAT III								
MC 72	Executing Agency for Fire sealing system	CAT I								
MC 73	Porcelain Insulator	CAT III								
MC 74	Lighting & Welding Transformer	CAT III								
MC 75	Industrial /welding receptacles & boxes	CAT III								
MC 76	LT Switchgear - Wall mounted fixed type indoor / outdoor LT Switchgear non compartmentalized Panel (Lighting panels / AC / DC Fuse boards etc.)	CAT II								
	I.2 LIST OF MAJOR EQUIPMENT(POWER TRANSFORMER)								SOURCES FOR THESE ITEMS SHALL BE FINALIZED DURING DETAILED ENGINEERING AND MQP FINALIZATION	
1	CRGO STEEL	CAT II								
2	TANK FABRICATION	CAT II								
3	CRGO PROCESSORS	CAT II								

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4	CONTINUOUSLY TRANSPOSED CONDUCTOR	CAT II								
5	PAPER INSULATED COPPER CONDUCTOR	CAT II								
6	INSULATING PAPER for PICC	CAT III								
7	MOULDED INSULATION COMPONENTS	CAT III								
8	PRE-COMPRESSED BOARDS & INSULATION COMPONENTS	CAT III								
9	OIL PUMP AND MOTOR SET	CAT II								
10	BUCHOLZ RELAY	CAT III								
11	ON LOAD TAP CHANGER	CAT III								
12	OFAF COOLER	CAT III								
13	RADIATORS	CAT II								
14	REGENERATIVE MAINTENANCE FREE BREATHER	CAT III								
15	CMS System	CAT I								
16	CMS PANEL	CAT II								
17	TRANSFORMER TESTING & MAINTENANCE EQUIPMENTS	CAT III								
	L2 LIST OF BUS DUCTS									
1	Air Pressurisation Equipment	CAT II								
2	Hot Air Blower	CAT II								
3	LAVT Cubicle / NG Cubicle/ Marshalling Box	CAT II								
4	CT for IPBD	CAT II								
5	Epoxy Seal off bushing / Insulators	CAT II								
NOTE	L2 LIST OF SWITCH GEAR								SOURCES FOR THESE ITEMS SHALL BE FINALIZED DURING DETAILED ENGINEERING AND MQP FINALIZATION	
1	Numerical Relays	CAT I							SUB-QR CLEARED VENDORS ARE ACCEPTABLE FOR NUMERICAL RELAYS	
2	Silver Plating	CAT III								
3	LV Air Circuit Breaker	CAT I								
4	LT CT/PT/CBCT/ Control Transformer	CAT II								
5	MV Vacuum Type Circuit Breaker	CAT I								
6	MV CT / PT & CBCT	CAT I								
7	MCBs	CAT III								
8	ENERGY METER	CAT III								
9	H.V. Fuse	CAT III								
10	Terminal Blocks (Control)	CAT III								
11	Surge Capacitors	CAT II								
NOTES:										
Note - 1 : Vendors to submit project specific documents as per Sub-QR requirements in case the Vendor is approved under collaboration agreement.										
Note - 2: Vendors under 'A' are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.										
Note - 3: Main contractor approved sub vendors are acceptable those are evaluated / assessed as per Main contractor Quality Management System for vendor approval. Main contractor to inform the finally selected vendor to NTPC as soon as PO is placed for these items. In case of sub-QR Note-1 is also applicable.										
Note - 4 : BOI shall be reviewed and finalised during MQP approval for items/systems where ever applicable.										
Note - 5: Category of inspection for LT Cables:										
	For Total Contract Quantity per Size					Category Of Inspection				
	For cable total quantity ≤ 2.5 KM					Cat-III - submission of TC & Certificate of Conformance by Main Contractor for the manufacturers having successfully supplied to any NTPC project-site through Corporate contracts for atleast 2 years				
	For cable total quantity above 2.5 km & up to ≤ 10 km per size/type					Cat-II for the manufacturers having successfully supplied to any NTPC project-site through Corporate contracts for atleast 2 years				

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	For cable total quantity above 10 km per size/type					Cat-I				
Note - 6: Category of inspection for Cable Trays & Cable Tray Flexible Support System:										
	For Total Contract Quantity per Size					Category of Inspection				
	For cable total quantity ≤ 2.5 KM					Cat-III - submission of TC & Certificate of Conformance by Main Contractor for the manufacturers having successfully supplied to any NTPC project-site through Corporate contracts for atleast 2 years				
	For cable total quantity above 2.5 km & up to ≤ 10 km per size/type					Cat-II for the manufacturers having successfully supplied to any NTPC project-site through Corporate contracts for atleast 2 years				
	For cable total quantity above 10 km per size/type					Cat-I				
Note - 7:	i) For Motors less than 50 KW: CAT-III. Acceptance of Motor less than 50 KW is based on COC of the Manufacturer and the Main Contractor confirming as follows: "It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage & frequency variation, hot starts, pull out torque, starting KVA/KW, temp. rise, distance between centre of stud & gland plate and tested in accordance with approved drawing /data sheets". ii) For Motors 50 KW and less than 75 KW : CAT- II. Acceptance of Motor is based on NTPC review of Routine Test inspection report as per IS: 12615 / applicable standards duly witnessed by main contractor along with COC of the Manufacturer and the Main Contractor confirming as follows: "It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage & frequency variation, hot starts, pull out torque, starting KVA/KW, temp. rise, distance between centre of stud & gland plate, space heater and tested in accordance with approved drawing /data sheets". iii) For Motors 75 KW & above : CAT- I . AS PER NTPC APPROVED QUALITY PLAN (To be submitted seperately for NTPC review & approval).									
Note - 8:	NTPC approved Galvanizers:									
	1. M/s M J Engg.Delhi			7. M/s National Galvanizer, Kolkata			13. M/s Gurpreet Galvanizer, Hyderabad		19. Unitech Fabricators & Galvanizers- Hoogly	
	2. M/s A.V. Engg. Kolkata			8. M/s Unistar Galvanizer, Kolkata			14. M/s Sigma, Mumbai			
	3. M/s Inar Profiles, Vishakapatnam			9. M/s B.P. Project. Kolkata			15. M/s Radhakrishnan Shetty, Chennai			
	4. M/s Anand Udyog, Mumbai			10. M/s Bajaj Pune			16. Karamtara Mumbai			
	5. M/s Techno Engg.Chandigarh			11. M/s Electrocure Industries, Mumbai			17. Poona Galvanizers Pune			
	6. M/S Steelite Engg. Mumbai			12. M/s B.G. Shirke, Pune			18. Neha Galvanizer- Kolkata			
Note - 9: Relevant certificates shall be submitted for NTPC approval.Approval conditions attached to above identified vendors, as applicable shall be adhered to.										
Note - 10 : Indigenous sub-vendors for Annexure-I items are acceptable subject to meeting the MLC (Minimum Local Content) in line with latest MOP order.										
LEGENDS / संकेतिका SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY /प्रणाली आपूर्तिकर्ता / सब -वेंडर की स्वीकृति की स्थिति की श्रेणी (SHALL BE FILLED BY NTPC एनटीपीसी द्वारा भरा जाएगा) A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any/ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त , यदि कोई हो, के साथ-साथ पत्र “क” में इंगित किया जाए । DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए “विस्तृत ब्यौर की आवश्यकता” होगी। सूची में “DR” पत्र में इंगित किया जाना चाहिए। QP/INSPN CATEGORY: क्यूपी / निरीक्षण की श्रेणी: CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी। CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है। हालाँकि एनटीपीसी द्वारा कोई भौतिक निरीक्षण नहीं किया जाएगा। एनटीपीसी द्वारा अंतिम स्वीकृति अनुमोदित क्यूपी के अनुसार दस्तावेजों की समीक्षा के आधार पर दी जाएगी। CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor. UNITS/WORKS इकाईयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाईयाँ / कार्य के मुख्य सप्लायर का स्थान. : Control measure of item covered in quality plan of main item.										

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Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark	
1	AAQMS System											
		I				ACOEM Ecotech Industries Pvt Ltd	Pithampur	A			1. So2 ,Nox,CO,CO2 ,Ozone ,PM-10,PM-2.5 & multipoint calibrator will be from Ecotech Australia 2.Metrological sensor from Dynalab 3. Mercury analyser from LOA agreed sources 4.PI refer Note-07	
		I				Horiba India Pvt ltd	Pune	A			1. So2 ,Nox,CO,CO2 ,Ozone & multipoint calibrator will be from Horiba Japan 2.PM-10,PM-2.5 ,TSP will be from Met One USA & metrological sensor from Spectrum USA 3. Mercury analyser from LOA agreed sources	
		I				Enviroment SA India Pvt. Ltd.	Mumbai	A			1.Analysers SO2,Nox,CO2 & SPM from Environment SA France, 2-Multipoint Calibrator From envoiement SA France 3-Metrological Sensor with interface unit from M/s LSI Lastem SRL, Italy	
		I				Thermo Fisher Scientific India Pvt. Ltd	Mumbai	A			1) Analysers (Sox,Nox,CO,SPM,RSPM ,Ozone) ,multi gas calibrator shall be sourced from their principle Thermo Environmental ,USA (Division of M/S Thermo fisher Scientific ,USA) 2)Metrological sensors shall be sourced from M/S Metone Instruments USA	
		I				Chemtrol Engineering Ltd	Goa	A			1. Analysers from M/S Teledyne USA except Mercury analyser . 2.Metrological sensors & SPM analysers from Met one Instruments Inc USA 3.PI refer note-07	
2	Acoustic pyrometer System											
		I				Lucent Marcons Pvt Ltd (As a system Integrator of M/S Scientific Environmental Instruments, Inc. (SEI) USA)	Noida	A			1.Boiler watch processor control unit, acoustic sensor (Pizeo/Microphone with prefab cable) , Preamplifier , mapping software & analog output cards shall be from M/S SEI USA . 2. Enclousure ,OWS ,Waveguide ,Transition cone with flange , venturi , Tube box etc shall be from M/S SEI USA approved sources to be tiedup in MQP. 3. PI refer Note-07	

