

**TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)**

VOLUME: II B & III

**TECHNICAL SPECIFICATIONS
FOR DM PLANT**

SPECIFICATION NO.: PE-TS-497-163-A001



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA**

1151791/2022/PS-PEM-MAX



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SECTION: --

REV NO: 01

DATE:

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VOLUME-IIB & III**

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SECTION – A
SCOPE OF ENQUIRY



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1. SCOPE OF INQUIRY/ INTENT OF SPECIFICATION

- 1.1** This specification is intended to cover design (i.e. Preparation and submission of drawing/ documents including " As Built " drawings and O&M Manuals), engineering, manufacture, fabrication, assembly, inspection & testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), fill of lubricants & consumables and chemicals, mandatory spares along with spares for erection, spares for start up and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling transportation and storage at site, in site transportation, assembly, erection and commissioning, final painting at site, trial run, site testing, preparation of drawings in 3D, e-learning module, civil assignment drawing, carrying out performance guarantee tests (PG Test) at site, operation & maintenance for one (1) year including spares , training of customer/ client O&M staff & final handing over to end customer in flawless condition of entire **DM Plant** complete with all accessories as per the details in different sections / volumes of this specification for **TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)**.

The bidder's scope shall also include any other services, etc. if called for in the succeeding sections of the specification.

- 1.2** The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve them of the responsibility of providing such facilities to complete the supply, erection and commissioning of **DM PLANT**.
- 1.3** It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgment is not in full accordance herewith.
- 1.4** The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.
- 1.5** The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification are subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.
- 1.6** While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of BHEL/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by BHEL/ Customer as and when brought to their notice either by the bidder or by BHEL/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.
- 1.7** Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.
- 1.8** In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

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- 1.9** Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer including their consultant as interpreted by BHEL in the relevant context. Bidder to refer GCC/SCC for more clarity.
- 1.10** The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.
- 1.11** BHEL's/Customer's representative shall be given full access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.
- 1.12** Pre-bid meeting shall be held before bid submission. Bidder to ask all their queries in pre-bid meeting.

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SECTION – B

PROJECT INFORMATION

TALCHER TPP STAGE-III (2X660 MW)

1.00.00

BACKGROUND

Talcher Thermal Power Project is situated near Talcher town in Angul district of Orissa having capacity of 460 MW (4x60 MW + 2x110 MW). The project was implemented by Orissa State Electricity Board (OSEB). Subsequently TTPS was taken over by NTPC on 03.06.1995. The present proposal is for expansion of TTPS by adding 2 units of 660 MW.

2.00.00

PROJECT HIGHLIGHTS

2.01.00

Location

The proposed site is located near Talcher town in Angul district of Orissa having latitude and longitude as 20°55' N and longitude 85°25' E respectively. The site is approachable from Banarpal–Talcher section of National Highway No. 23 at a distance of about 1 km from Anand Bazar. Nearest railway station is at Talcher on Talcher-Cuttack section of North Eastern Railway at about 4 Kms. The nearest commercial airport is Bhubaneswar at about 90 km.

Vicinity Plan of the proposed project is placed at **Annexure-I**.

3.00.00

BASIC INPUTS

3.01.00

Land

The plant facilities for this expansion stage would be accommodated within the land available in the existing power station and ash disposal shall be in mine voids.

3.02.00

Water

Make up water requirement for Talcher Thermal power project, Stage-III expansion (2x660 MW) would be about 40 Cusec with ash water recirculation system. Water requirement for the project will be met from upstream of the Samal barrage discharge on the River Brahmani and shall be pumped to the raw water reservoir located about 28 kms from intake well.

3.03.00

FUEL

3.03.01

Coal Requirement, Availability and Linkage

The Coal Linkage for the project granted by SLC(LT) and CLOA has allocated 5.854 MMTPA coal from MCL.

The primary fuel for the main steam generator shall be coal. The domestic coal quality parameters are indicated in **Annexure-IV-2** and imported coal parameters are indicated in **Annexure-IV-4** are to be considered for steam generator design.

3.03.03

Coal Transportation

The envisaged mode of coal transportation from the coal mines to the power plant is through Indian Railways network and will be unloaded in underground RCC Track Hoppers.

3.03.03

Fuel Oil

The fuel oil to be used for start-up, coal flame stabilization and low load operation of the steam generator shall be Light Diesel oil (LDO) having the characteristics given at **Annexure-IV-1** and HSD Oil characteristics given at **Annexure-IV-3**.

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4.00.00	STEAM GENERATOR TECHNOLOGY The steam generators shall be super critical once through type, water tube, direct pulverized coal fired, top supported, balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangement shall be single pass (Tower type) or two pass type.	
5.00.00	FLUE GAS DESULPHURIZATION SYSTEM (FGD) & SCR ready system: The project is envisaged with Flue Gas Desulfurization (FGD) system and DeNOx ready system meeting Ministry of Environment, Forest & Climate Change notification dated 07.12.2015. Limestone to be used for design of FGD system shall be as per the characteristic given at Annexure-IV-5 .	
6.00.00	CAPACITY Talcher TPP, Stage-III : 2x660 MW - Present proposal	
7.00.00	BENEFICIARY STATES The project is being implemented as a regional project for meeting the power demand of Eastern Region Beneficiaries including Orissa – the home-state. The exact allocation of power shall be subject to the approval of Ministry of Power, Govt. of India.	
8.00.00	METEOROLOGICAL DATA The meteorological data from nearest observatory is placed at Annexure-II .	
9.00.00	Plant Water Scheme The Plant water scheme is included in Part-E of Technical Specification.	
9.01.00	Condenser Cooling (CW) Water System It is proposed to adopt a recirculating type cooling water system with cooling towers for the project. For the re-circulating type CW system it is proposed to supply clarified water as make up. Circulating water from CW pumps to TG area and from TG area to cooling tower will be carried through pipes/ducts. Cooled water from cooling tower will be led to CW pump house through the cold water channel by gravity.	
9.02.00	Equipment Cooling Water (ECW) System (Unit Auxiliaries) All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through plate type heat exchangers by Circulating Water tapped from CW system in a closed secondary circuit. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system. It is proposed to provide independent primary cooling water circuit for TG & its auxiliaries and Steam Generator & auxiliaries (including station auxiliaries) on Unit basis.	
9.03.00	Other Miscellaneous Water Systems CW system blow down water shall be used for the FGD process requirement, ash slurry pumps sealing, sealing of Vacuum pumps (if applicable) of Ash Handling plant, make-up to fire water system. The service water shall be taken from clarified water tank of Pre-treatment plant. The service (wash water) water collected from various areas and coal handling plant shall be treated as per requirement and reused. The drinking water requirement shall be provided from water treatment plant.	

The quality of Raw water is given in this sub-section at **Annexure-III**

10.00.00

POWER EVACUATION SYSTEM

In view of above and considering the present capacity of the project (1320 MW), it is proposed to adopt the step-up/power evacuation voltage as 400kV. Accordingly provision for 4 Nos. of 400 kV line bays has been considered in the generation switchyard. Station supply shall be derived directly from 400kV voltage level through 400kV Class station transformers. The issue of power evacuation of the project shall be taken up with appropriate Transmission Utility as per regulatory provision, based on final power allocation received from Ministry of Power.

11.00.00

Criteria for Earthquake Resistant Design of Structures and Equipment

All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in Part-B of this section.

12.00.00

Criteria for Wind Resistant Design of Structures and Equipment

All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part-B of this section.

13.00.00

Vulnerability Atlas of India(VAI), prepared by Building Materials, Training and Promotion Council (BMTPC) under Ministry of Housing and Urban Affairs, is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State/UT-wise hazard, maps with respect to earthquakes, winds and floods for district-wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of this Atlas is its use for disaster preparedness and mitigation at policy planning and project formulation and construction stage. The VAI provides necessary information for risk analysis and hazard assessment and is available at website www.bmtpc.org.

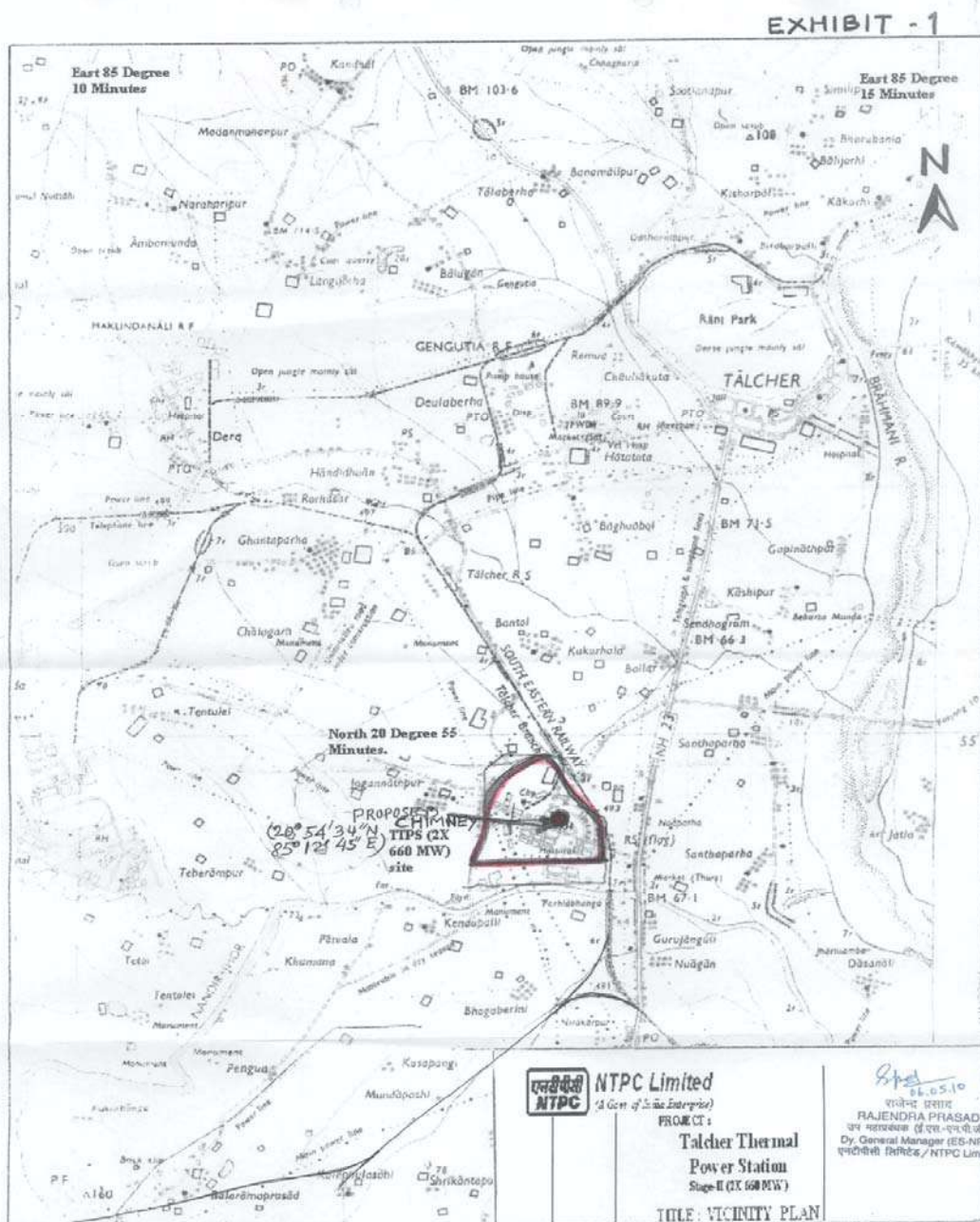
As per Government's directive, it is mandatory for the bidders to refer VAI for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning, designing and execution of the project in terms of following details:

- i) Seismic zone (II to V) for earthquakes
- ii) Wind velocity
- iii) Area liable to floods and Probable max. surge height
- iv) Thunderstorms history
- v) Number of cyclone storms/sever cyclone storms and max sustained wind specific to coastal region
- vi) Landslides incidences with Annual rainfall normal
- vii) District wise Probable Max. Precipitation

Accordingly, bidder should refer VAI while planning, designing and execution of the project.