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		I				Hi-Tech Systems & Services Ltd (As a system Integrator of M/S Bonnenberg + Drescher GmbH, Germany)	Kolkata	A			1.All critical components are to be procured from M/S Bonnenberg + Drescher GmbH, Germany 2.Standard indigenous components like Solenoid valve (Asco make) ,matching flange ,printer & monitor table shall be supplied by M/S Hi- Tech	
		II				Scientific Environment Instrument Inc (SEI)	USA	A			1.PCU ,Acoustic sensor ,Preamplifier mapping software shall be from SEI USA . 2. Enclosure ,OWS ,Waveguide ,Tube box etc shall be from SEI approved sources to be tiedup in MQP. 3.Pl refer Note-07	
		II				Bonnenberg + Drescher GmbH,	Germany	A				
		II				STOCK Equipment Co	USA	A				
3	Addressable Detector (Multisensor , Photo & Heat Detectors Type), Interface units & Manual call points											
		II				Honeywell Life Safety-HIPL	Gurugram	A			Notifier Brand (Detector, Interface Module only)	
		II				Schrack	Austria	A				
		II				Autronica	Norway	A				
		II				Edwards	Mexico	A				
		II				Notifier	USA	A				
		II				Sheld Fire safety	UK	A				
		II				Jhonson Controls	USA	A			Simplex Brand	
4	Battery for 24VDC charger & UPS											
		Note-4				Hoppecke Batterien GmbH & Co Kg	Germany	A			For Lead Acid- Plante	
		Note-4				Exide	Kolkata	A			For Lead Acid- Plante	
		Note-4				SAFT India Ltd	Bengaluru	A			For Ni-Cd	
		Note-4				HBL Power	Hyderabad	A			For Ni-Cd ,Upto 990AH (H type)	
		Note-4				SAFT	France/Sweedon	A			For Ni-Cd	
		Note-4				Hoppecke Batterien GmbH & Co Kg	Germany	A			For Ni-Cd	
5	Blank Panels / Cabinets											
		III				Pyrotech Electronics Pvt. Ltd	Udaipur	A				
		III				Rittal India Private Ltd	Bengaluru	A				
		III				Hoffman	Bengaluru	A				
		III				BHEL	Bengaluru	A				
		III				BCH ELECTRIC LIMITED	Faridabad	A				
6	Boiler tube leak detection system (ASLD)											
		III				HI Tech System & services Ltd (System Integrator of Acoustic Monitoring International Inc. USA)	Kolkata	A			1.M/S Acoustic Monitoring International Inc. USA Make system Conditional as per approval letter 01/CQA/9573-102/Hi-tech-AMI dated 11.04.2013 2.Pl refer Note-07	
		III				Raman Instruments (System Integrator of M/S Procon UK)	Delhi	A			1.M/S Procon UK Make system 2.Pl refer Note-07	
		III				BHEL Ltd	Trichurapalli	A				
		III				Instrotech (PTY) Ltd	South Africa	A				

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		III				Rectuson Co. Ltd	S.Korea	A				
		III				Procon Engineering	UK	A				
		III				Acoustic Monitoring International Inc. (AMI)	USA	A				
7	CCTV System (IP Based)											
		III				Axis	Sweden	A			1-CCTV components will be of Axis communication AB,Sweden make & Video Management Software will be of Milestone Brand. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.	
		III				Bosch	Bengaluru	A			1.CCTV components will be of M/S Bosch make, and supplied through M/s Bosch, Bengaluru. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.	
		III				Pelco	USA	A			1.CCTV components will be of M/S Pelco, USA make 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.	
7A	CCTV System (IP Based) /System Integrators											
		I				Jonson Control India Pvt Ltd	Mumbai	A			M/S Pelco Make CCTV system	
		I				Toshniwal Industrial Pvt Ltd	Ajmer	A			M/S Axis Make CCTV system	
		I				L&T TECHNOLOGY SERVICES	Bengaluru	A			M/S Bosch Make CCTV system	
		I				Score Information Technologies Limited	Kolkata	A			M/S Bosch Make CCTV system	
8	Control Desk											
		I				Pyrotech Workspace Solutions Pvt Ltd	Udaipur	A			BOI items like Mosaic tiles /Console items shall be as per LOA approved sources	
		I				Cosmos Media Products Pvt Ltd	Greater Noida	A			1.BOI items like Mosaic tiles /Console items shall be as per LOA approved sources 2. H block should be from knurr Germany .Solid acrylic surface should be procured from Du Pont/NTPC approved sources 3.Extruded Al profile structure should be procured from Hindalco (With Knurr design)	
		I				Adarsha Control system Pvt Ltd	Bengaluru	A			1.BOI items like Mosaic tiles /Console items shall be as per LOA approved sources 2. Acrylic solid surface (ASS) should be procured from Du Pont /NTPC approved sources 3.wood works are to be done by M/S C K Furn Bengaluru	
9	Control Valves											
9-A	Control Valves for Aux PRDS system including desuperheater											

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		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to A182F92 material with conditions as per approval letter
		I				Koso India Pvt limited	Nasik	A			Up to A182F92 material with conditions as per approval letter
		I				Bomafa Special Valve solutions Pvt ltd	Ahmedabad	A			Up to A182F92 material with conditions as per approval letter
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			As per approval Ref: 02/CQA/SG/Tanda/MIL Dated 30.09.2015
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.MQP shall be vetted by M/S CCI -USA 2.Sources of major components like casting /forging and actuators shall be tied up during finalization of MQP
		II				Parcol SPA	Italy	A			
		II				Daume	Germany	A			
		II				HOLTER	Germany	A			
9-B	Control Valve for Start Up System										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				Emerson Process Management Ltd	Chennai	A			
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				SEMPELL AG	Germany	A			Up To size 20 Inches & 2500 ANSI Class
		II				Nihon Koso Co Ltd	Japan	A			
		II				HORA	Germany	A			
		II				CCI	S.Korea	A			
		II				Emerson (Fisher)	USA/France/Japa n	A			
9-C	Control Valve for BFP Recirculation.										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			Up to 10 Inches & 3400 ANSI class
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				Nihon Koso Co Ltd	Japan	A			
		II				CCI	USA	A			

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		II				Emerson (Fisher)	USA/France/Japan	A				
9-D	Control valve for feedwater flow Control											
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.	
		I				KOSO India Pvt Ltd	Nasik	A				
		I				Emerson Process Management Ltd	Chennai	A			Control valve body assembly will be from Nippon Fisher ,Japan with IBR form III C certificates .	
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			1.Provision of straight type of brackets for linkage mechanism .2.Factory fitted strainer /diffuser type seat ring . 3.AFR with T connector for pneumatic connection to volume booster	
		II				Dresser Produits industriels Industriels S.A.S	France	A				
		II				Nihon Koso Co Ltd	Japan	A			CONDITIONAL	
		II				CCI	USA / Austria / S.Korea / Switzerland	A				
		II				Emerson (Fisher)	USA/France/Japan	A				
9-E	Control valves for Soot blower pressure reducing ,SH/ RH Attemperation.											
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.	
		I				KOSO India Pvt Ltd	Nasik	A				
		I				Emerson Process Management Ltd	Chennai	A				
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A				
		I				GE Oil & Gas India Pvt Limited	Coimbatore	A			up to 2500 ANSI Class	
		I				Flow Serve India Controls Pvt Ltd	Bengaluru	A				
		I				Instrumentation Limited	Palakkad (Kerala)	A			only for SH / RH	
		II				Nihon Koso Co Ltd	Japan	A				
		II				Dressor Masoncilan	USA	A			only for SH / RH/ up to 2500 class	
		II				Dresser Produits industriels Industriels S.A.S	France	A				
		II				SPX Flow Technology	USA	A			only for SH / RH	
		II				Leslie Controls Inc	USA	A			only for SH / RH	
		II				Sempell AG (Tyco group)	Germany	A			only for SH / RH	

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		II				CCI	USA/Sweden /S.Korea	A				
		II				Emerson (Fisher)	USA/France /Japan	A				
9-F	Control valve(Other application)											
		I				Mascot Valves Pvt Ltd	Ahmedabad	A			Up to size 12 inches & 900 ANSI class	
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			Up to 2500 ANSI class	
		I				KOSO India Pvt Ltd	Nasik	A				
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			Up to 2500 ANSI class	
		I				Emerson Process Management Ltd	Chennai	A			Up to 2500 ANSI class	
		I				GE Oil & Gas India Pvt Ltd	Coimbatore	A			Up to size 10 inches & 900 ANSI class /Up to size 24 inches & 600 ANSI class	
		I				Flow Serve India Controls Pvt Ltd	Bengaluru	A			Up to size 14 inches & 600 ANSI class	
		I				Forbes Marshal Arca Pvt. Ltd.	Pune	A			Up to size 16 inches & 900 ANSI class	
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to 2500 ANSI class	
		I				Severn Glocon India Pvt Ltd	Chennai	A			Up to size 14 inches & 300 ANSI class	
		II				CCI	USA/Sweden /S.Korea	A				
		II				Nihon Koso Co Ltd	Japan	A				
		II				Emerson (Fisher)	USA/France /Japan	A				
		II				Leslie Controls Inc	USA	A				
		II				PARCOL S.P.A	Italy	A				
		II				Dresser Produits industriels Industriels S.A.S	France	A				
		II				HORA	Germany	A				
		II				Wellend & Tuxhorn	Germany	A				
		II				SPX Flow Technology	USA	A				
		II				Sempell AG (Tyco group)	Germany	A				
9-G	Control Valve (Ceramic lined)											
		I				Samson Controls Pvt Ltd	Pune	A			1. For M/S Samson Cera Germany make valve Up to 10 inches size & 150 ANSI class 2. BOI shall be tied up at the time of finalisation of MQP	
10	DDCMIS											
		I				ABB	Germany	A				
		I				SIEMENS AG	Germany	A				
		I				Emerson Process Management Asia Pacific Pvt Ltd	Singapore	A				
		I				Hitachi nest control system Pvt Ltd	Bengaluru	A				
		I				Honeywell Automation India Ltd	Pune	A				
		I				GE	France	A				
		I				SIEMENS	Gurugram	A				
		I				BHEL	Bengaluru	A			For MAX DNA System	
		I				Yokogawa	Bengaluru	A				
		I				GE Power India Ltd	Noida	A				
		I				Toshiba	Japan	A				
		I				ABB	Bengaluru	A				
		I				Emerson Process Management Ltd	Pawane	A				

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11	Dust Emission Monitor											
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			1. For Durag Germany Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter CQA/NTPC BARH STPP-I / D-263 / Durag India Instrumentation Pvt Ltd Bengaluru Dated 28.08.2019	
		III				Sick India Pvt ltd	Mumbai	A			1.For SICK AG Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter CQA/NTPC BARH-I /S-907/M/S SICK India Pvt Ltd dated 28.08.2019	
		III				Environment SA India Pvt Ltd	Navi Mumbai	A			1.For ENEVA UK Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter No.: CQA/NTPC BARH-I / E-335 / M/S Environment SA India Pvt Ltd Dated 16.09.2019	
		III				Land Instruments International	UK	A			For In Situ type /Optical Transreceiver type	
		III				Codel	UK	A			For In Situ type /Optical Transreceiver type	
		III				Durag Industrie Elektronik GmbH & Co KG	Germany	A			For In Situ type /Optical Transreceiver type & Extractive Type	
		III				Emerson Process Management	Ireland	A			For In Situ type /Optical Transreceiver type	
		III				SICK AG	Germany	A			For In Situ type /Optical Transreceiver type & Extractive Type	
		III				ENEVA	UK	A			For Extractive Type Dust density analyser	
12	Electrical Actuators											
12-A	Electrical Actuator (With gear box if applicable)											
		II				Antrieb Technik Pvt Ltd	Chennai	A			For low torque applications only	
		II				Auma	Bengaluru	A				
		II				Limitorque	Faridabad	A			Model no L120,SMB,LY series, Gear Box T, HBC Series	
		II				Rotork	Bengaluru	A			For low torque app (Up to 1000 Nm)	
		II				Rotork Controls (India) Private Ltd	Chennai	A			For low torque app (Up to 1000 Nm) & High torque 4000 to 7000 Nm With integral starter for non critical applications	
		III				Auma	Germany	A				
		III				Limitorque	USA	A				
		III				Rotork	UK	A			For low torque app (Up to 1000 Nm)	
		III				Nippon gear	Japan	A				
		III				Drehmo GMBH	Germany	A			C Matic Series (DMC/DMCR)	
12-B	Electrical Actuator- Non-Intrusive (With gear box if applicable)											
		I				Auma India Pvt Ltd	Bengaluru	A			Also acceptable for Field Bus based applicable	
		I				Rotork Control	Chennai	A			Upto 630Nm	
		III				Flowserve	USA	A			Also acceptable for Field Bus based applicable	
		III				Bernard Controls	France	A				

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12-C	Electrical actuator for ID/FD/PA Blade pitch ,IGV &SCOOP											
		III				Harold Beck & Sons Inc	USA	A				
		III				SIPOS Aktorik GmbH	Germany	A				
13	Electronics Transmitter (Pressure , DP and DP based Flow/Level)											
13-A	Electronics Transmitter (Pressure , DP and DP based Flow/Level)											
		III				ABB Ltd	Bengaluru	A			2600T & critical item from ABB Italy/ Their approved source;	
		III				Emerson Process Management Ltd	Pawane	A				
		III				Siemens Ltd	Thane	A			Model:-SITRANS P	
		III				Honeywell Automation India Ltd	Pune	A				
		III				Baldota Control and Equipment Pvt Ltd	Navi Mumbai	A			PT & DPT of LD 301 Series (SMAR)	
		III				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condotion (sensor assembly as a single unit) shall be sourced from M/S Yokogawa Japan	
		III				M/s Endress + Hauser India Automation Instrument Pvt Ltd	Aurangabad	A				
		III				Emerson (Rosemount)	USA	A				
		III				Yokogawa	Japan	A				
		III				ABB	Germany / Italy	A			2600T & critical item from ABB Italy/ Their approved source;	
		III				Siemens	France	A			Sitrans P DSIII Series	
		III				Fuji Electric	France	A			FCX -AIII SERIES	
		III				Fuji	Japan	A				
13-B	Electronics Transmitter -Field Bus Based (Pressure , DP and DP based Flow/Level)											
		I				ABB India Ltd	Bengaluru	A			One no of Transmitter will be sent at DDCMIS supplier for function testing of field bus communication with DDCMIS during FAT	
		I				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condotion (sensor assembly as a single unit) shall be sourced from M/S Yokogawa Japan	
14	EOMS											

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		I				SWAN	Hyderabad	A			1. Conductivity analyser, pH analyser and Temperature Transmitter will be of M/s ABB, UK make . 2. TSS analyser will be of M/s Daeyoon, South Korea make . 3. Oil in water analyser will be of M/s TriOs, Germany make. 4. Online BOD/COD analyser will be of M/s Shimadzu, Japan make . 5. Flow meter will be of M/s Khronc Marshall, Maharashtra make. 6. Data Aquisition System will be procured from Knowledge Lens, Karnataka.	
15	Fiber optic cable											
		Note-3				U M Cables Ltd	Silvassa (Daman)	A				
		Note-3				KEC International Ltd	Mysore	A				
		Note-3				Apar Industries Limited	Valsad (Gujrat)	A				
		Note-3				HFCL	Goa	A				
		Note-3				Aksh Fibre	Bhiwadi (Raj)	A				
		Note-3				Finolex Cable Ltd	Goa	A				
		Note-3				Birla Cable Limited	Rewa	A				
		Note-3				R&M	Switzerland	A				
		Note-3				Molex	UK	A				
		Note-3				Corning	USA	A				
16	Fire alarm Panel											
		II				Toshniwal Industrial Pvt Ltd	Ajmer	A			1.M/S Notifier Make Fire alarm Panel 2.PI Refer Note-07	
		II				Bosch Security system	Bengaluru	A			1.Detector , Hooter, MCP, Modules, Panel shall be M/s Bosch Make	
		II				Notifier	USA	A				
		II				Autronica	Norway	A				
		II				Schrack	Austria	A				
		II				Edwards	Mexico	A				
		II				Shield Fire safety and security Ltd	UK	A				
		II				Jhonson Controls	USA	A			Simplex Brand	
17	Flame Monitoring System (Scanner)											
		I				Lucent Marcons Pvt Ltd (System Integrator of M/S Forney Corporation USA)	Noida	A			1.Flame detector, amplifier ,light guide fiber optic , smart display programming unit , test kit & simulator will be supplied from M/S Forney Corporation USA 2.Other components like outer carrier ,IDD cable with connector , expander , Y connector with adapter gasket , fastners & signal isolators will be supplied from M/S Forney Corporation USA approved sources . 3.PI Refer Note-7	
		I				HI Tech System & services Ltd (System Integrator of BFI Germany)	Kolkata	A			1.For BFI Germany make system 2. PI Refer Note-7	

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		II				Durag India Instrumentation Pvt Ltd	Bengaluru	A			For Durag Germany make system	
		II				Forney Corporation	USA	A				
		II				BFI	Germany	A				
		II				Durag GmbH	Germany	A				
		II				Emerson (COEN)	USA	A				
		II				BHEL	Trichurapalli	A				
18	Flow nozzle assembly											
		I				Microprecision Product Pvt Ltd	Palwal	A			Up to Alloy steel material grade P-92 & other conditions as per approval letter	
		I				Minco India Flow Elements Pvt. Ltd.	Goa	A			Up to size 26 Inches for Alloy steel/ Stainless steel pipe SA335 P-11, P -22 and SA 335 P-91 & other conditions as per approval letter	
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to alloy steel grade P-92 subject to qualified WPS & other conditions as per approval letter	
		I				Starmech controls (India) Pvt Ltd	Pune	A			Up to alloy steel grade P-92 subject to qualified WPS & other conditions as per approval letter	
		II				SEIKO	Czech Republic	A				
		II				WISE Control	S.Korea	A				
		II				Technomatic	Italy	A				
19	Flue Gas Analyser (CO)											
		III				Forbes Marshall Pvt Ltd	Pune	A			For In situ type CO analyser	
		III				ICE (Asia) Pvt Ltd	Mumbai	A			For In situ type CO analyser 1. CO analyser from Protea UK 2. Other components like, Mounting Flanges, tubing, fittings junction boxes, air purging system , calibration cylinders & cables will be supplied by ICE (Asia) Pvt Ltd 3.PI refer Note-7	
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type / CO analyser from SICK AG & Other components like ,Protection tube ,Flanges ,tubing ,fittings junction boxes, solenoid valves & calibration cylinders will be supplied by M/S Sick India Pvt Ltd .	
		III				Emerson Process Management Ltd	Pawane	A			For M/S Emerson Germany/ USA make Analyser	
		III				Codel	UK	A				
		III				Land Instruments International	UK	A				
		III				Sick AG	Germany	A			For In Situ Type	
		III				Envoirement SA	France	A			For Hot Extractive	
		III				Fuji Electric	Japan	A				
		III				Servo max Group	UK	A				
		III				Siemens	Germany	A				
20	Flue Gas Analyser (CO2,SO2 and Nox)											
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type SO2 analyser 1. Analyser will be from Sick AG Germany 2. Other components like ,Whether proof covers ,flanges ,purge air unit junction boxes ,cables ,PC ,remote display ,gas cylinders shall be supplied by M/s Sick India Pvt Ltd	