However, for design of structures/facilities and equipment, the criteria for earthquake resistant design of structures and equipment, the criteria for Wind Resistant Design of Structures and Equipment and design parameters for drainage facilities, stipulated in the Technical Specification shall be followed.

For other information like area liable to floods, probable max. surge height, landslide, thunderstorm, cyclone etc. agencies are required to refer the VAI.



ANNEXURE-III

RAW WATER ANALYSIS

SN	Constituent	As	mg/l (except pH & turbidity)
1	Calcium	CaCO ₃	80
2	Magnesium	CaCO ₃	35
3	Sodium	CaCO ₃	20
4	Potassium	CaCO ₃	5
5	Total Cation	CaCO ₃	140
6	HCO ₃	CaCO ₃	85
7	p Alkalinity	CaCO ₃	0
8	Chlorides	CaCO ₃	35
9	Sulphate	CaCO ₃	20
10	Total Anion	CaCO ₃	140
11	Reactive Silica	SiO ₂	25
12	Silica non-Reactive	SiO ₂	5
13	Total Iron	Fe	0.5
14	pH value	-	6.8-8.0
15	Turbidity	NTU	2000
16	TDS	ppm	190
17	Temp	deg C	20-35
18	KMnO ₄	ppm	2
19	TOC	ppm	5
20	Total Suspended Solids	mg/l	2000

ANNEXURE-IV-1

TABLE-1

LIGHT DIESEL OIL CHARACTERISTICS

AS PER IS 15770-2008

Characteristics	LDO
1. Pour Point (max)	21 °C & 12°C for Summer and Winter respectively
2. Kinematic viscosity in centistokes at 40 deg.C	2.5 to 15.0
3. Sediment percent by mass (max)	0.10
4. Total sulphur percent by mass (max)	1.5
5. Ash percentage by mass (max)	0.02
6. Carbon residue (Rams bottom) percent by pass (max.)	1.50
7. Acidity inorganic	Nil
8. Flash point (Min.) - Pensky Martens	66 deg.C
9. Copper strip corrosion for 3 hours at 100°C	Not worse than No. 2
10. Water content, % by volume (max)	0.25
11. GCV(kcal/kg)	10,000

DOMESTIC COAL CHARACTERISTICS ANNEXURE-IV-2

TABLE-1 – A

S No.	Characteristics (As received basis)	Range of 95% coal supplies			Range of 5% coal supplies	
		Column -1	Column-2	Column-3	Range of Adequacy coal	
1.0	PROXIMATE ANALYSIS	Design	Worst	Best	Worst	Best
1.1	Total Moisture (%)	14	16	12	17	11
1.2	Ash (%)	41	45	38	46	34
1.3	Volatile matter (%)	22	19	24	18	25
1.4	Fixed carbon (%)	23	20	26	19	30
	Total (%)	100	100	100	100	100
2.0	ULTIMATE ANALYSIS					
2.1	Carbon (%)	34.04	30.53	37.84	29.33	41.7
2.2	Hydrogen (%)	2.73	2.45	2.8	2.1	3.1
2.3	Sulphur (%)	0.55	0.45	0.65	0.45	0.8
2.4	Nitrogen (%)	0.83	0.63	1.2	0.55	1.3
2.5	Oxygen (%) (By difference)	6.85	4.94	7.51	4.57	8.1
2.6	Total Moisture (%)	14	16	12	17	11
2.7	Ash (%)	41	45	38	46	34
2.8	Total (%)	100	100	100	100	100
2.8	GCV (kcal/kg)	3400	3100	3700	3100	4000
2.9	Hard grove index	50	45	60	45	65
2.10	YGP (mg/kg)	75	80	70	85	65
3.0	ASH ANALYSIS					
3.1	Silica (%)	57.61	55.60	59.62	53.10	60.50
3.2	Alumina (%)	29.65	30.20	28.67	32.38	28.10
3.3	Iron Oxide (%)	6.96	7.75	6.03	8.28	5.51
3.4	Titania (%)	1.60	1.50	1.70	1.40	1.80
3.5	Phosphoric Anhydride (%)	0.53	0.58	0.46	0.60	0.40
3.6	Lime (%)	0.89	1.10	1.50	0.80	1.70
3.7	Magnesia (%)	0.35	0.40	0.30	0.50	0.25
3.8	Sulphuric Anhydride (%)	0.05	0.05	0.05	0.05	0.05
3.9	Sodium Oxide (%)	0.30	0.30	0.50	0.25	0.55
3.10	Balance Alkalies(By Difference) (%)	2.06	2.52	1.17	2.64	1.14
4.0	ASH FUSION RANGE (Under reducing atmosphere)					
4.1	Initial Deformation Temperature (degree Celsius)	1100	1100	1150	1100	1150
4.2	Hemispherical temperature (degree Celsius)	1300	1250	1350	1250	1350
4.3	Flow temperature (degree Celsius)	1400	1400	1400	1400	1400

TABLE-2

ANNEXURE-IV-3

HIGH SPEED DIESEL OIL CHARACTERISTICS

[AS PER IS 1460-2005 (BS-II)]

S. No.	Particulars	Unit	Value
1.	PHYSICAL PROPERTIES a. Distillation volume recovery @ 350 ⁰ C b. Distillation volume recovery @ 370 ⁰ C c. Kinematic Viscosity @ 40 Degree C d. Density @ 15 Degree C e. Pour Point - Summer - Winter f. Cold Filter Plugging Point - Summer - Winter g. Flash Point (Abal) h. Lubricity WSD 1.4 @ 60 Degree C	% vol. (min) % vol. (min) cSt kg/m ³ Degree C (max) Degree C (max) Degree C (max) Degree C (max) Degree C (max) Microns (max)	85 95 2.0 – 5.0 820 – 860 15 03 18 06 35 460
2.	HEATING VALUE a. Higher Heating Value (HHV) b. Lower Heating Value (LHV)	Kcal/Kg Kcal/Kg	11,000 10,300
3.	ACIDITY a. Inorganic b. Total	mg KOH/g mg KOH/g	Nil 0.2 (max.)
4.	Copper Strip Corrosion 3 hours @100 ⁰ C	No.	1 (max)
5.	RCR on 10% residue	% wt.	0.3 (max)
6.	CONTAMINANTS a. Ash b. Sediments c. Total Sulphur d. Water Content e. Trace Metals - Na + K - Vanadium - Lead - Calcium - Ni + Zn	ppm (wt.) % wt % wt % volume ppm (wt) ppm (wt) ppm (wt) ppm (wt) ppm (wt)	100 (max) 0.05 (max) 0.05 (max) 0.05 (max) 0.30 (max) 0.50 (max) 0.50 (max) 2.0 Nil
7.	Nitrogen content (FBN)	% wt.	0.015

ANNEXURE-IV-4

TABLE – 4

TYPICAL IMPORTED COAL AND ASH CHARACTERISTICS

Sl.No.	Characteristics (as received basis)	Imported Coal	
		Worst	Best
1.0	Proximate Analysis		
1.1	Total Moisture (%)	20	16
1.2	Ash (%)	10	10
1.3	Volatile Matter (%)	30	45
1.4	Fixed Carbon (%)	40	29
1.5	Total (%)	100	100
2.0	Ultimate Analysis		
2.1	Carbon (%)	56.4	62.4
2.2	Hydrogen (%)	4.5	4.9
2.3	Sulphur (%)	0.9	0.8
2.4	Nitrogen (%)	0.9	0.5
2.5	Oxygen (%) (By difference)	7.3	5.4
2.6	Carbonates (%)	0	0
2.7	Phosphorous (%)	0	0
2.8	Total Moisture (%)	20	16
2.9	Ash (%)	10	10
	Total	100	100
2.10	GCV (Kcal/Kg)	5800	6500
2.11	Hard Grove Index	45	60
2.12	YGP (mg/kg)	100	70
3.0	Ash Analysis		
3.1	Silica (SiO ₂) (%)	32.74	34.94
3.2	Alumina(Al ₂ O ₃) (%)	30.5	28.43
3.3	Iron Oxides(Fe ₂ O ₃) (%)	18.2	15.2
3.4	Titania (TiO ₂)	1.56	1.76
3.5	Phosphoric Anhydride(P ₂ O ₅) (%)	0.44	0.54
3.6	Lime (CaO) (%)	6.12	7.62
3.7	Magnesia (MgO) (%)	1.83	1.93
3.8	Sulphuric Anhydride (%)	6.95	7.65
3.9	Sodium Oxide (Na ₂ O) (%)	0.3	0.4
3.10	Balance alkalies (by difference)	1.36	1.56
	Total	100	100
4.0	Ash Fusion Temperature reducing temperature		
4.1	Initial deformation Temp (°C)	1100	1250
4.2	Hemispherical Temp. (°C)	1300	1350
4.3	Flow Temp. (°C)	1400	1400

Annexure – IV-5

LIMESTONE CHARACTERISTICS

Chemical Analysis(% by mass)			
1.	CaO	%	47-51.0*
2.	MgO	%	0.9-3.8
3.	Fe ₂ O ₃	%	0.45-1.0
4.	Al ₂ O ₃	%	1.19-2.1
5.	Si ₂ O ₃	%	2.1-4.5
6.	Mn ₂ O ₃	%	<0.12
7.	P ₂ O ₅ ,	%	Traces
8.	Cl ₂	%	<0.015
9.	Na ₂ O	%	<0.16
10.	K ₂ O	%	<0.01
11.	TiO ₂	%	<0.02
12.	Total Sulphur	%	<0.1
13.	LOI	%	39.0-41.3
Physical properties			
1	Bond Index	kWh/t	13
2	Granule size		Medium

Notes:

- *Guaranteed parameters (guarantee on limestone consumption, auxiliary power consumption & gypsum purity) shall be based on available (reactive) CaCO₃ content of 89%. The design of Flue Gas Desulphurisation (FGD) system & auxiliaries shall be based on available (reactive) CaCO₃ content of 79%.
- For the purpose of volumetric computations of limestone handling & storage system the bulk density of limestone shall be taken as 1400 kg/m³. However for torque, drive & structural load requirements the density of lime stone shall be taken as 1700 kg/m³. For gypsum, the bulk density shall be taken as 900 kg/m³ for volumetric computation and 1250 kg/m³ for torque, drive & structural load requirements.
- For the purpose of sizing of equipments and guarantee, MgCO₃ shall be considered as unreactive dolomitic form.