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		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Germany/ USA make Hot Extractive SO2, NOx Analyser	
		III				Envoirement SA	France	A			For Hot Extractive	
		III				Fuji Electric	Japan	A			Hot Extractive Type For SO2 & Nox	
		III				Siemens	Germany	A			Hot Extractive Type For SO2 & Nox	
		III				Yokogawa Electric Corporation	Japan	A			IR-400 Series (Hot Extractive Type For CO2, SO2 & NOx)	
		III				Servo max Group	UK	A			Hot Extractive Type For SO2 & Nox	
		III				Sick AG	Germany	A			Hot Extractive Type For CO2, SO2 & NOx and In situ type for SO2 analyser	
21	Flue Gas Analyser O2 Analyser (HT)											
		III				SECO	Chennai	A				
		III				Marathon Monitor	USA	A				
		III				Servo max Group	UK	A				
22	Flue Gas Analyser {O2 Analyser (LT)}											
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type 1. Analyser will be from Sick AG Germany 2. Other components like ,Whether proof covers ,flanges ,purge air unit ,junction boxes ,cables ,PC ,remote display ,gas cylinders shall be supplied by M/s Sick India Pvt Ltd	
		III				Analysar Instruments Co Pvt Ltd	Kota	A			For In Situ Type 1.Main parts like Sample probe & Analyser will be supplied by M/s Enotec Germany. 2. Other components like auto calibration unit ,probe protector ,enclosure panel & calibration kit will be supplied & integrated M/s AIC kota. 3.Pl refer Note-07	
		III				Emerson Process Management Ltd	Pawane	A			For In Situ Type For M/s Emerson USA make Analyser	
		III				ABB	Bengaluru	A			For In Situ Type For M/s ABB UK make Analyser	
		III				Yokogawa India	Bengaluru	A			For In Situ Type For M/s Yokogawa Japan make Analyser	
		III				Enotech GmbH	Germany	A			For In Situ Type	
		III				Ametek	USA	A			For In Situ Type	
		III				Yokogawa Electric Corporation	Japan	A			For In Situ Type	
		III				Servo max Group	UK	A			For In Situ Type	
		III				Sick AG	Germany	A			For In Situ Type	
23	Continous Emission Monitoring system											
		I				Horiba India Pvt Ltd	Pune	A			Approval conditions as per approval letter no - CQA/NTPC Mauda-II / H-321 / M/S Horiba India Pvt Ltd Dated 03.10.2019	
		I				Yokogawa India Ltd	Bengaluru	A			1. SO2,NOx & CO2 Analyser will be from M/S Yokogawa Electric Corporation Japan . 2.Other Conditional as per approval letter no Ref. No.:-CQA/BARH-I / Y-023/ M/s Yokogawa India Ltd dated 21.05.2020	

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		I				Adage Automation Pvt Ltd.	Goa	A			For M/s Siemens Germany make SO2,NOx & CO2 Analysers	
		I				Thermo Fisher Scientific India Pvt. Ltd	Pune	A			Approved only for Dilution Extractive Technique 1)Analyser (SO2,NOx,CO,CO2,Mercury) , sampling probe ,sample handling system ,umbical cord etc to be supplied from M/S Thermo Fisher USA . 2) Other BOI shall be as per LOA approved sources	
		I				Emerson Process Management India Pvt Ltd	Pawane	A			For M/s Emerson Germany make SO2,NOx & CO2 Analysers other conditions as per approval letter.	
		I				Analyser Instruments Co Pvt Ltd	Kota	A			Analysers from Fuji Japan & other BOI shall be as per LOA approved sources .	
		I				Envoirement SA India Pvt Ltd	Navi Mumbai	A			Hot Extractive Type / 1.Multipoint gas Analyzers MIR-9000 for SO2, NOx,CO2 & CO ,Probe ,Nafyon drier & heater for drier will be of M/S Environment SA France make. 2. Other components shall be as per the approval letter ref no CQA/NTPC Telangana/E-335/M/SEnvoirement SA India dated 12.02.2019	
24	Furnace Flame viewing system (High Temperature CCTV Components)											
		III				Sertel Electronics Pvt. Ltd.	Chennai	A			Approved for Visible type only	
		III				Hi Tech System and Service (System Integrator of M/S Lenox USA)	Kolkata	A			1.M/S Lenox USA Make System 2.Pl refer Note-07	
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			1.Complete Camera Assembly, IRIS Control etc. from Durag Germany 2.Other Component like chiller, vedio monitor, OFC ,Panel from M/S Durag Approved sources	
		III				TLT Engg Pvt. Ltd. (System Integrator of M/S Diamond Power USA/ Sweden make system)	Kolkata	A			1.M/S Diamond Power USA/ Sweden make system 2.Pl refire Note-07	
		III				Toshniwal Industries (System Integrator of M/S Mirion UK make system)	Ajmer	A			1. M/S Mirion UK make system 2.Pl refer Note-07	
		III				Diamond Power	USA / Sweden	A				
		III				Durag GmbH	Germany	A			D-VTA-201	
		III				Lenox	USA	A				
		III				Mirion	UK	A				
		III				Piper GmbH	Germany	A				
		III				Sabota GmbH	Germany	A				
25	H2 Gas Analyser											
		I				ABB India Ltd	Bengaluru	A			M/s ABB Germany /UK Make analyser	
		I				Adage Automation Pvt. ltd	Goa	A			1.M/s Siemens, Garmany (Calomat 6) Make analyser 2. Pl refer Note-07	

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		I				Yokogawa India ltd	Bengaluru	A			M/s Yokogawa Japan (Gas Densitybased) Make analyser
		I				SIEMENS	Gurugram	A			M/s Siemens, Garmany (Calomat 6) Make analyser
		III				GE Sensing EMEA	Ireland	A			Conductivity based
		III				ABB	UK	A			
		III				Emerson (Rosemount)	USA	A			
		III				Environment One Corporation	USA	A			Conductivity based
26	HEA ignitor										
		I				Durag India Instrumentation Pvt Ltd	Bengaluru	A			M/S Durag Germany make HEA Ignitor
		I				Hindustan Thermometers	Ambala	A			Conditional as per approval ref no 01/CQA/0270-102 dated 17.09.2012.Spark tip of their own make is also acceptable
		I				Fives combustion System Pvt Ltd	Vadodara	A			
		I				Boiler control Pvt Ltd	Puddukottai (Tamilnadu)	A			Approved for Aux Boiler package only
		III				Unison Industries	USA	A			
		III				Durag GmbH	Germany	A			
		III				Ignition system INC	USA	A			
		III				Tesi SPA	Italy	A			
27	High Temp. cable (PTFE/FEP)										
		II				Thermocables	Hyderabad	A			
		II				Tempsens	Udaipur	A			
		II				Habia cables	Sweden	A			
		II				Thermo Electrica BV	Netherland	A			
		II				Lapp cables	Germany	A			
		II				Kerpen cables	Germany	A			
		II				TEW & C	USA	A			
28	Impulse Pipes/Tubes										
		II				Mahrashtta Seamless	Raigarh	A			For CS Pipes only
		II				Ratnamani Metals and Tubes	Gandhinagar	A			For SS only.
		II				Heavy Metals and Tubes	Gandhinagar	A			For SS & CS only.
		II				ISMT	Ahamadnagar	A			For CS/ AS upto Gr 22 Pipes only
		II				Nippon Steel & Sumitomo Metals corporation	Japan	A			
		II				TPS Tecnitube	Germany	A			
		II				Veluric & Manessmann	Germany	A			
		II				Trouvay and Cauvin	France	A			
		II				Sandvik	Sweden	A			For SS only
		II				REMI Edeltahl Tubulars Ltd	Palghar	A			
29	Instrument Cables (F,G & T/C Cables)										
		Note-2				Goyolene Fibers (India) Pvt Ltd	Silvassa	A			F&G Type Cable
		Note-2				Temsens Instruments Ind Pvt Ltd	Udaipur	A			
		Note-2				Havells India	Alwar	A			F Type Cable
		Note-2				Paramount Communication Ltd	Khushkhera	A			
		Note-2				Polycab	Daman	A			
		Note-2				Delton	Faridabad	A			
		Note-2				KEI	Bhiwadi (Raj)	A			
		Note-2				Elkey Telelinks	Faridabad	A			
		Note-2				CORDS	Kaharani	A			
		Note-2				CORDS	Bhiwadi	A			
		Note-2				Nicco	Kolkata	A			

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		Note-2				Universal Cable	Satna	A				
		Note-2				Thermocables	Hyderabad /Mahboobnagar	A				
		Note-2				Gupta Power Infrastructure Ltd.	Khurdha	A				
		Note-2				CMI	Faridabad	A				
		Note-2				Advance Cables Pvt Ltd	Bengaluru	A			F&G Type Cable	
		Note-2				Gemscab Industries Ltd	Bhiwadi (Raj)	A			F&G Type Cable	
		Note-2				Apar Industries Limited	Valsad	A			F&G Type Cable	
		Note-2				Suyog Electricals Ltd	Halol (Gujrat)	A				
		Note-2				Special Cables Pvt Ltd	Rudrapur	A				
		Note-2				T C Communication	Ghaziabad	A				
		Note-2				TEW & C	USA	A				
		Note-2				Habia cables	Sweden	A				
		Note-2				Kerpen cables	Germany	A				
		Note-2				Lapp cables	Germany	A				
		Note-2				Thermo electrta Bv	Netherland	A				
30	Intelligent Battery charger 24V DC / DCDB/BHMS											
		II				Chabbi Electricals	Jalgaon	A			Rectifier module, Controller module and Battery Health monitoring system shall be of M/s Vertiv make	
		II				Eltek SGS Pvt Ltd	Gurugram	A				
31	Large Video Screen (LED Based)											
		I				Pyrotech Electronics Pvt Ltd	Udaipur	A				
		I				Delta India Electronics Pvt Ltd	Gurugram	A				
		I				Barco Electronics system (P) Ltd	Noida	A				
		I				Planner System Inc	USA	A				
32	Level switch- Conductivity type											
		II				Raman Instruments (System integrator of Delta Morbey/ Emerson Mobrey /Solartron -Mobrey)	Delhi	A			1.M/S Emerson (Morbey) UK system 2.Pl refer Note-07	
		II				HI Tech System & services Ltd (System Integrator of Levelstate systems Ltd ,UK)	Kolkata	A			1. M/S Levekstate UK System .Vessel from M/s Hi Tech 2.Pl refer Note-07	
		II				BHEL	Trichurapalli	A				
		III				Emerson -Mobrey (Solartron mobrey)	UK	A				
		III				Levelstate Systems Ltd	UK	A				
		III				Yarway	USA	A				
33	Local Instrument Enclosure/Rack											
		I				Pyrotech Electronics Pvt. Ltd	Udaipur	A			BOI from LOA approved sources	
		I				Sajas electrical	Trichurapalli (Tamilnadu)	A			BOI from LOA approved sources	
		I				Prammen	Puddukottai (Tamilnadu)	A			BOI from LOA approved sources	
		I				Chemin C&I Pvt Limited	Puducherry	A			1- BOI from LOA approved sources 2.Fabrication at M/s LUFT tech India 3- Painting at M/s Supreame Coater & Fabricator	
34	Master Slave Clock System											
		I				Signals and Systems Pvt. Ltd. (SANDS)	Chennai	A				
		I				Masibus	Gandhinagar	A				

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		I				Sertel Electronics Pvt. Ltd.	Chennai	A				
		II				Hopf Elektronik GmbH	Germany	A				
		II				Hathway	USA	A				
		II				Mein Berg	Germany	A				
		II				Moser Baer AG	Switzerland	A				
35	Mercury Analyser											
		I				Analysar Instrument Co. Pvt Ltd (AIC)	Kota	A			1. Mercury Analyzer from PS Analytical UK 2.System integration & supply of components like, Enclosure with AC, calibration cylinders, PC will be done by M/s Analyser Instrument Co. Pvt Ltd (AIC) Kota . 3.PI refer Note-07	
		III				Environment SA India Pvt Ltd	Navi Mumbai	A			1-Mercury analyzer with accessories will be from Mercury instruments GmbH Germany . 2- Other components like, sample line between probe to mercury analyzer will be supplied by M/s Environment SA India Pvt Ltd .	
		III				Thermo Fisher Scientific India Pvt Ltd	Pune	A			1. Mercury Analyser shall be from Thermofisher USA 2. Other approval conditions are as per approved letter ref no 01/CQA/9578-001/Thermofisher dated 09/12/2016	
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			Analysar from M/s Verewa Umwelt Germany	
		III				Mercury Instruments GmbH	Germany	A				
		III				SICK AG	Germany	A				
		III				Themofisher	USA	A				
		III				Lumax	Russia	A			For AAQMS System	
36	PA System (IP Based)											
		III				BNA Technology Consulting Ltd.	Bengaluru	A			BOI shall be from LOA approved sources.	
		III				Armtel	Russia	A				
		III				Zenitel	Norway	A			1.PA system active component , Proprietary item will be Zenitel Norway make 2.Other components & BOI shall be from LOA approved sources	
		III				Commend International GMBH	Austria	A				
36A	PA System (IP Based)/System Integrators										note-7	
		III				Willstrong Solutions Pvt. Ltd	Greater Noida	A			For M/s Armtel Russia system Approval conditions as per approval letter no Patratu-QA/9585-001-102/VA-Willstrong Dated: 21.12.20	
		III				Toshniwal Industries Pvt Ltd	Ajmer	A			For M/s Commend Austria make system	
		III				Aishan Technologies Pvt Ltd	Bengaluru	A			For M/s Zenitel Norway make system	
		III				Haritasa Checkmate Electronics Pvt Ltd	Bengaluru	A			For M/s Commend Austria make system	
		III				Netware Computer Pvt Ltd	New Delhi	A			For M/s Commend Austria make system	

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37	PLC System											
		I				Emerson Automation solution Intelligent platforms Pvt Ltd	Bengaluru	A			PLC modules from M/s Emerson USA & BOI shall be from LOA approved sources	
		I				ABB India Ltd	Bengaluru	A				
		I				Schneider Electric system india Pvt Ltd	Chennai	A			PLC modules from M/s Schneider France & BOI shall be from LOA approved sources	
		I				Rockwell	Sahibabad	A				
		I				Siemens	Nasik	A				
		I				Honeywell	Pune	A			PLC modules from M/s Honeywell ,S.Korea & BOI shall be from LOA approved sources	
		I				Schneider Electric India Pvt Ltd	Bengaluru	A			PLC modules from M/s Schneider France & BOI shall be from LOA approved sources	
37-A	PLC System Integrators										Note-11 and note-7	
		I				Ladder Automation Solution Pvt Ltd	Gurugram	A			For M/s Honeywell make system	
		I				Virtual Automation	Ranga Reddy (Telangana)	A			For M/s Schneider make system	
		I				Cotmac Electronics Pvt Ltd	Pune	A			For M/s SIEMENS make system	
		I				Tech-Masters	Hyderabad	A			For M/s Emerson make system	
		I				Powertech Switchgear (I) Pvt Ltd	Sonepat	A			For M/s Schneider make system	
		I				Unity Industrial Automation Pvt Ltd	Delhi	A			For M/s Rockwell make system	
		I				EMCONS	Ranchi	A			For M/s Rockwell make system	
		I				Divya Engineers	Chennai	A			For M/s SIEMENS make system	
		I				M D Industries	Vadodara	A			For M/s Emerson make system	
		I				Velox automation	Surat	A			For M/s SIEMENS make system	
		I				Vision Compitel	Kolkata	A			For M/s Emerson make system	
		I				Adaptive Engineering Private Limited	Ahmedabad	A			For M/s Schneider make system	
		I				Greenwave Solutions Private Limited	Kolkata	A			For M/s Rockwell make system	
		I				Dreamz Automation	Ghaziabad	A			For M/s SIEMENS make system	
		I				Creative Robotics	Ghaziabad	A			For M/s Honeywell make system	
		I				Kruti Techno Engineer Pvt Ltd	Chhapraula (GB Nagar	A			For M/s SIEMENS make system	
		I				EDS Instruments & Systems Pvt Ltd	Chennai	A			For M/s Honeywell make system	
		I				Delsys Automation Technologies Pvt Ltd	Chennai	A			For M/s Emerson make system	
		I				Hindustan Controls and Equipment Ltd	Kolkata	A			For M/s Emerson make system	
		I				Vollkraft Engineering And Consultant (P) Ltd	Kolkata	A			For M/s Emerson make system	
		I				SSM Infotech Solutions Pvt Ltd	Surat	A			For M/s Schneider make system	
		I				Sun Industrial Automation & Solutions	CHENNAI	A			For M/s Schneider make system	
		I				ARTEE FLOW CONTROL PVT LTD	ANKLESHWAR	A			For M/s Honeywell make system	
		I				CSS AUTOMATION PVT. LTD	KOLKATA	A			For M/s Emerson make system	
		I				ARMAX AUTOMATION PVT LTD	BANGALORE	A			For M/s ABB make system	

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		I				KAIZEN AUTOMATION	AHEMDABAD	A			For M/s Schneider make system	
		I				ELECON PERIPHERALS LIMITED	ANAND	A			For M/s ABB make system	
38	Pneumatic Actuator Regulating (Power Cylinder HAD,CAD SADC & Burner Tilt)											
		I				Instrumentation Limited	Palakkad (Kerala)	A				
		I				Kelton	Cochin (Alleppy)	A				
		I				SMC Corporation India Private Ltd	Noida	A			Up to Bore size 12 inches	
		I				IMI Norgren Herion Pvt ltd	Noida	A				
		II				Dong Woo Valve Control Co. Ltd	S.Korea	A				
		II				Shin Hwa Engineering Co. Ltd	S.Korea	A				
39	Radar type level transmitter											
		III				Limaco	Russia	A			High Frequency Type	
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Singapore make	
		III				Endress & Houser	Aurangabad	A				
		III				SIEMENS	Canada	A				
		III				B M Technology	Italy	A			For Non Contact type	
		III				Magnetrol	Belgium	A				
		III				ABB	USA	A			K-Tech Brand	
		III				Endress & Houser	Germany	A				
		III				Saab Rosemount	Sweden	A				
		III				Emerson Process Management	Singapore	A			Rosemount 3300 series for GW Radar & 5600 Series for Non-Contact type	
		III				Endress & Houser	Germany	A				
		III				Vega Grieshaber KG	Germany	A				
40	Short Term Fire Proof cable											
		III				nVent Solutions limited	UK	A				
		III				Wrexham Mineral	UK	A				
		III				KME	Italy	A				
41	SWAS (Sampling Handling System and Dry Panel)											
		I				Emerson Process Management Ltd	Navi Mumbai	A			Analysers and Other BOI Componets from LOA agreed source	
		I				Forbes Marshall	Pune	A			Analysers and Other BOI Componets from LOA agreed source	
		I				SEPL	Pune	A			Analysers and Other BOI Componets from LOA agreed source	
42	Water Analyser (Chloride, Conductivity, Dissolved Oxygen,pH, Hydrazine, Concentration , Phosphate, Silica, Soldium,Turbidity, Total Iron, Degassed Cation Conductivity)											
		III				Emerson Process Management Pvt Ltd	Pawane	A			For Conductivity,pH, Dissolved Oxygen, Turbidity	
		III				Mettlet Toledo India Pvt Ltd	Vasai	A			For pH Analyser (1. PH analyser from M/S Mettler Toledo GmbH Switzerland 2. Other components like, Housing, Panel mounting kit, Tubing's & easy clean mechanism will be supplied by M/s Mettler Toledo India Pvt Ltd)	