Annexure-IV-6

METHANOL CHARACTERISTICS

SN	Fuel Property	Unit	Methanol
1	Chemical Formula		CH ₃ -OH
2	Fuel Carbon	Wt%	38
3	Fuel Oxygen	Wt%	12
4	Density at 20 deg C	kg/m ³	792
5	LHV	Kcal/kg	4800
6	Boiling Temp	°C at 1 bar	65
7	Vapour Pressure	bar at 20°C	0.13
8	Kinematic viscosity	cSt at 20°C	0.74
11	Auto Ignition	°C	470
12	Heat of Vapourization	kcal/kg	260
15	Flammability limit	vol %	6-36
16	Flash Point	°C	12

Annexure-IV-7(A)

S.N.	Technical Data	Unit	Specifications for Torrefied Pellet
1.	Base Material		Agro residue: Which means the leftover portion of the agriculture produce such as stubble/straw/stalk/husk of those agro residue which are surplus and not being used as animal fodder such as paddy, soya, arhar, gwar, cotton, gram, jawar, bajara, moong, mustard, seasam, til, maize, sunflower, jute, coffee etc., groundnut shell, coconut shell, castor seed shell etc., pine needle, elephant grass, sarkanda and horticulture waste such as dry leaves and trimmings generated during the maintenance and pruning of trees and plants. Wood obtained from tree cutting shall not be treated as agro residue and shall be not to be used as base material or mixing purpose whatsoever.
2.	Diameter	mm	In case of cylindrical shape: Diameter: Not more than 35 mm Length: Random For other shapes: No dimension should exceed 35 mm.
3.	Fines % (<3 mm) (ARB*)	Wt%	finer $\leq$ 5%
4.	Gross Calorific Value (GCVARB*)	Kcal/Kg	Refer below
5.	Moisture (ARB*)	Wt%	$\leq$ 15% (not more than 15%)
6.	Bulk density	Kg ³	600

*ARB – As Received Basis

Annexure-IV-7(B)

The sample was prepared by torrefying rice straw at 300 deg C with a holding time of one hour. Following analysis are carried out at NETRA using the powdered torrefied rice straw samples and the results of various testing for the specific sample is tabulated below:

a. Proximate Analysis (wt %, Air Dried Basis)

M	Ash	VM	FC
6.68	21.66	47.68	23.98

b. Ultimate Analysis (wt %, Air Dried Basis)

C	H	N	S	O
46.65	3.93	1.13	0.14	19.81

c. GCV : 4201 kcal/kg

d. Ash Fusion Temperature under reducing conditions: °C

IDT	ST	HT	FT
1134	1357	1374	1422

e. Ash Elemental Analysis (Elements expressed as Oxides in %w/w)

Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	K ₂ O	CaO	TiO ₂	MnO	Fe ₂ O ₃
2.423	7.783	4.623	67.48	1.9	1.9	6.15	4.21	0.39	0.03	2.83

Annexure-IV-7(C)

For the Torrefied Rice Straw Pellets (Prepared by torrefaction of rice straw at 300 deg C with holding time of 1 hr) tested at NETRA, the test results are as follows:

- A. For Anion (ISO 16994:2016 E-Solid Biofuels- Determination of total content of sulphur and chlorine)-reported as wt % dry basis
- a. Chlorine (Cl): 0.32%
 - b. Fluorine (F) : 0.09%
- B. For Cation (ISO 16967:2015 E-Solid Biofuels- Determination of major elements ...)- Reported as wt % dry basis
- a. Sodium (Na): 0.31%
 - b. Potassium (K): 2.04%

Note: The above details as at Annexure-IV-7(A), IV-7(B & IV-7(C) are indicative only and shall vary based on the exact raw material and its subsequent processing.

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SECTION – C

(SPECIFIC TECHNICAL REQUIREMENTS)

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SECTION – C1

(SPECIFIC TECHNICAL REQUIREMENTS FOR MECHANICAL)



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1.0 GENERAL

The **DM PLANT** and associated accessories shall conform to the technical specification. DM Plant shall be located under Industrial Shed and all the Chemical Storage Tanks system shall be located outdoor.

2.0 SCOPE OF SUPPLY

Broad scope of work of this package includes all equipment and accessories and shall be as per the following (please refer P&ID) and same shall be included in bidder scope. Please also refer Electrical (Section-C1) & C&I (Section-C2) for respective scopes.

The DM Plant with net capacity of 120 CuM/HR (each stream of UF outlet), as specified in Technical data sheets & technical specifications, and shall consist of at least the followings:

- 1) Three (3) numbers (3X100%) (1Working+2Standby) DM Plant Supply (Feed) pumps (Filtered Water Pumps) along with motors, piping, valves, fittings, instrumentation & all other accessories as required.
- 2) Two (2) numbers (2X100%) (1Working+1Standby) Activated Carbon Filters (ACF) each complete with internals, integral pipe works, valves, activated carbon, fittings, instrumentation and all other accessories as required.
- 3) Two (2) numbers (2X100%) (1Working+1Standby) Weak Acid Cation Exchangers along with ion exchange resin, integral pipe works, internals, resin traps, valves, fittings, instrumentation, and accessories associated with the same.
- 4) Two (2) numbers (2X100%) (1Working+1Standby) Strong Acid Cation Exchangers along with ion exchange resin, integral pipe works, internals, resin traps, valves, fittings, instrumentation, and accessories associated with the same.
- 5) Two (2) numbers (2X100%) (1Working+1Standby) forced draft Degasser Towers [One (1) nos. on each Degassed Water Storage Tank] along with internals. integral pipe works, valves, fittings, instrumentation and accessories associated with the same.
- 6) Two (2) numbers (2X100%) (1Working+1Standby) Degasser Air Blowers for each Degasser Tower along with suction filter, silencer, motors, acoustic hood, piping, valves, fittings, instrumentation and all other accessories as required.
- 7) Two (2) numbers (2X100%) (1Working+1Standby) Degassed Water Storage Tank along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 8) Three (3) numbers (3X100%) (1Working+2Standby) Degassed Water Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 9) Two (2) numbers (2X100%) (1Working+1Standby) Weak Bases Anion Exchangers along with ion exchange resin, resin trap, integral pipe works, internals, valves, fittings, instrumentation and accessories associated with the same.
- 10) Two (2) numbers (2X100%) (1Working+1Standby) Strong Bases Anion Exchangers along with ion exchange resin, resin trap, integral pipe works, internals, valves, fittings, instrumentation and accessories associated with the same.
- 11) Two (2) numbers (2X100%) (1Working+1Standby) Mixed Bed Exchangers along with ion exchange resin, resin trap, integral pipe works, internals, valves, fittings, instrumentation accessories associated with the same.
- 12) Two (2) numbers (2X100%) (1Working+1Standby) Air Blowers for Mixed Bed Exchangers (common for two MB and Neutralization Pit) along with suction filter, silencer, motors, acoustic hood, piping, valves, fittings, instrumentation and all other accessories as required.
- 13) Two (2) nos of hose stations for unloading of Hydrochloric Acid. The hose station shall have two (2) nos of 80 mm NB flexible hose connection.
- 14) Two (2) numbers (2X100%) (1Working+1Standby) Hydrochloric Acid Unloading Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 15) Three (3) numbers (3X100%) (1Working+2Standby) Bulk Hydrochloric acid Storage Tanks along with piping,



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valves, fittings, instrumentation and accessories associated with the same.

- 16) Two (2) numbers (2X100%) (1Working+1Standby) Hydrochloric acid Measuring Tanks for Cation Exchangers and Mixed Bed Exchangers along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 17) One (1) no. Hydrochloric Acid Dosing ejectors (Ebonite Lined) for Cation Exchangers along with accessories. Both water and acid shall be thoroughly mixed in the ejector.
- 18) One (1) no. Hydrochloric Acid Dosing ejectors (Ebonite Lined) for Mixed Bed Exchanger along with accessories. Both water and acid shall be thoroughly mixed in the ejector.
- 19) One (1) no. Hydrochloric acid Measuring Tanks for Neutralization at N-PIT along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 20) Two (2) nos of hose stations for unloading of Caustic/Alkali. The hose station shall have two (2) nos of 80 mm NB flexible hose connection.
- 21) Two (2) numbers (2X100%) (1Working+1Standby) Alkali Unloading Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 22) Two (2) numbers (2X100%) Bulk Alkali Storage Tanks along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 23) Two (2) numbers (2X100%) Alkali Preparation Tanks for Anion Exchangers and Mixed Bed Exchangers along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 24) Two (2) numbers (2X100%) (1Working+1Standby) Alkali Transfer cum Recirculation Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 25) Two (2) numbers (2X100%) Alkali Measuring Tanks for Anion Exchangers and Mixed Bed Exchangers along with piping, valves, fittings, instrumentation and accessories associated with the same.
- 26) One (1) no. Hot Water Tank along with Regeneration Water heaters, piping, valves, fittings, instrumentation and accessories associated with the same.
- 27) One (1) no. Activated Carbon Filter for caustic each complete with internals, integral pipe works, valves, activated carbon, fittings, instrumentation and all other accessories as required.
- 28) One (1) no. Alkali Dosing ejectors (Ebonite Lined) for Anion Exchangers along with accessories. Both water and Caustic shall be thoroughly mixed in the ejector.
- 29) One (1) no. Alkali Dosing ejectors (Ebonite Lined) for mixed bed Exchangers along with accessories. Both water and Caustic shall be thoroughly mixed in the ejector.
- 30) One (1) no. Lime Measuring Tanks (MOC: RCC by BHEL) for Neutralisation at N-PIT along with agitators, agitator motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 31) One (1) no. Brine solution preparation Tanks along with agitators, agitator motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 32) Two (2) numbers (2X100%) (1Working+1Standby) Brine Solution Transfer Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 33) Two (2) numbers (2X100%) (1Working+1Standby) DM Regeneration Pumps along with motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 34) Neutralization Pit (MOC: RCC by BHEL) along with instrumentation, piping, valves, fittings and accessories associated with the same shall be in bidder's scope.
- 35) Three (3) numbers (3X100%) (1Working+2Standby) Neutralized Effluent Disposal Pumps along with motors, piping, valves, fittings, instrumentation, recirculation arrangements and accessories associated with the same.
- 36) Two (2) numbers (2X100%) UF Feed Tanks along with piping, valves, fittings, instrumentation and accessories

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associated with the same.

- 37) Three (3) numbers (3X50%) (2Working+1Standby) UF Feed pumps along with motors, piping, valves, fittings, instrumentation & all other accessories as required.
- 38) 3 x 100% basket strainers at Inlet to each UF stream along with necessary piping, valves, fittings, instrumentation and associated accessories.
- 39) 2 x 100% Ultrafiltration System along with piping, valves, fittings, instrumentation and associated accessories. The UF system provided must be proven and the required details in support of the provenness shall be provided during detail engineering including selection of basic design criterion.
- 40) 2 x 100% UF Backwash/Fast Flush Pumps along with motor, piping, valves, fittings, instrumentation and associated accessories.
- 41) One (1) no. UF Chemical Cleaning System (CIP-Clean In Place) consisting of 2 nos. (2 x 100%) UF Chemical Cleaning Tank and 2 nos. (2 x 100%) UF CIP Dosing Pumps along with motor, piping, valves, fittings, instrumentation and associated accessories.
- 42) One (1) no. UF Chemical Enhanced Backwash (CEB) consisting of 2 nos. (2 x 100%) UF CEB Dosing Tank and 2 nos. (2 x 100%) UF CEB Dosing Pumps along with motor, piping, valves, fittings, instrumentation and associated accessories.
- 43) Any other chemical required for UF shall be provided with 2X100% Dosing Tanks and 2x100% Dosing pumps configuration with with motor, piping, valves, fittings, instrumentation and associated accessories.
- 44) ACF and UF Backwashed Water Pit (MOC: RCC by BHEL) along with instrumentation, piping, valves, fittings and accessories associated with the same shall be in bidder's scope.
- 45) Two (2) numbers (2X100%) (1Working+1Standby) ACF and UF Backwashed Water Transfer Pumps along with motors, piping, valves, fittings, instrumentation, recirculation arrangements and accessories associated with the same.
- 46) Two (2) numbers (2X100%) (1Working+1Standby) Air Blowers for ACF and UF Backwashed Water Pit along with suction filter, silencer, motors, acoustic hood, piping, valves, fittings, instrumentation and all other accessories as required.
- 47) One (1) No Filtered Water Overhead Tank (MOC: RCC by BHEL) Complete valves, fittings, instrumentation and all other accessories for Priming and Chemical (Lime) preparation purpose in DM Plant.
- 48) One (1) no. Instrument Air Receiver with integral pipe works, internals, valves, fittings, instrumentation accessories associated with the same.
- 49) Safety equipments as per Data Sheet-A.
- 50) Two (2) nos. safety shower near acid/ caustic storage tanks.
- 51) One (1) no. Central Sampling Rack (to be located at express laboratory to be located at ground floor of DM Plant building).
- 52) First fill of filter media, resin, and degasser tower packings for all the units complete with make-up filter media, resin and packings material.
- 53) All vessels as per '**Flow Diagram-1**' & Data Sheet-A complete with inlet and outlet connections, bed support cum under drain system, inlets water distributors, all fittings and appurtenances etc. as specified and as required.
- 54) External resin/media traps at the outlet of each of the vessels, designed for in place manual backwashing.
- 55) All tanks as per '**Flow Diagram-1**' & Data Sheet-A complete with inlet and outlet connections, drain system, inlets water connection, all fittings and appurtenances etc. as specified and as required.
- 56) Bidder to note that the equipment, valves, instruments indicated in the '**Flow Diagram-1**' attached in the technical specification are minimum and are in bidder's scope. During detailed engineering, bidder to furnish complete and detailed scheme in all respects including all valves, equipment's etc. for smooth, safe, efficient