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		III				Endress Hauser India Pvt. Limited	Mumbai	A			For pH Analyser (1. pH sensor with cable , analyser ,retract & cleaning assembly , electrolyte reservoir (As applicable) will be supplied from Principals of M/S Endress Hauser India Pvt. Limited. 2. Other components like, Flow through assembly shall be supplied from M/S Endress Hauser India Pvt. Limited approved sources.)	
		III				Thermo Fisher Scientific	USA	A			For Chloride,Dissolved Oxygen,Hydrazine	
		III				ABB	UK	A			For Chloride,Dissolved Oxygen,Hydrazine, Phosphate, Silica,Sodium,Turbidity	
		III				Hach	USA	A			For Conductivity, pH,Concentration, Phosphate, Silica,Turbidity	
		III				ABB	USA	A			For Conductivity, pH	
		III				Yokogawa	Japan	A			For Conductivity	
		III				Hach	Switzerland	A			For Dissolved oxygen, Hydrazine, Silica,Sodium	
		III				Yokogawa	Japan	A			For pH	
		III				Eutech Instrument PTE Ltd	Singapore	A			For Silica	
		III				Orion	USA	A			For Sodium	
		I				METTLER TOLEDO INDIA PVT LTD	Mumbai	A			For Chloride Analyser	
43	Temp Transmitter											
43-A	Temp Transmitter											
		III				Endress & Houser	Aurangabad	A				
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Singapore make	
		III				Yokogawa	Bengaluru	A			Make Yokogawa japan and calibration at Yokogawa Banglore	
		III				ABB	Bengaluru	A			For M/s ABB Germany make	
		III				WIKA Instruments India Pvt Ltd	Pune	A			For M/s WIKA Germany make Model no T-32	
		III				Honeywell Automation India Ltd	Pune	A				
		III				Yokogawa	Japan	A				
		III				Moore	USA	A				
		III				M System co Ltd	Japan	A			Model No-B3HU-0	
		III				Emerson	U.S.A/Singapore/ Germany	A				
		III				ABB	Germany	A				
		III				Emerson Process Management	Germany	A				
43-B	Temp Transmitter -Field Bus based Single/Dual Input											
		I				ABB India Ltd	Bengaluru	A			One no of TT will be available at DCS supplier for function testing of field bus communication with DCS during FAT	
44	Turbine supervisory Instruments along with vibration analysis system.											
		I				GE	Pune	A			For GE Bently ,USA make system	

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		I				Meggitt India Pvt ltd	Bengaluru	A			For Meggitt (Vibrometer) Switzerland make system	
		I				Forbes Marshall	Pune	A			For Shinkawa ,Japan make system	
		II				GE BENTLY	USA	A				
		II				SHINKAWA	JAPAN	A				
		II				MEGGITT	Switzerland	A				
45	Ultrasonic Type Flow Meter (for Stack)											
		III				Sick India Pvt ltd	Mumbai	A			For Sick AG Germany make	
		III				Sick AG	Germany	A				
		III				Durag	Germany	A				
		III				Teledyne	USA	A				
46	Ultrasonic type level Transmitter											
		III				EIP Enviro	Noida	A			1-Ultrasonic level Tx shall be BM Technology Italy make 2-Required mounting arrangement , Testing, Calibration shall be carried out at M/s EIP Works.	
		III				E & H	Aurangabad	A				
		III				Emerson Process Management Ltd	Pawane	A			Complete Intrument Transmitter & Probe to be procured from Mobrey UK , only intergration & configuration at Pawane works	
		III				BM Technology	Italy	A				
		III				Siemens Miltronics	Canada	A				
		III				Nivelco Process Control	Hungary	A				
		III				E & H	Germany	A				
		III				HAWK Measurement PTY Ltd	Australia	A				
47	UPS With ACDB											
		Note-5				Vertive Energy Pvt Ltd	Pune	A			Upto 125 KVA for 1 phase and 300 KVA for 3 Phase	
		Note-5				Vertive Energy Pvt Ltd	Mumbai	A			Upto 160 KVA	
		Note-5				Hitachi Hirel Power Electronics Pvt Ltd	Gandhinagar	A			Upto 200 KVA,	
		Note-5				Fuji Electric Consul Neowatt Private Limited	Pune	A			Up to 100 KVA single phase	
		Note-5				KELTRON	Trivendrum	A				
		Note-5				Merlin & Gerin	France	A				
		Note-5				Gutor	Switzerland	A				
		Note-5				AEG	Germany	A				
		Note-5				Fuji Electric	Japan	A				
48	Vibration Monitoring System											
		II				Sensonics Technology India	Kundli	A			For Sensonic UK system	
		II				BHEL	Bengaluru	A			1. Imported items like Vibration Monitors, Cross Connection Cables, Buffered Output Modules, and Piezoelectric Vibration Sensors, Eddy Current type Proximity Probe, Extension Cable and Signal Conditioner will be procured from Valmet Automation, Finland. 2.Indigenous items like Communication cables, networking components, blank panels, TB, OWS will be procured from NTPC approved sources.	

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		II				IRD Mechanlysis Ltd	Thane	A			Vibration sensors will be sourced from M/s Hansford UK ,however brand name of IRD and its logo is acceptable with suitable tracebility of M/s Hansford ,UK.	
		II				Forbes Marshall Pvt Limited	Pune	A			VMS hardware , Sensors ,extention cables shall be shinkawa Japan make .2. All other BOI shall be from LOA agreed sources	
		II				GE	Pune	A			For GE Bentley , USA Make	
		II				Rockwell Automation	Sahibabad	A			For Rockwell USA make	
		II				SKF	Pune	A			For SKF USA make	
		II				Imageneous Engineering Pvt Ltd	Vadodara	A			1-For Meggitt Switzerland make 2- Refer note 7	
		II				Shinkawa	Japan	A				
		II				GE	USA	A			Bentley Niveda brand	
		II				Meggitt	Switzerland	A				
		II				Sensonic Limited	UK	A				
49	Wireless Solution (Microwave Tower Communication)											
		I				L&T Technology Services (LTTS)	Bengaluru	A			1- Wireless Product (Access Point, Antenna) shall be M/s Cambium UK Make 2- Other Item like Switch, Cat-6 Cable can be supplied from M/s LTTS approved sources meeting technical requirements.	
		I				Lotus wireless technologies India Pvt Ltd	Visakhapatnam	A				
		I				Sheetal Wireless Technologies Pvt Ltd	Pune	A				
		III				Proxim Wireless Corporation	USA	A			BOI shall be as per approval letter	
50	Field Bus Cable/ Profibus Cable- PA & DP type											
		I				LAPP India Pvt Ltd	Bangalore	A				
51	Field bus components (Field bus modules ,segment protector ,surge protector & SS JB)											
		III				Phoenix Contact Inc	USA	A			Materiall will be allowed to dispatch from the vendor works as CAT-III item ,however all material except SS junction box will be available at DDCMIS supplier works for functional testing .	
		III				Pepperl + Fuchs Pte Ltd	Singapore	A			Materiall will be allowed to dispatch from the vendor works as CAT-III item ,however all material will be available at DDCMIS supplier works for functional testing .	
52	Stockyard Management System(Including 3D profiling scanner ,Thermal Imaging Camera, RTK GPS)											
		III				TSA	Brazil	A			For 3D profiling / Tripple-IN Germany make	

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		I				EIP Enviro	Noida	A			For 3D profiling / 1-Tripplle-IN Germany make Laser Scanner and RPU along with software from TSA Brazil inline with the M/s TSA Letter. 2- Other item like ethernet cable, Ethernet Switch, Junction Box required for execution of 3D stockpile management system can be supplied by EIP Enviro
53	Perimeter Intrusion Detection System										
		III				Senstar	Canada	A			
54	Radar based Perimeter Surveillance System										
		III				Magos System Ltd	Israel	A			Third Party “Cyber Penetration report “ shall be provided along with material TC/COC
55	Thermal Camera (PTZ)										
		III				FLIR Commercial Systems INC	USA	A			
Main Contractor approved sources (Note-12)											
MC-1	Amonia Analyser	III				Main Contractor Approved Sources					
MC-2	Amonia leak detector	III				Main Contractor Approved Sources					
MC-3	Air Filter Regulator	III				Main Contractor Approved Sources					
MC-4	Anemometer	III				Main Contractor Approved Sources					
MC-5	Annunciator	III				Main Contractor Approved Sources					
MC-6	Battery Health Monitoring System	III				Main Contractor Approved Sources					
MC-7	Biofouling/ Deposit Monitor	III				Main Contractor Approved Sources					
MC-8	Coal bunker Level monitor	III				Main Contractor Approved Sources					
MC-9	Compression Fittings(SS)	III				Main Contractor Approved Sources					
MC-10	Condensing Pots	III				Main Contractor Approved Sources					
MC-11	Conduits /Pipe (GI)	III				Main Contractor Approved Sources					
MC-12	Conduits lead coated (Flexible)	III				Main Contractor Approved Sources					
MC-13	Copper tubing/Brass connectors	III				Main Contractor Approved Sources					
MC-14	Coriolios Type Mass Flow meter	III				Main Contractor Approved Sources					
MC-15	Coupling /Interposing Relays	III				Main Contractor Approved Sources					
MC-16	Density Indicator	III				Main Contractor Approved Sources					
MC-17	Desk for OWS/EWS/Printer/Server	III				Main Contractor Approved Sources					
MC-18	Digital Indicators	III				Main Contractor Approved Sources					
MC-19	Dust Sensor	III				Main Contractor Approved Sources					
MC-20	Dew point sensor/meter (H2)	III				Main Contractor Approved Sources					
MC-21	Flow Gauge	III				Main Contractor Approved Sources					
MC-22	Flow Indicator cum Totaliser	III				Main Contractor Approved Sources					
MC-23	Flow Switch	III				Main Contractor Approved Sources					
MC-24	FRP Junction Box	III				Main Contractor Approved Sources					
MC-25	Furniture for control Room(Chair, Almira, Lock)	III				Main Contractor Approved Sources					
MC-26	Furnace exit gas temp probe	III				Main Contractor Approved Sources					
MC-27	Graphic Interface Unit	III				Main Contractor Approved Sources					
MC-28	Hand Held Calibrator	III				Main Contractor Approved Sources					
MC-29	Hart Management System	III				Main Contractor Approved Sources					
MC-30	Humidistat / Thermostat / Gyserstat / Airstat	III				Main Contractor Approved Sources					
MC-31	Instant Corrosion Rate Monitor & Portable Corrosion Meter	III				Main Contractor Approved Sources					
MC-32	Impact head type flow element	III				Main Contractor Approved Sources					
MC-33	Instrument Tube Fittings (Air)	III				Main Contractor Approved Sources					