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and trouble free operation of the plant meeting the specification requirement and also considering the applicable statutory requirement.

- 57) Necessary piping, fitting, valves, drains, vents, sampling etc. required for the complete DM Plant. Pipe racks shall be provided by BHEL wherever available, wherever pipe racks are not available, pipe shall be laid on pedestal to be provided by BHEL. However, all auxiliary steel structure (U-clamps, nuts, bolts, channels etc) for fixing pipes on pedestal or racks shall be in bidder's scope.
- 58) All insert plates, rung ladder, nuts and bolts, and flanges and matching counter flanges wherever applicable.
- 59) All necessary valves and fittings for the installations with the actuators necessary for their remote operation.
- 60) Embedment plates with lugs shall also be provided by bidder as per system requirement.
- 61) All channels & brackets, mounting plates as required for mounting of motors, pumps, stirrers, tank etc shall be in bidder's scope.
- 62) Start-up and commissioning spares as required.
- 63) Mandatory spares as indicated elsewhere in the specification.
- 64) All special tools necessary for proper maintenance or adjustment of the equipment packed in permanent box. Operating platforms, permanent ladders (not rugs), supports and other structural works for each tanks, valves etc. to facilitate accessibility for operation and maintenance.
- 65) All necessary structural steel for pipe supporting structure, platforms, walkways / pathways and access stairs, mechanical plant and equipment, mechanical services and pipe work associated with DM Plant.
- 66) Finish paints for touch up painting of equipments after erection at site in sealed container.
- 67) All pipes, fittings etc required for hand railing, platforms, and ladders shall be in the scope of bidder.
- 68) All handrails shall be of 32 mm nominal bore MS pipes (medium class) as per IS: 1161 galvanised using 750 gm/sq. m of zinc. Hand railing shall be a two-rail system with the top rail 1000 mm above the walkway surface and the intermediate rail 450 mm below the top rail. Handrail post spacing shall be limited to 1500 mm as far as possible but can be proportioned to the length of the opening. In such a case spacing shall not exceed 1850 mm centre to centre of posts. Hand railing shall be shop fabricated for specific locations and field welded or bolted to the erected structural steel. Railings shall be provided with 100 mm wide and
- 69) 8 mm thick MS strip at bottom as toe guard all along the length of railing in horizontal plane. For RCC stairs, hand railing with 20 mm square MS bar balustrade with suitable MS flat and Aluminium / Teakwood handrail shall be provided, unless specifically mentioned otherwise.
- 70) Monitoring gadgets, instruments and equipments required for commissioning & maintenance (till PG test and plant handover).
- 71) Instrument hook up material shall be in bidder's scope.
- 72) Permanent ladder (not rungs) for approaching the top of tanks, valves for All steel inserts with lugs, plates, bolts, nuts, sleeves, edge angles and all other embedding components etc as required to grout in civil works and to support/hold the equipments being supplied under this specification for opening/maintenance purpose.
- 73) Wherever pipe racks are not available, pipes shall run on pedestals or below ground. All auxiliary structure & fixing items such as U clamps, nuts, bolts, channels, insert plates etc. required to lay the pipes on pedestals shall be in bidder's scope of work. Wrapping, coating and protection of all the buried pipe is also in bidder's scope.
- 74) Wrapping, coating and protection of the entire buried pipe shall be as per IS 10221 or AWWA C 203-93.
- 75) Any item/work either supply of equipment or erection material which have not been specifically mentioned in but are necessary to complete the works for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification and shall be in bidder's scope without any commercial, technical and delivery implication to BHEL.
- 76) All other items are also included in scope of supply as specified in other part of the specification.

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- 77) All required elbow, tee, pipe fittings etc. required for erection of the complete system including piping shall be in bidder's scope. Bidder to provide the detailed BOQ during detail engineering
- 78) Bidder shall perform the guarantee parameters as per specification requirement to the satisfaction of owner. The exact modalities of verifying guarantee for the parameters indicated in the specification shall be finally as agreed with the owner during detailed engineering & mutually agreed.
- 79) Two no. Electric Hoist with Monorail and traveling trolley with trailing cable of minimum 1000 kg capacity. Capacity of hoists shall be selected considering a minimum margin of 10% over the maximum weight of the heaviest equipment / component to be handled by the Hoist.
- 80) All the first fill and six months topping requirements of consumable such as greases, oil, lubricants, servo fluids/control fluids etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be in bidder's scope. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.
- 81) Monitoring gadgets, instruments and equipments required for monitoring (till PG test and plant handover).
- 82) First fill all type of chemical including HCl and NaOH are in bidder scope.
- 83) All blank flanges/counter flanges, isolations valves, tees etc. to interconnect the pipes at all terminal points.
- 84) All necessary structural steel for pipe supporting structure, platforms, walkways / pathways and access stairs for mechanical plant and equipment, mechanical services and pipe work associated with Effluent Treatment Plant.
- 85) All steel inserts with lugs, plates, bolts, nuts, sleeves, edge angles and all other embedding components etc as required to grout in civil works and to support/hold the equipments being supplied under this specification for opening/maintenance purpose.

86) PIPING

All the piping as listed below shall be in bidder's scope. The below indicated pipes shall be designed, supplied, erected, laid and tested by the bidder. Elbows, tees, flanges Hangers and supports, embedment plates with lugs etc required for the below given piping shall also be provided by the bidder.

- 1) All piping within the DM Plant.
- 2) Inlet and outlet pipes for each vessel, pumps, other equipments, etc. with pipe connections to the respective vessels/equipments.
- 3) 350 meter DM plant feed piping from Filtered water pump house where (DM Feed pumps are located) to DM plant.
- 4) 50 meter DM water piping from DM plant to each DM Water storage tanks.
- 5) 50 meter DM water recirculation piping from DM water regeneration pumps to each DM Water storage tanks.
- 6) 50 meter DM water piping from common suction header of DM Water storage tanks to DM water regeneration pumps.
- 7) 1500 meter neutralize effluent disposal piping from Neutralization pit in DM plant area to Ash Slurry Sump.
- 8) 350 meter neutralize effluent disposal piping from Neutralization pit in DM plant area to CMB at ETP (Effluent Treatment Plant).
- 9) 400 meter waste water disposal piping from ACF and UF Backwashed Water Pit in PT Plant (at DM Clarifier Stilling Chamber).
- 10) Service water piping, instrument air piping, service air piping, etc. as applicable as per the Terminal Points at 20 Meter from DM Plant boundary.
- 11) In addition, any additional piping and associated accessories required to complete the system shall also be in bidder's scope.

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3) SCOPE OF SUPPLY (ELECTRICAL)

Complete electrical as per specification and details indicated in Section C2 (Specific Technical Requirement Electrical) and D2 (General Technical Requirement Electrical).

4) SCOPE OF SUPPLY (C&I)

Complete C&I as per specification and details indicated in Section C3 (Specific Technical Requirement C&I) and D3 (General Technical Requirement C&I).

5) SCOPE OF SUPPLY (CIVIL)

Total Civil is in BHEL's Scope of work, however complete grouting for equipment, fixing and any concreting inside the vessels and lining shall be in bidder's scope.

Also detailed Civil Input drawing shall be provided by bidder. Successful bidder shall furnish civil assignment drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence

6) SCOPE OF SERVICES

The bidder's scope also includes following services for scope under this specification:

- 1) Erection and Commissioning, unloading, storage and handling at site.
- 2) Arrangement of all instruments, reagents, monitoring gadgets for monitoring, pre-commissioning, carrying out trial run & commissioning and Performance guarantee test.
- 3) Monitoring gadgets, instruments and equipments required for maintenance.
- 4) Complete grouting for equipment, fixing and any concreting inside the vessels and lining.
- 5) All personnel required during maintenance, Commissioning and Performance guarantee test.
- 6) Trial run and Performance guarantee test.
- 7) Painting shall be as specified in "Surface Preparation & Painting" Sec-D1 of this technical specification. Bidder to note that paint shed shall be finalized during detailed engineering as per customer & BHEL requirement and any variation in the painting schedule as finally approved by customer shall be taken care by bidder without any commercial and delivery implication.
- 8) Operation & maintenance for one (1) year including spares.
- 9) Final touch up paint at site.

7) TERMINAL POINTS

- 1) 25 NB Instrument air supply at 5 to 7 kg/cm² (g) – At 20 meter distance from the DM Plant area. However distribution and piping inside DM Plant area shall be in bidder's scope.
- 2) 25 NB Service air supply at 5 to 7 kg/cm² (g) - At 20 meter distance from DM Plant area. However distribution and piping inside DM Plant area shall be in bidder's scope.
- 3) Service water connection (50 NB connections) at 20 meter distance from DM Plant area. Piping inside DM Plant area for mentioned services will be in bidder's scope.
- 4) Drinking water (or potable water) of 25 NB connections - At 20 meter distance from the DM Plant area. However distribution and piping inside DM Plant area shall be in bidder's scope.
- 5) DM Water piping from DM plant upto nozzle flange of respective DM water storage tanks.
- 6) DM Water recirculation piping from DM water regeneration pumps upto nozzle flange of respective DM water storage tanks.

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- 7) DM Plant N-pit effluent upto Ash Slurry Sump and CMB at ETP.
- 8) ACF and UF Backwashed Water upto PT DM Clarifier Stilling Chamber.

8) EXCLUSIONS

- 1) All civil works including foundation of equipment and Acid/Alkali Lining/Tiling, building, Industrial Shed are excluded from DM Plant vendor scope. However complete grouting for equipment, fixing and any concreting inside vessels and lining shall be in the scope of the bidder. Also civil works including operating / maintenance platforms and interconnection platforms with ladders / stairs & handrails, structural supports and hangers for pipes / cables / ducts, crane rails, all embedment's and inserts with lugs including anchor fasteners, bolts etc., dressing of foundations, grouting of pockets and underpinning of base plates for equipment / structures and fixing supports, filling and finishing of openings in walls, floors, cladding, roof and trenches shall be in bidder's scope.
- 2) Instrument air & service air up to terminal points.
- 3) Air conditioning, ventilation & fire fighting facilities.
- 4) Other exclusions are mentioned in the electrical & C&I parts of this specification.
- 5) Drinking water (or potable water), service water up to terminal points.
- 6) Excavation and Back filling for underground piping (However, laying is in DM Plant Vendor scope).

9) QP AND SUB VENDOR APPROVAL

- 1) The quality assurance plan is enclosed elsewhere in technical specification. However requirement of detailed QP, inspection checklist, certificate of conformance etc. for each equipment and sub-vendor shall be finalized during detailed engineering stage; decision of BHEL/customer shall be binding on vendor in this regard. Any changes/additional tests insisted upon by Owner during approval of QAP's shall be accepted by bidder without any commercial and delivery implication to BHEL/Customer. Bidder shall submit the quality plans in BHEL format during detailed engineering stage. Bidder to note further that during detailed engineering all the QAP's/check lists etc. shall be submitted to Customer/BHEL for approval. All inspection & testing etc. shall be carried out accordingly.
- 2) The sub vendor list enclosed elsewhere in technical specification is indicative only and is subject to approval / acceptance by customer. Bidder to propose his sub vendor list with back up documents (experience list, end user certificate as applicable) etc. The same shall subject to BHEL and Customer approval during detailed engineering stage without any technical, commercial & delivery implication to BHEL.

10) TREATED WATER QUALITY

Water Quality at the outlet of MB:	
Reactive Silica	<0.01 ppm as SiO ₂
Iron as Fe	Not Detectable as per ASTM (ASTM-D-1068)
Total Hardness	Not Detectable.
pH	6.8-7.3
Conductivity	<0.1 micromhos/cm at 25 Deg C.

Water Quality at the outlet of UF:	
SiO ₂ (Colloidal)	<0.01 ppm as SiO ₂
SDI	<3

The Performance guarantee for other parameters shall be as indicated elsewhere in this specification.

11) DESIGN/ CONSTRUCTION

In addition to the requirements of Section C & D the following shall also be complied under scope of this specification.

The 'Flow Diagram-1' for DM Plant is enclosed herein in this section for bidders compliance.

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The material of construction specified in data sheet-A are minimum requirements and material of construction for other components not specified shall be similarly selected by the bidder for intended duty which shall be subject to BHEL / Customer approval during detail engineering without any commercial & delivery implication to BHEL.

12) DRAWING/DOCUMENTS REQUIREMENT

For the Drawings/Documents submission schedule, please refer **MDL enclosed in Vol-III**.

For the Drawings/Documents Submission Procedure, please refer **Sec-C1**. The bidder has to submit the revised drawing/document along with the compliance sheet indicating enumerate reply to all BHEL and customer comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER without price & delivery implication.

13) 3D MODEL SPECIFICATION:

A) BIDDER SHALL SUBMIT 3D PARAMTERIC MODEL OF THE SAID AREA COMPATIBLE WITH SP3D LIBRARY.

B) BIDDER TO PREFERABLY USE DEFAULT LIBRARY OF SP3D FOR CREATION TO PRIMITVES/MODEL/LAYOUT SO THAT IT CAN BE INTEGRATGED WITH 3D MODEL OF THE MAIN PLANT

FOLLOWING REQUIREMENTS TO BE MET BY BIDDER

All the layouts shall be made using computerized 3D modelling system (SP3D). The Employer reserves the right to review the 3D model at different stages during the progress of engineering. The layout drawings submitted for Employer's review shall be fully dimensioned and extracted from 3D model after interference check.

Contractor shall prepare 3D design review model (network ready, which shall include visual interference check, walk-through animation, video simulation for major equipment placement and removal, visual effect, photo realism etc), which is extracted from intelligent 3D model, for employer's review as & when desired by the employer. All piping layouts, equipment layouts, floor plans, ducting layout (Air/flue gas, A/C, Ventilation (if applicable etc.) and structural arrangement drawings shall necessarily be extracted from the aforesaid 3D model and submitted for employer's review along with the 3D Review model to enable employer to review and approve these drawings.

The complete editable 3D model (complete 3D data) along with complete component catalogues for all the size range, configuration files, customization files, templates and all referenced databases pertaining to 3D model of the package along with as built GADs, layout, isometrics, reports etc. with any other document generated from 3D model and naming conventions with as-built updates shall be handed over to the employer after completion of Engineering. The corresponding complete 3D review model shall also be handed over to the employer for reference after the completion of engineering of respective package.

Handover Plan: There shall be continuous handover of documents and data at various stages of the project including rules and trigger points for handover of data to employer shall be at 30%, 60% and 90 % of 3D model stage.

14) SPARES

1. All the spares for the equipment under the contract provided by the vendor will strictly conform to the specifications and documents and will be identical to the corresponding main equipment/components supplied under the contract.
2. The quality plan and the inspection requirement finalized for the main equipment will also be applicable to the corresponding spares.
3. The list of mandatory spares to be considered is available elsewhere in this Technical specificaliton.

All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipments.

Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.

4. Start-up and commissioning spares are in bidder's scope of supply.
 Start-up and Commissioning spares are those which would be required during equipment or system testing, start-

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up and commissioning. All spares used until the plant is finally handed over by the bidder to the customer come under this category. All start-up and commissioning spares as required shall be provided by the bidder without any additional cost to the BHEL and customer. List of spares shall be furnished by BIDDER along with the offer.

Bidder shall be responsible for the ready and timely availability for all the startup and commissioning spares as required during various stages of testing, cleaning and commissioning up to handing over of each unit of the total plant.

An adequate stock of start-up spares shall be available at the site such that the start-up and commissioning of the equipment/systems, Performance guarantee test and handing over the equipment/ systems to the customer will be carried out without hindrance and delay. All start-up spares which remain unused after the taking over of the plant shall remain the property of the customer.

5. In addition to the spare parts mentioned above, the Bidder shall also provide a list of recommended spares for 3 years of normal operation of the plant and indicate the list and unit prices in Price Schedules. This list shall take into consideration the mandatory spares specified elsewhere in this specification and should be independent of the list of the mandatory spares. The BHEL reserves the right to buy any or all of the recommended spares. The recommended spares shall be delivered at project site at least two months before the scheduled date of initial operation of first unit. However, the spares shall not be dispatched before the dispatch of the main equipment. Price of recommended spares will not be used for evaluation of the bids. However, the Bidder shall be liable to provide necessary justification for the quoted prices for these spares as desired by BHEL.

The vendor warrants:

- (i) That all spares supplied will be new and in accordance with the contract document and will be free from defects in design, material and workmanship and shall further guarantee as under:
 - (ii) In case of any failure in the original component/equipments due to faulty designs, materials and workmanship, the corresponding spare parts if any, supplied will be replaced without any extra cost to the BHEL and customer unless a joint examination and analysis by BHEL and/or customer of such spare parts prove that the defect found in the original part that failed can safely be assured not to be present in spare parts.
 - (iii) The long term availability of spares to the BHEL and the customer for the full life of the equipment covered under the contract and that before going out of production of spare parts of the equipment covered under the contract, vendor and his sub-vendors shall give the BHEL and the customer at least 24 (Twenty Four) months advance notice so that the latter may order his bulk requirements of spares, if he so desires. The same provision will also be applicable to the sub-vendors. Further, in case of discontinuance of manufacture of any spares by the vendors or his sub-vendors the vendors and his sub-vendors, will provide the BHEL and the customer, 2 (two) years in advance, with full manufacturing drawings, material specifications and technical information required by the BHEL and the customer for the purpose of manufacture of such items and also the right to manufacture such spares for their own requirements.
 - (iv) Further in case of discontinuance of supply of spares by the vendors or his sub-vendors, the vendor will provide the BHEL and the customer with full information for replacement of such spares with other equivalent makes, if so required by the BHEL and the customer.
 - (v) Notwithstanding the above, the vendor shall be responsible for supply of spares for the lifetime of the package at reasonable prices. The prices of all future requirements of spares shall be derived from the corresponding ex-works price at which the orders for such spares have been placed by the BHEL and the customer as a part of the mandatory or long term or any other kind of spares. The base indices for calculating ex-works price shall be commissioning of last equipment under main contract.
6. The vendor will indicate the delivery period of the spares, which the BHEL and the customer may procure in accordance with this clause.
7. In case of emergency requirements of spares, the vendor would make every effort to expedite the manufacture and delivery of such spares on the basis of mutually agreed time schedule.
8. In case the vendor fails to supply the mandatory or long term or any other kind of spares on the terms stipulated above, the BHEL and the customer shall be entitled to purchase the same from the alternate sources at the risk and the cost of the vendor and recover from the vendor, the excess amount paid by the BHEL and the customer over the rates as per the contract. In the event of such risk purchase by the BHEL or the customer, the purchases will be as

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per the works and procurement policy of the BHEL and the customer prevalent at the time of such purchases and BHEL & the customer at his option may include a representative from the vendor in finalizing the purchases.

9. It is expressly understood that the final settlement between the parties in terms of relevant clauses of the tender document shall not relieve the vendor of any of his obligations under the provision of long term availability of spares and such provisions shall continue to be enforced till the expiry of 30 (thirty) years period reckoned from the scheduled date of completion of trial operation of the last equipment unless otherwise discharged expressly in writing by the BHEL or the customer.

15) BIDDER to furnish 4 sets of techno-commercial bid including following documents/information (For Electrical and C&I please refer the respective section of the specification).

- Deviation if any in the enclosed Schedule of deviation with cost of withdrawal only with mention of specification clause for which deviation is being asked. (Stamped & Signed).
- Compliance certificate.(Stamped & Signed)
- Schedule of Declaration. (Stamped & Signed)
- Price Schedule duly filled in. (Stamped & Signed).

Any other documents submitted by bidder except as asked in the bid's specification shall not be evaluated & considered as **null & void**.

16) ADDITIONAL REQUIREMENT

1. Wherever pipe racks are not available, pipes shall run on pedestals or below ground. All fixing items such as U clamps, nuts, bolts etc. required to lay the pipes on pedestals shall be in bidder's scope of work. Coating, wrapping and protection required for buried pipes shall be in bidder's scope of work.
2. Wherever pipes are running on pipe rack, Bidder will consider 15 m static head + 10% margin, in addition to the losses in straight length and bend in pipes and valves etc. while selection of pump head during detailed engineering.
3. All the first fill and one Year's topping requirements or 10 % of first fill quantity, whichever is more of consumable such as greases, oil, lubricants, servo fluids/control fluids, gases and etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be furnished by the bidder. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.
4. Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
5. In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.
6. Bidders shall make Site visit in order to familiarize themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t. existing facility at site. Customer approval on any drawing having details of existing facility shall not be cited by the successful bidder a valid reason for any shortcoming in the work by them. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail engineering.
7. Final Electrical Load list will be submitted by the successful bidder as per agreed drawing/ doc submission schedule. Thereafter any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendor cost of any changes necessitated in the switch gear /MCC on account of changed loads.
8. Wherever CIVIL works is excluded from the bidder's scope, successful bidder shall furnish civil assignment / scope drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence. In case any modification is required in the civil work already carried out based on final civil inputs given by vendor, BHEL reserves the right to debit cost of such rework to vendor".