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MC-34	Instrument Valve	III				Main Contractor Approved Sources						
MC-35	IR Detector	III				Main Contractor Approved Sources						
MC-36	KVM Switch/Matrix KVM Switch	III				Main Contractor Approved Sources						
MC-37	Level gauge (Transperent & Reflex, Tubular type)	III				Main Contractor Approved Sources						
MC-38	Level Indicator (Float & Board type)	III				Main Contractor Approved Sources						
MC-39	Level switch - Float/Displacer Type	III				Main Contractor Approved Sources						
MC-40	Level Switch (RF Type)	III				Main Contractor Approved Sources						
MC-41	Level switch capacitance type	III				Main Contractor Approved Sources						
MC-42	Limit Switch	III				Main Contractor Approved Sources						
MC-43	Maintenance and Calibration Equipment	III				Main Contractor Approved Sources						
MC-44	Mini UPS-Type C configuration	III				Main Contractor Approved Sources						
MC-45	Orifice plate assembly	III				Main Contractor Approved Sources						
MC-46	On line carbon in Ash analyser	III				Main Contractor Approved Sources						
MC-47	Pitot Tube	III				Main Contractor Approved Sources						
MC-48	Pr./Vaccum./DP Gauges	III				Main Contractor Approved Sources						
MC-49	Press, DP, Vacuum Switch	III				Main Contractor Approved Sources						
MC-50	Printer (Dot Matrix/Inkjet / Laser)	III				Main Contractor Approved Sources						
MC-51	Psychrometer	III				Main Contractor Approved Sources						
MC-52	Pulse jet Controller	III				Main Contractor Approved Sources						
MC-53	Pulse Valve	III				Main Contractor Approved Sources						
MC-54	Residual Chlorine Analyser	III				Main Contractor Approved Sources						
MC-55	Rotameter	III				Main Contractor Approved Sources						
MC-56	Reverse Rotation Indicator	III				Main Contractor Approved Sources						
MC-57	Synchronising Relay	III				Main Contractor Approved Sources						
MC-58	Synchroscope	III				Main Contractor Approved Sources						
MC-59	Semaphore Indicators	III				Main Contractor Approved Sources						
MC-60	Sight Flow Indicator	III				Main Contractor Approved Sources						
MC-61	Smart Positioner	III				Main Contractor Approved Sources						
MC-62	Socket Weld Fittings	III				Main Contractor Approved Sources						
MC-63	Solenoid Valve	III				Main Contractor Approved Sources						
MC-64	Solid Mass Flow Meter	III				Main Contractor Approved Sources						
MC-65	Terminal Block (Cage and Clamp type)	III				Main Contractor Approved Sources						
MC-66	Temperature cum Humidity Indicator	III				Main Contractor Approved Sources						
MC-67	Temperature Element(Thermocouple , RTD & Thermowell)	III				Main Contractor Approved Sources						
MC-68	Temperature Gauge(With Thermowell)	III				Main Contractor Approved Sources						
MC-69	Temperature Switch	III				Main Contractor Approved Sources						
MC-70	Transducer	III				Main Contractor Approved Sources						
MC-71	Tube thicknes Meter	III				Main Contractor Approved Sources						
MC-72	Voltmeter/ Watterhour Meter	III				Main Contractor Approved Sources						
MC-73	Valve manifolds	III				Main Contractor Approved Sources						
MC-74	Electric to Pneumatic Converter	III				Main Contractor Approved Sources						
MC-75	Network components	III				Main Contractor Approved Sources						
MC-76	Isolator	III				Main Contractor Approved Sources						
MC-77	ORP Monitor /Analyser	III				Main Contractor Approved Sources						
MC-78	Ultrasonic Type Flow Transmitter	III				Main Contractor Approved Sources						
MC-79	Chlorine Leak detector	III				Main Contractor Approved Sources						
MC-80	Density Meter	III				Main Contractor Approved Sources						
MC-81	Electro Magenetic Flow meter	III				Main Contractor Approved Sources						
MC-82	Postive disalcement Type Flow Meter	III				Main Contractor Approved Sources						
MC-83	Level Scanner (3 D)for Solid Application	III				Main Contractor Approved Sources						
MC-84	Mosaic tiles /Console items	III				Main Contractor Approved Sources						
MC-85	Electrical Control Panel (UCP/Backup)	III				Main Contractor Approved Sources						
MC-86	Electrical Indicating Instruments (Mosaic Compatible)	III				Main Contractor Approved Sources						
MC-87	OWS/EWS/Server	III				Main Contractor Approved Sources						

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MC-88	Bio Matrix Reader	III				Main Contractor Approved Sources						
MC-89	ANPR	III				Main Contractor Approved Sources						
MC-90	UVSS	III				Main Contractor Approved Sources						
MC-91	Comd & Control System	III				Main Contractor Approved Sources						
MC-92	Access & Controller Software	III				Main Contractor Approved Sources						
MC-93	IR LED based Illuminator	III				Main Contractor Approved Sources						
MC-94	ATB Bollard	III				Main Contractor Approved Sources						
MC-95	Boom Barrier	III				Main Contractor Approved Sources						
MC-96	Touchless biometric recorder	III				Main Contractor Approved Sources						
MC-97	GPS Sensor based Vehicle Monitoring system	III				Main Contractor Approved Sources						
MC-98	10mp digital camera with tripod for photo capture	III				Main Contractor Approved Sources						
MC-99	2D GIS map application	III				Main Contractor Approved Sources						
MC-100	Audible alarm device	III				Main Contractor Approved Sources						
MC-101	CameraPoles	III				Main Contractor Approved Sources						
MC-102	Card Reader	III				Main Contractor Approved Sources						
MC-103	Door Frame Metal Detector -DFMD	III				Main Contractor Approved Sources						
MC-104	Door sensor	III				Main Contractor Approved Sources						
MC-105	Egress Switch	III				Main Contractor Approved Sources						
MC-106	EM LOCK	III				Main Contractor Approved Sources						
MC-107	Emergency exit / door override switch	III				Main Contractor Approved Sources						
MC-108	Emergency Siren /Hooter	III				Main Contractor Approved Sources						
MC-109	Flap barrier	III				Main Contractor Approved Sources						
MC-110	Flash Lights for covering perimeter area for clear view from PTZ in night time	III				Main Contractor Approved Sources						
MC-111	Geo fencing	III				Main Contractor Approved Sources						
MC-112	Glass Break switch at Emergency Exit	III				Main Contractor Approved Sources						
MC-113	Guard tour	III				Main Contractor Approved Sources						
MC-114	Half Height Turnstile	III				Main Contractor Approved Sources						
MC-115	Handheld Walkie - Talkie	III				Main Contractor Approved Sources						
MC-116	HHMD	III				Main Contractor Approved Sources						
MC-117	Long Range RFID Reader	III				Main Contractor Approved Sources						
MC-118	Monitors 24 Inch Full HD	III				Main Contractor Approved Sources						
MC-119	Network Panel	III				Main Contractor Approved Sources						
MC-120	Optical Time Domain Reflector-meter (OTDR) with all accessories	III				Main Contractor Approved Sources						
MC-121	Panic Button with Audible Alarm	III				Main Contractor Approved Sources						
MC-122	Panic button/SOS button supportin SIP protocol	III				Main Contractor Approved Sources						
MC-123	RFID based Stickers	III				Main Contractor Approved Sources						
MC-124	Sliding Gate	III				Main Contractor Approved Sources						
MC-125	SMS gateway	III				Main Contractor Approved Sources						
MC-126	Storage Device (SAN/NAS/DAS) of 100 TB each	III				Main Contractor Approved Sources						
MC-127	Traffic Light	III				Main Contractor Approved Sources						
MC-128	Turnstile - half height	III				Main Contractor Approved Sources						
MC-129	SPIKE BARRIER	III				Main Contractor Approved Sources						
MC-130	CHAIN LINK FENCE	III				Main Contractor Approved Sources						
MC-131	X-ray Baggage Scanner	III				Main Contractor Approved Sources						
MC-132	Static Radio Set	III				Main Contractor Approved Sources						
LEGENDS :												
1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY												
A - For those items proposed vendor is acceptable to Customer. To be indicated with letter "A" in the list alongwith the condition of approval, if any.												
2.0 QP INSPECTION CATEGORY :												