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9. The complete system shall be proven and necessary design documentation in support of proveness shall be submitted by the successful bidder in support of the systems, if asked by the customer without any price and delivery implication to BHEL and customer.
10. System to be designed to meet all the statutory requirements. Preparation of all necessary drawings/data/ documents for obtaining necessary Approval of statutory authorities like CCOE , IBR , Weight & Measures Department and any other agency/ competent authority ,on behalf of the customer, related to installation of DM plant (if required) is included in bidder's scope. All expenses required to obtain the approval shall also be borne by the successful bidder. Successful bidder shall inform customer well in advance requirement of authority letter along with format for the same. After issuance of authority letter by customer, it will be vendor's responsibility to regularly follow up with the concerned authorities to obtain timely approval from these authorities. Any delay on account of the same, unless any specific information related to above approval to be furnished by customer is delayed by customer, shall be to vendor's account and shall not be used as a reason for extension in contract completion.
11. Vendor to attend regular engineering meeting with BHEL and customer fortnightly in BHEL or customer office as decided during detail engineering. Vendor will depute all his concerned engineering representative along with the project manager for discussion and approval. Meeting can be held at site also.
12. Space available for D.M. plant (**refer Key Plan**) are attached in Section-C1 of this specification. Bidder to accommodate their equipment within the space provided.
13. Bidder to submit BBU during detailed engineering after approval of Basic documents. BBU shall be equal to BOQ for the package and there shall be no price and delivery implication is applicable to BHEL / CUSTOMER for the same. None of the items supplied for the project as non-billable. Incomplete BBU shall not be review by BHEL.
14. Preparation of drawings / document / P&ID's in 3D modelling software and providing soft copy of same to BHEL.
15. Training of plant Owner's personnel, O&M operators' personnel on plant operation and maintenance.
16. Relevant requirements as per GTR, GCC, ECC & SCC.
17. Any statutory requirement / clearance required for the packages from government / local body shall be in bidder's scope.
18. Service water shall be available near DM plant/ system building/ area at approximately 1.5 to 2.0 Kg/ Cm². Hence, bidder to take care for cooling/ lubrication of the pumps being supplied by the bidder under this technical specification. If service water pressure requirement is more than available pressure, bidder to consider two (2) nos. cooling pump for package.
19. In case of any conflict and repetition of clauses in the specification, the more stringent requirements among them are to be complied with.
20. Latest version of all codes and standards to be followed.
21. All the vertical pumps shall be considered as self-lubricating type unless specifically mentioned.
22. The depth of the water pits shall be considered as 3.0 meters (minimum) unless specifically mentioned.
23. Air distribution line to all final control elements like control valves, pneumatic dampers (both regulating / on-off type), SOV operated valves shall be through SS manifolds and SS isolating valves only. These valves shall be properly tagged also with KKS tag no. and description of final control element / instrument for which they are intended.
24. **SITE VISIT BEFORE SUBMISSION OF OFFER:** Bidders shall make Site visit in order to familiarize themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t existing facility at site. Customer approval on any drawing having details of existing facility shall not be cited by the successful bidder a valid reason for any shortcoming in the work by them. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail engineering.

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25. PERCENTAGE OF BILLING BREAK UP (BBU):

Bidder to submit BBU during detailed engineering after approval of Basic documents. BBU shall be equal to BOQ for the package and there shall be no price and delivery implication is applicable to BHEL / CUSTOMER for the same. None of the items supplied for the project as non-billable. Incomplete BBU shall not be review by BHEL.

The Break-up (%) of Supply prices of DM plant package in the BBU shall be in line with the provided below details:

SL NO	TECHNICAL PARTICULARS	% OF BBU
1.0	Lumpsum firm price for supply of Pressure vessels inclusive of all taxes, duties and other levies as applicable.	14% of Total Supply price of DM Plant.
2.0	Lumpsum firm price for supply of Resin inclusive of all taxes, duties and other levies as applicable.	19% of Total Supply price of DM Plant.
3.0	Lumpsum firm price for supply of Atmospheric tank & UF Skid inclusive of all taxes, duties and other levies as applicable.	17% of Total Supply price of DM Plant.
4.0	Lumpsum firm price for supply of Valves inclusive of all taxes, duties and other levies as applicable.	8% of Total Supply price of DM Plant.
5.0	Lumpsum firm price for supply of Instruments & Analyzer inclusive of all taxes, duties and other levies as applicable.	11% of Total Supply price of DM Plant.
6.0	Lumpsum firm price for supply of Rotary Equipments (Pumps, Blowers, Agitators etc.) inclusive of all taxes, duties and other levies as applicable.	7% of Total Supply price of DM Plant.
7.0	Lumpsum firm price for supply of Piping & Fittings inclusive of all taxes, duties and other levies as applicable.	15% of Total Supply price of DM Plant.
8.0	Lumpsum firm price for supply of Balance items inclusive of all taxes, duties and other levies as applicable.	7% of Total Supply price of DM Plant.
9.0	Lumpsum firm price for preparation of drawing in 3D, e-learning module inclusive of all taxes, duties and other levies as applicable.	2% of Total Supply price of DM Plant.

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LIST OF SUB VENDORS

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.

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- 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.

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1	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		
		\$			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		
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		\$			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 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		
		\$			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		
		\$									
		\$			SALZGITTER MANNESMANN PRECISION	FRANCE	A		CS(RIFFLED)		
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		\$			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		
2	SEAMLESS PIPES	\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	DALMINE, ITALY	A		CS & AS P-11, P-22, P-91		
		\$			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		C5, 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		

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		\$			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		

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		\$			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		
		\$			RINGMILL SPA	ITALY	A		CS OD UP TO 914 MM & WT UP TO 102 MM & AS P-91		
		\$									
3	PLATES AND ROLLED SECTION	\$			INDUS STEEL	BELGIUM	A		CS-SA515 AS UP TO 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		

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		\$			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.		
		\$			REFER TO SUB-VENDORS MENTIONED IN THE TECHNICAL SPECIFICATIONS SEC-VI, PART-B		A		(CS-IS 2062 STRUCTURAL STEEL GRADES)		
		\$					A				
		\$			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		
4	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				
5	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				

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6	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				
7	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				
8	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				
		I			BHR	GERMANY	A				

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		I			DEE DEVELOPMENT	PALWAL	A				
		I			BENTEC	USA	A				
		I			L&T PIPING CENTRE	HAZIRA	A				
		I			SEONGHWA IND CO LTD	SOUTH KOREA	A				
9	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				
10	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		

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		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	VISAKHAPATNAM	A		ONLY FOR CS GRADE		
11	MIXING SPHERES	I			GE INDIA	DURGAPUR	A				
		I			BHEL	TRICHY	A				
		I			ALSTOM	USA	A				
		I			DOOSAN	SOUTH KOREA	A				
12	COAL BURNER ASSY & SOFA/ OFA PORT/AA PORT	I			ALSTOM	USA	A				
		I			BHEL	TRICHY	A				
		I			DOOSAN	SOUTH KOREA	A				
		I			L&T-MHPS PVT LTD	HAZIRA	A				
		I			DEE DEE ENGINEERING ENTERPRISES	TRICHY	A				

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13	AIR COOLED OIL GUN ASSEMBLY	I			BHEL	TRICHY	A					
		I			SIGMA POWER	TRICHY	A					
		I			DOOSAN	SOUTH KOREA	A					
14	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					
15	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			
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		I			CLYDE BERGEMANN	GERMANY	A				
		I			DIAMOND POWER SPECIALITY LTD	SCOTLAND	A				
		I			DAIEYOUNG MACHINERY	KOREA	A				
16	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		
		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		

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		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		
17	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				
18	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				
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		I			TLT ENGG. PVT. LTD.,	MEHSANA	A				
19	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				
		I			NADI AIR TECH P LTD	CHENNAI	A				
20	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				
21	QUICK ERECT FURNACE SCAFFOLDING	II			BSL	UK	A				
		II			INSTANT UPRIGHT	IRELAND	A				
		II			EASTMAN IMPEX	LUDHIANA	A		CARBON STEEL SCAFFOLDING		
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		II			BSL	HARIDWAR	A				
		II			ARUFASE	SPAIN	A				
22	METALLIC EXPANSION JOINT FOR DUCTS	I			FLEXATHERM EXPANLLOW 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.)		

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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				

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23	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		
					FLEXATHERM EXPANLOW PVT LTD	VADODARA	A		UPTO 2000 NB		
24	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				
		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				

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		II			JAMSHEDPUR MINERAL WOOL	JAMSHEDPUR	A				
		II			ROXUL ROCKWOOL	DAHEJ	A				
25	CLH & VLH	I			BHEL	TRICHY	A				
		I			MID AMERICA	USA	A				
		I			MANNESMANN	GERMANY	A				
		I			ITT	GERMANY	A				
		I			PIPE SUPPORTS	UK / THAILAND					
		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				
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		I			BROWICK	UK	A				
		I			CARPENTER PATTERSON	UK	A				
		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		
26	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		

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		I			VELAND VALVE CORP.	USA			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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		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 (FORGED) 80 NB		
		I			TOA VALVE ENGGINER 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		

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		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"		
		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		

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		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		
27	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			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		

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		I			FAINGER LESER VALVES P LTD	AURANGABAD	A		SIZE(INELT/OULET): 200/300 MM APPLICABLE TO MAX DESIGN TEMPERATURE:474 DEG C & PRESSURE:47 KG		
28	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				
		I			SAMPELL AG	GERMANY	A				
		I			DRESSER INDUSTRIES	USA	A				
		I			MIEWA CORPORATION	JAPAN	A		SIZE UPTO 65MM & UPTO 4500 CLASS		
29	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		

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30	BOILER STRUCTURE & FABRICATION ITEMS(MAIN & AUX COLUMNS, CEILING GIRDERS, BUILT-UP BEAMS, BRACINGS & BUCKSTAY), COAL BUNKER AND ESP STRUCTURE	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, COLUMNS 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		
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		I			INDOFAB	TRICHY			CEILING GIRDERS		
		I			SANTHI ENGG. UNIT-II	PUDUKKUDI	A		CEILING GIRDERS		
		I			MASTERFAB UNIT-II	DEVARAYANERI	A		CEILING GIRDERS		
		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)		

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		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		
		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.		

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		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)		

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		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)			
		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)			
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		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			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		
31	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					
		II			PINAX STEEL INDUSTRIES PVT LTD	PATNA	A				

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		II			GREATWELD STEEL GRATING PVT. LTD	PUNE	A				
		II			VIN FAB ENGG. PVT LTD.,	MUMBAI	A				
32	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			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		
33	FITTINGS(GRADE 91/92)	I			PETROL RACCORD SPA	ITALY	A		FORMED AND FORGED FITTINGS 91/92 GRADE		
		I			BOKOYOUNG METAL CO.	SOUTH KOREA	A		FORGED FITTINGS AS PER SA- 182 F92 GRADE (REDUCERS, NOZZLE, HALF COUPLING ETC.)		
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		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			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.		

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		I			FORGITAL	ITALY	A		MANUFACTURING AND SUPPLY OF GRADE 91 FORTGINGS (HOLLOW FORTGINGS/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			GRADE 92 WITH SIZE/TYPE LIMITATIONS		
		I			FORGIATURA MORANDINI SRL	ITALY	A		GRADE 92 FORGED FITTINGS(REDCERS, TEES & Y- PIECES)		
		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		
34	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				
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		I			POSITIVE METERING SYSTEM	NASIK	A				
		I			PSI ENGG SYSTEM	CHENNAI	A				
35	SG CW BOOSTER PUMP/ ECW	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				
36	COAL MILL STATIC & ROTATING PARTS	I									
	PGB	I			SIEMENS	GERMANY	A				
		I			BHEL	HYDERABAD	A				
		I			SIEMENS LTD	Chennai	A				
		I			ELECON ENGG CO. LTD.	VALLABH VIDYA NAGAR	A				
		I			HYOSUNG	KOREA	A				
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	PGB INTERNALS	I			SIEMENS, WELTER	GERMANY	A				
	PGB HOUSING	I			NS ENGG.	HYDERABAD	A				
		I			SIMPLEX	BHILAI	A				
		I			KCP	CHENNAI	A				
		I			BROWN'S HITECH STRUCTURES	BHEL ANCILLARIES	A				
		I			SRI SRI ENGG. WORKS	JEEDIMETLA	A				
		I			GVR ASSOCIATES	PATANCHERU	A				
	GRINDING ROLL	I			AIA ENGINEERING	AHMEDABAD/ NAGPUR	A				
		I			MAGATTOEUX	RAJKOT	A				
	BULL RING SEGMENTS	I			AIA ENGINEERING	AHMEDABAD/ NAGPUR	A				

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		I			MAGATTOEUX	RAJKOT	A				
	SEPARATOR BODY	I			KCP	CHENNAI	A				
		I			NS ENGG.	HYDERABAD	A				
		I			ALSTOM PROJECTS INDIA LTD	SHAHABAD	A				
		I			SIMPLEX	BHILAI	A				
		I			PREMIER ENGG. INDUSTRIES	JEEDIMETLA	A				
		I			BHEL – HPVP	VISAKHAPATNA M	A				
		I			BHEL – CSU (FP)	JAGDISHPUR	A				
		I			L&T- MHPS BOILERS PVT. LTD.	HAZIRA	A				
		I			ISGEC HEAVY ENGINEERING	YAMUNA NAGAR	A				
		I			GTV ENGG	MANDIDEEP	A				
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	SEPARATOR TOP	I			KCP	CHENNAI	A				
		I			SIMPLEX	BHILAI	A				
		I			NS ENGG.	HYDERABAD	A				
		I			ALSTOM PROJECTS INDIA LTD	SHAHBAD	A				
		I			BHEL – HPVP	VISAKHAPATNA M	A				
		I			YOGASREE	BENGALURU	A				
		I			BHEL – CSU(FP)	JAGDISHPUR	A				
		I			L&T- MHPS BOILERS PVT. LTD.	HAZIRA	A				
		I			ISGEC HEAVY ENGINEERING	YAMUNA NAGAR	A				

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		I			GTV ENGG	MANDIDEEP	A				
	MILL DISCHARGE VALVE (VALVE OUTLET & ADAPTOR	I			BHEL - EPD	BANGALORE	A				
		I			BHEL – IP	JAGDISHPUR	A				
	MILL MOTOR COUPLING	III			SIEMENS	GERMANY	A				
37	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				
		I			BIJUR DELIMON INDIA PVT LTD	PUNE	A				
		I			UNIQUE ENGINEERING ENTERPRISE P LTD	HYDERABAD	A				
		I			SOUTHERN LUB	BANGALORE	A				
38	CERAMIC LINED BEND COAL PIPES	II			BHEL EDN	BANGALORE	A				
		II			BMW	HATHRAS/ROURKEE	A				
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		II			CARBORANDUM UNIVERSAL	HOSUR	A				
		II			BHEL IP	JAGDISHPUR	A				
39	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"		
40	RAPH (STATIC COMPONENTS, ROTATING COMPONENTS, GUIDE/SUPPORT BEARINGS	I			Bharat Heavy Electrical Limited	Ranipet	A				
	RAPH Rotor Parts	I			Diffusion Engineers	Nagpur	A				
		I			Baroda Equipment and Vessels	Vadodara	A				
		I			NR Air-preheater	Pudukudi	A				
	RAPH Static Parts	I			Indira Ind.	Ranipet	A				
		I			Diffusion Engineers	Nagpur	A				
		I			NR Air-preheater	Pudukudi	A				
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41	FD, PA & ID FANS(STATIC, ROTATING COMPONENTS	I			Bharat Heavy Electrical Limited	Ranipet	A				
	FAN STATIC PARTS	I			Diffusion Engineers	Nagpur	A				
		I			Baroda Equipment and Vessels	Vadodara	A				
		I			GTV Engg. Ltd						
		I			Efficient Envirotech Pvt. Ltd.	Pune					

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42	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				
43	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			GUILLOTINE GATE(2700 MM HEIGHT)		
		I			DAMPER TECHNOLOGY INDIA PVT LTD	COIMBATORE	A				
44	ESP COLLECTING ELECTRODE				BHEL	Ranipet	A				
		I			L&T Hazira works	Hazira	A				

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		I			Penner Industries	Medak-Telengana	A				
		I			Dewas Metal	Dewas, MP	A				
		I			Auro Impex	Kolkata	A				
45	ESP EMITTING ELECTRODE	I			The G Engineers	Pune	A				
		I			Auro Impex	Kolkata	A				
		I			Patco Tech	Kolkata	A				
		I			Siva springs	Madurai	A				
		I			Venkateshwara Steel & springs	Coimbatore	A				
		I			Nagappa Springs	Ranipet	A				
		I			Kwality coils	Madurai	A				
		I			Best coils	Ranipet	A				
		I			Vishnu wire forms	Madurai	A				
46	PA Fans	I			Bharat Heavy Electrical Limited	Ranipet	A				
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		I			L&T- Howden Private limited	Hazira	A				
		I			TLT-Turbo GmbH	Germany	A				
		I			Howden	Denmark	A				
47	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				
48	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				
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49	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				
50	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				
51	Boiler Start Up Drain Re-Circulation Pump	I			Torishima Pump Mfg Co. Ltd.,	Japan	A				
		I			Hayward Tyler Limited	UK	A				
					KSB AG	Germany	A				
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		Project/ परियोजना : Talcher III Package/ पैकेज : EPC 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 SUB-SYSTEM उप-प्रणाली:SG(MECH)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 03.02.2022 PAGE/ पृष्ठ : PAGE 46 OF 50	
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52	Air Pre-Heaters	I			Bharat Heavy Electricals Limited	Ranipet	A				
					L&T Howden Private Limited	Hazira	A				
					Arvos India Pvt.LTd.	Chennai	A				
53	Auxiliary Boiler	I			ISGEC John Thompson (IJT)	Yamuna Nagar	A				
		I			Thermax Babcock & Wilcox Ltd.	Pune	A				
		I			Bharat Heavy Electricals Limited & BHEL (HVPB)	Trichy, Vizag	A				
54	ESP	I			Bharat Heavy Electricals Limited	Ranipet	A				
		I			Larsen & Toubro Limited	Hazira	A				
		I			GE Power India	India	A				
ITEMS WITH MAIN CONTRACTOR APPROVED SOURCES AND INSPECTION CATEGORY-III											
1	ALUMUNIUM 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						

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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						
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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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		Project/ परियोजना : Talcher III Package/ पैकेज : EPC 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 SUB-SYSTEM उप-प्रणाली:SG(MECH)				DOC. NO./ दस्तावेज सं.:	
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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.											

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		Project/ परियोजना : Talcher III Package/ पैकेज : EPC 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 SUB-SYSTEM उप-प्रणाली:SG(MECH)				DOC. NO./ दस्तावेज सं.:			
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	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 जाए) 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 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" 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 अनुमोदन 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 Conformity (COC) by Main Contractor. UNITS/WORKS इकाइयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयों / कार्यों के मुख्य सप्लायर का स्थान.										

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		Package/ पैकेज : EPC PACKAGE				QUALITY PLAN AND SUB-SUPPLIER APPROVAL			REVISION NO : 00		
		Supplier/ आपूर्तिकर्ता:				QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DATE/ तिथि : 17.01.22		
		Contract No./ अनुबंध सं.:				SUB-SYSTEM उप-प्रणाली: FGD					
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1	SLURRY RECIRCULATION PUMP	I			KSB LTD	INDIA	A		Note-1	4.26.2	Flow-12710 m3/hr Head-25.7 m
		I			DUCTHING PUMPEN	GERMANY	A		Note-1	4.26.1	Flow-12500 m3/hr Head-24.4 m
							A				
2	WET BALL MILL	I			CHRISTIAN PFEIFFER	INDIA	A		Note-1	4.26.2	Capacity-41.8 TPH
		I			THYSSENKRUPP INDIA	INDIA	A		Note-1	4.26.2	Capacity- 92 TPH
3	OXIDATION BLOWER	I			SWAM PNEUMATICS PVT LTD. (POSITIVE DISPLACEMENT)	INDIA	A		Note-1	4.26.1	Flow-14000 Nm3/hr Head-11000 mmwc
		I			SWAM PNEUMATICS PVT LTD. (CENTRIFUGAL)	INDIA	A		Note-1	4.26.3	Flow-21370 Nm3/hr Head-9381 mmwc
		I			BOLDROCCHI INDIA PVT LTD(SINGLE STAGE CENTRIFUGAL)	INDIA	A		Note-1	4.26.3	Flow-18000 Nm3/hr Head-11318mmwc
		I			GARDNER DENVER INDIA (MULTISTAGE CENTRIFUGAL)	INDIA	A		Note-1	4.26.2	Flow-30000 Nm3/hr (wet) Head-98 Kpa(g)
		I			TLT BABCOCK (CETRIFUGAL)	INDIA	A		Note-1	4.26.2	Flow-21500 Nm3/hr Head-11000 mmwc
4	Vacuum Belt Filter	I			M/S. TENOVA INDIA	INDIA	A		Note-1	4.26.1	Capacity-55TPH
5	SLURRY PUMP	I			WEIR MINERALS	INDIA	A		Note-1	4.26.2	
		I			METSO INDIA PVT LTD	INIDA	A		Note-1	4.26.2	
6	AGITATORS	I			MUT-TSCHAMBER (TOP ENTRY)	GERMANY	A			4.26.1	

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		I			REMI PROCESS MACHINERY (SIDE/TOP ENTRY)	INDIA	A		Note-1	4.26.5	
		I			EKATO INDIA PRIVATE LIMITED (TOP ENTRY) INDIA	India	A		Note-1	4.26.2	
7	BOOSTER FAN	I			L&T HOWDEN	INDIA	A		Note-1	4.01.01	Capacity :763 m3/hr Head :-573 mmwc
					TLT TURBO INDIA PVT LTD	INDIA	A		Note-1	4.01.03	Capacity :874 m3/hr Head :-592 mmwc
		I			BHEL,Ranipet	INDIA	A		Note-1	4.01.02	Capacity :747 m3/hr Head :-1221 mmwc
Note-1 :- For final Sub-Qr approval , document required to be submitted as per specification Sub-QR requirements of Talcher											

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		Contract No./ अनुबंध सं.:				SUB-SYSTEM उप-प्रणाली: TG-Mech						
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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	Muzaffamagar	A		Weight upto 38 T, 1.25 Cr Grade			
					LMB Heavy Casting Unit	Hazira	A					
					BHEL-CFFP	Haridwar	A					
2	HP/IP Inner Casing Casting (9 Cr)	I			Voestalpine	Austria	A					
					JCFC	Japan	A					
					JSW	Japan	A					
					GE	Poland	A					
					Kobe Steel	Japan	A					
					Starwire	Ballabgarh	A		Weight Upto 22T			
					Sande Stahlguss GmBH	Germany	A					
					Gruppo Cividale	Italy	A		Weight Upto 20T			
					LMB Heavy Casting Unit	Hazira	A					
					BHEL-CFFP	Haridwar	A					
3	HP/IP Inner & Outer Casing Machining	I			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										