		PROJECT : Sipat-III (1X800MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00	
		PACKAGE : EPC PACKAGES									DATE :02.05.2023	
		CONTRACTOR:									SUB SECTION: C&I	
		CONTRACT NO :										
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark	
CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer												
CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents.												
CAT - III :For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.												
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.												
NOTE - 1 : A: Vendors to submit project specific documents as per Sub-QR requirements in case the Vendor is approved under collaboration agreement. B: In case approved sub vendor is offering product with latest model/series apart from earlier approved, vendors to submit project specific documents as per Sub-QR requirements.												
NOTE - 2 : For Instrument cable <= 1 KM inspection category CAT - III, For > 1 KM to <= 10 KM Inspecton category CAT - II COC & FOR> 10 KM Inspection category CAT-I												
NOTE -3 : For Fiber Optic cable <=10KM inspection category CAT - III & for > 10KM Inspection category CAT-II												
NOTE-4 : Batteries for UPS <= 10 KVA and batteries for intelligent battery charger 24 V DC <= 40 Amp inspection category CAT-III & for Batteries for UPS> 10KVA and batteries for intelligent battery charger 24 V DC > 40 Amp rating												
NOTE-5 UPS <= 10 KVA rating inspection category CAT-III & for > 10KVA rating inspection category CAT-I												
NOTE - 7 - EMPTY CABINETS, COMPUTERS, SIGNAL ISOLATOR/ MULTIPLIER and TB SHALL ALSO BE ACCEPTABLE FROM OWNER ACCPETED IN QP. IF THE TOTAL INTEGRATED PANEL AND FAT IS CONDUCTED INDEGENEOUSLY												
NOTE-8 : For the C & I instrumnts mounted on the skid of the main item or supplied as a integral part of the main item, instrument to be supplied as per proven practice of the manufacturer meeting the Customer technical specification												
NOTE-9- This item is a bought out componenet of main equipments like DDCMIS ,PLC,TSL,CCTV ,PA system etc												
NOTE-10- For these controlled items, vendor shall be proposed for owner acetpance with-in the agreed contract schedule of the package												
NOTE-11 - Major Bought-Out-Items are to be procured from LOA approved sources & the same shall be finalized during the finalization of Manufacturing Quality Plan . MQP shall be duly vetted by OEM with their project specific authorisation letter .												
NOTE-12 : Main contractor apporved sub vendors are acceptable those are evaluated / assesesed as per Main contractor Quality Management System for vendor approval. Main contractor to inform the finaly selected vendor to NTPC as soon as PO is placed for these items. In case of sub-QR Note-1 is also applicable.												

	PROJECT: SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC NO	
	PACKAGE: EPC PACKAGE				REV. NO.	
	Main supplier:	SUB SYSTEM: CIVIL WORKS			DATE	02.05.2023
	Contract No.:					
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
1.	GALVANIZED STEEL STRUCTURES (LATTICE & PIPE) FOR SWITCHYARD AND TRANSMISION LINE	I	VIJAY TRANSMISSION LTD	RAIPUR	A	
			UNITECH POWER TRANSMISSION LTD	NAGPUR	A	
			ASSOCIATED POWER STRUCTURES	VADODARA	A	
			R.S. INFRAPROJECTS PVT. LTD	SURAJPUR	A	
			NEW MODERN TECHNOMECH	MAYURBHANJ (ORRISA)	A	
			GOOD LUCK STEEL TUBES	SIKANDRABAD	A	
			UNIQUE STRUCTURES & TOWERS LTD.	RAIPUR	A	
			VATCO ELEC-POWER PVT. LTD.	NAVIMUMBAI	A	GALVANISING AT SIGMA GALVANISER NAVI MUMBAI
			R.S. INFRAPROJECTS PVT. LTD	SIKANDRABAD	A	
			ADVANCE STEEL TUBE	SAHIBABAD	A	
			SANGAM STRUCTURES LTD.	ALLAHABAD	A	
			RELIABLE SPONGE PVT LTD UNIT III	KALUNGA	A	
			VSP ENTERPRISES PVT. LTD	SONEPAT	A	
			SKIPPER LIMITED	UNIT-I: JANGALPUR, Howrah. Unit-II: ULUBERIA UNIT, Howrah. UNIT- III: BCTL, Howrah.	A	Proto type inspection at Unit-Bagnan, Howrah

	PROJECT: SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC NO	
	PACKAGE: EPC PACKAGE				REV. NO.	
	Main supplier:	SUB SYSTEM: CIVIL WORKS			DATE	02.05.2023
	Contract No.:					
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
			RUKMANI ELECTRICAL & COMPONENT PVT. LTD	RAIPUR	A	
			RICHARDSON & CRUDDAS (1972) LTD	NAGPUR	A	
2.	COLOUR COATED METAL DECK & CLADDING/ROOFING SHEET (COIL)	I	TATA STEEL LIMITED	RAIGAD	A	
			TATA STEEL BSL LIMITED	SAHIBABAD	A	
			TATA BLUESCOPE STEEL LTD	JAMSHEDPUR	A	AL-ZN COIL FOR CLADDING
			ESSAR STEEL LTD	PUNE	A	
			NATIONAL STEEL & AGRO INDUSTRIES LTD	DHAR	A	
			JSW STEEL COATED PRODUCTS LTD	KALMESHVAR (NAGPUR)	A	
			JSW STEEL COATED PRODUCTS LTD	TARAPUR, BOISAR	A	
			BHUSHAN POWER & STEEL LTD	SAMBALPUR (ODISHA)	A	
3.	CHIMNEY ELEVATOR (RACK AND PINION)	I	MEKASTER ENGG. & EQUIPMENT(P) LTD.	HALOL, GUJARAT	A	
			ALIKRAFT ENGINEERS PVT. LTD.	SAVIL (VADODARA)	A	
			AVON CRANES	GURGAON	A	
			UNIVERSAL CONSTRUCTION MACHINERY & EQUIPMENT LTD.	PUNE	A	
4.	ELECTROFORGED GRATING	II	INDIANA GRATINGS PVT. LTD	PUNE	A	
			KANADE ANAND UDYOG	THANE	A	

	PROJECT: SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC NO	
	PACKAGE: EPC PACKAGE				REV. NO.	
	Main supplier:	SUB SYSTEM: CIVIL WORKS			DATE	02.05.2023
	Contract No.:					
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
			PREMIER POWER PRODUCTS LTD	HOWRAH	A	
			BHOLA RAM STEEL PVT. LTD	PATNA	A	
			PINAX STEEL INDUSTRIES PVT LTD	PATNA	A	
			GREATWELD STEEL GRATING PVT. LTD	PUNE	A	
			ANKIT ELECTROGRATING	RAIPUR	A	
			SUTTATTI ENTERPRISES LTD.	PUNE	A	
			RATAN PROJECTS & ENGINEERING CO. PVT. LTD.	HOWRAH	A	
			VINFAB ENGINEERS INDIA PVT LTD. (For Galvanising) VINFAB GRATINGS (For Fabrication)	THANE	A	
5.	PROFILERS FOR COLOUR COATED METAL DECK & CLADDING/ROOFING SHEETS	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
6.	FABRIC EXPANSION COMPENSATOR (FOR CHIMNEY)	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
7.	MINERAL WOOL FOR THERMAL INSULATION (FOR CHIMNEY)	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
8.	STOP LOG GATES, TRASH RACK AND LIFTING BEAM	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
9.	HIGH PERFORMANCE MOISTURE COMPATIBLE CORROSION RESISTANT COATING SYSTEM	III	CECRI LICENSED SOURCES	-	-	
10.	BITUMEN	III	ALL GOVERNMENT REFINERIES	-	-	

	PROJECT: SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC NO	
	PACKAGE: EPC PACKAGE				REV. NO.	
	Main supplier:	SUB SYSTEM: CIVIL WORKS			DATE	02.05.2023
	Contract No.:					
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
11.	PTFE BEARING / ELASTOMERIC BEARING	III	MORTH / RDSO APPROVED VENDORS	-	-	
12.	CEMENT	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
13.	CI PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
14.	RCC PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
15.	CPVC/UPVC PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
16.	PVC WATER STOP	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
17.	POLYTHENE WATER STORAGE TANKS	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
18.	CERAMIC / VITRIFIED TILES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
19.	PARTICLE BOARDS, PLYWOOD, MDF	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
20.	FIRE PROOF DOORS	III	MAIN CONTRACTOR APPROVED SOURCES WITH VALID PROTOTYPE TEST REPORT FROM CBRI/CPRI/GOV. LAB.)	-	-	
21.	CONSTRUCTION CHEMICALS/ADMIXTURE, WATER PROOFING COMPOUNDS AND GROUTS	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
22.	PAINT AND PAINTING SYSTEM	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
23.	HIGH SOLID CONTENT LIQUID APPLIED URETHANE BASED ELASTOMERIC MEMBRANE FOR WATER PROOFING	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	

	PROJECT: SIPAT SUPER THERMAL POWER PROJECT STAGE-III (1X800 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC NO	
	PACKAGE: EPC PACKAGE				REV. NO.	
	Main supplier:	SUB SYSTEM: CIVIL WORKS			DATE	02.05.2023
	Contract No.:					
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
24.	FOUNDATION BOLTS	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
LEGENDS: 1. SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC) A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any. DR – For these items “Details required” for NTPC review. To be identified with letter “DR” in the list. 2. QP/INSPN CATEGORY: CAT-I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. CAT-II: For these items the Quality Plans approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved quality plan. CAT-III: For these items the Quality control to be exercised as per Main Contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of conformance (COC) by Main Contractor. UNITS/ WORKS: Place of manufacturing Place of Main Supplier of multi units/works. NOTE 1: For the items placed in CAT-III for Civil Works, the review and final acceptance shall be done by NTPC-EIC/ FQA on the basis of MTC / certificate of conformance in line with Technical Specifications/FQP.						