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		Contract No./ अनुबंध सं.:									
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					BRUNO PRESEZZI	Italy	A				
					NUGO ROMANO	Italy	A				
					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		
4	HP/IP/LP Turbine shaft Forging	I			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				
5	Turbine shaft machining	I			Siemens	Germany	A				
					Franco Tosi	Italy	A		HP/IP		
					BHEL (HEEP)	Haridwar	A				
					ROSSEL DUSO	Italy	A				
					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				

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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					
					Einsal	Germany	A					
					Walzwerke Einsal	Switzerland	A					
7	HP/IP/LP Stationary & Moving Blades Machining(From Bar)	I			Nichia Tanko Co Ltd	Japan	A		LP Blades			
SET					Hungary	A						
MHPS					Japan	A						
Leistriz-Numberg					Germany	A						
Energietechnik Einsal					Germany	A						
Prawest					Germany	A						
						A		FOR LP STATIONARY BLADES				
ZEMA					Italy			FOR LP STATIONARY BLADES				
		A										
		LMTG	Hazira	A								
		GE	Switzerland/Germany/Sa nand	A								

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					Enem Excel	Hyderabad	A				
					TJPS	Chennai	A				
					Toshiba	Japan	A				
					BHEL (HEEP)	Haridwar	A				
					Siemens	Germany	A				
					QTPL	Bangalore	A		For Guide Blades		
					AZAD ENGG	Hyderabad	A				
8	LP Forged Blades(Drop)-Material	II			MHPS	Japan	A				
					GE	Switzerland	A				
					Leistriz Turbinenkomponenten	Germany	A				
					SMB SA	Switzerland			For L1 stage(Last but one) blades		
					C-BLADE SPA	Italy	A				
					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				
					Leistriz Turbinenkomponenten	Germany	A				
					Bohler	Austria	A				
					Toshiba	Japan	A				
					ALSTOM	Switzerland	A				
					AZAD ENGG	Hyderabad	A				
10	LP Cast Blades(material) & Machining	I			Zollern	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				

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					IPCL	Bhavnagar	A				
					EXCEL HITECH	Ghaziabad	A		For casting		
					AK ALLOYS	Ahmedabad	A				
					PTC	Lucknow/Mehsana	A				
					AMBE ENGG)- For Machining only	Ghaziabad	A				
11	LP Hollow Blades	I			Binder	Switzerland	A				
					Prime Hi-Tech Engineering Limited	Naidupet, AP	A				
12	LP Inner/Outer casing Fabrication	I			LMTG	Hazira	A				
					BHEL (HEEP)	Haridwar	A				
					SHARP	Pune	A				
					Shape Engg.	Haridwar	A				
					GE	Croatia/Shahabad	A				
					D&N	Germany	A				
					KCP	Chennai	A				
					ISGEC(Weight upto 38T)	Yamunanagar	A				
13	LP Inner casing Casting (GGG40)	I			GE Power sp. Z.o.o	Poland	A				
					L&T	Kansbahal	A				
					FWH Freidrich Wilhems-Hute GmBH	Germany	A				
					Heidenheimer Giessen GmBH	Germany	A				
					Pilsen Steel	Czech	A				
					Buderus Spezialguss GmBH	Germany	A				
14	LP Inner/Outer casing Machining	I			LMTG	Hazira	A				
					BHEL (HEEP)	Haridwar	A				
					TJPS	Chennai	A				
					MHPS	Japan	A				
					SHARP	Pune	A				
15	LP Crossover Pipe	I			LONE STAR	Chennai/Cheyyar	A				
					Hatec	Germany	A				
					Rohr-und Anlagenbau (ROBA)	Germany	A				

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					Seonghwa	S Korea	A				
					Dee Development	Ballabgarh	A				
					HKR	S Korea	A				
					Babylon	Germany	A				
					Eichhoff	Germany	A				
					LMTG	Hazira	A				
					Mech engineers	Valsad	A				
16	Electro-Hydraulic Actuators	I			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		
					SEMPPELL	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				

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					PMT	Pune	A					Applicable Note
					Wellbore	Ahmedabad	A					
					Bharat Forge	Pune	A					
					Indo air	Ahmedabad	A					
					Toshiba	Japan	A					
20	TG Bearings	I			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					
					Kingsburry	USA	A					
21	MOP/EOP	I			Allweiler	Germany	A					
					ABB	Switzerland	A					
					Bosch Rexroth	Germany/ Switzerland	A					
					Toshiba	Japan	A					
					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			

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					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				
					Rockfin	Poland	A				
25	Turbine Integral Piping	I			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	Ballabhgarh	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				
					ENPRO	Pune	A				
27	Thermal Insulation	II			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				

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					Minsulate Manufacturing Co.	Jamshed	A					
28	Condenser (water cooled) (Sub QR Item)	I			MHI	Japan	A					
					THERMAL ENGG INTERNATIONAL (TEI)	USA	A					
					TJPS	Chennai	A					
					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					

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					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					
					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					

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					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					
					SULZER	UK	A					
40	Drive Turbine for BFP	I			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					

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					BHEL	Hyderabad	A					
					MHI	Japan	A					
					Skoda	Czech republic	A					
41	HP Bypass Valves (Sub QR Item)	I			CCI	Sweden/ Switzerland/Czech Republic	A					
					CCI	Chittor,AP	A					
					Bomafa	Germany	A					
					Bomafa	Ahmedabad	A					
42	LP Bypass Valves (Sub QR Item)	I			CCI	Sweden/ Switzerland/Czech Republic	A					
					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					
					Multitex Filtration	Greater Noida	A					
44	Hydraulic Coupling for BFP	I			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 to 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					

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					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		
					HKR	S Korea	A				
47	HP Piping -Fabrication (Based on Design and Drawings of Qualified Vendor)	I			BHR	Germany	A				
					Seonghwa	S Korea	A				
					Finow	Germany	A				
					TOSHIBA	Japan	A				
					BHEL	Piping Center, Chennai &Thirumayam	A				

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												Applicable Note
					L&T	Hazira	A					
					Dee development	Ballabhgarh	A					
					Bendtec	USA	A					
48	HP Pipes and Fittings (Mills)	II			Wyman-Gordon	USA	A					
					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	A		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					

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					KSB	Pune	A					
					Hyundai	S Korea	A					
					KBL	Pune	A					
					Flowserve	Coimbatore	A					
51	Debris Filter/ Self Cleaning Strainer	I			GEA-BGR	Chennai	A					
					Multitex	Gr.Noida	A					
52	LP Pipes & Fittings (CS & SS)	I			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			
					Lalit Pipes & pipes Ltd.,	Thane	A		EFW Pipes			
					Ratnamni Metals and Tubes Ltd.,	Gandhinagar	A		EFW Pipes			
53	Butterfly Valves (* Also for steam services)	I			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					
					L&T	Coimbatore	A					

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					Intervalve	Pune	A					
54	Valves (gate/ globe/check) for LP application	I			L&T	Chennai/Coimbatore	A					
					Velan	Canada/Coimbatore	A					
					KSB	Germany/Coimabto	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					
					Steel Strong	Mumbai	A					
55	HP Feedwater Heaters Automatic (String Bypass) Isolation Valves	I			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			

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					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				
					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				

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					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				
					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	Turbine Bearing Pedestal	I			Main Contractor Approved Sources						
62	Chemical Dosing System	I			Main Contractor Approved Sources						
63	Vapour Exhauster With Motor	II			Main Contractor Approved Sources						
64	Drain Cooler & Misc Tanks	II			Main Contractor Approved Sources						

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		Supplier/ आपूर्तिकर्ता:				ब्रवालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मदों की सूची			DATE/ तिथि : 04.02.2022			
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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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुती करण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)	Applicable Note	
65	Oxygen/NaOH Dosing System	II			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.												
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												
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												
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												
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												
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.												
FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0												

1151791/2022/PS-PEM-MAX

		Project/ परियोजना : Talcher III Package/ पैकेज : EPC Package 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 SUB-SYSTEM उप-प्रणाली: TG HALL EOT CRANE			DOC. NO./ दस्तावेज सं.:	
								REV. NO.:	
								DATE/ तिथि : 22.05.2021	
								PAGE/ पृष्ठ : PAGE 1 OF 2	
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.	TG HALL EOT CRANE ALONG WITH LIFTING BEAM (IF APPLICABLE) (Sub-QR Item)	I			FAFCO	Vadodara/ Mumbai	A		Vadodara - upto 150 MT, Mumbai - Upto 200 MT
		I			Mukand	Thane	A		Upto 300 MT
		I			WMI Konecranes	Pune	A		Upto 300 MT
		I			Anupam Industries	V U Nagar	A		Upto 300 MT
		I			Unique Industries Handlers	Nasik	A		Upto 300 MT
		I			CRANEX	GHAZIABA D	A		Upto 140 MT
		I			HEC	Ranchi	A		Upto 265 MT. Main Contractor to ensure availability of Load / Overload testing facility at Shop.

NOTE -1 : For final Sub-QR approval , document required to be submitted as per Sub-QR requirements given in the specification.

FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0		Engg. Div. / QA&I

	Project/ परियोजना : Talcher III Package/ पैकेज : EPC Package 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 SUB-SYSTEM उप-प्रणाली: TG HALL EOT CRANE	DOC. NO./ दस्तावेज सं.:
			REV. NO.:
			DATE/ तिथि : 22.05.2021
			PAGE/ पृष्ठ : PAGE 2 OF 2
LEGENDS/ संकेतिका 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 । 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 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 : TALCHER-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता :
17911/2022/PS-PEM-MAX

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
इवालिटी 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 : 04-02-2022
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1	AIR BLOWERS -LOBE TYPE >= 5 KW	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&VENTILATI ON,CHP,LHP&GHP,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			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	
					CENTURY CRANE ENGINEERS PVT. LTD	BALLABHGARH	A		UP TO 25 MT	
					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 PVT LTD	NASHIK	A		UP TO 165 MT	
					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	
3	FAN- AXIAL TYPE >= 5KW				CB DOCTOR VENTILLATOR PVT LTD	AHMEDABAD	A		up to 50000 CMH	WTP,CT.AC&VENTILATI ON,CHP,LHP&GHP,AHP
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		up to 125000 CMH	
					C DOCTOR &CO PVT LTD	KOLKATA	A		up to 50000 CMH	
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	SHAHPUR, THANE	A		Up to 6000 CMH	



Project/ परियोजना : TALCHER-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:

791/2022/PS-PEM-MAX

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.:

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		I			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	
					ALMONAROD (P) LIMITED	CHENNAI	A		Up to 14000 CMH	
4	PIPES-MS- (BLACK/ GI) AS PER IS:3589 >1000NB	I			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	
					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	
					CAPACITE STRUCURES PVT LTD	THANE	A		406.4 MM TO 3874 MM OD	
5	PIPES & FITTINGS-GRP	I			EPP COMPOSITES PVT LTD	RAJKOT			UP TO 900MM	WTP,CT
					GRAPHITE INDIA	NASIK			UP TO 1000MM	
					SHRIRAM SEPL COMPOSITES LTD	CHENNAI			UP TO 1100MM	
					BALAJI FIBER REINFORCE PVT LIMITED	VADODARA			UP TO 650MM	
					MEGHA FIBRE GLASS INDUSTRIES PVT LTD	MEDAK			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 PIPES PRIVATE LTD	CHENNAI	A		DIA 2800MM, THICKNESS UPTO 47.5 KSC	



Project/ परियोजना : TALCHER-III
 Packages/ पैकेज : PSC
 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.:
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					आपूर्तिकर्ता					
					BELCO POLLUTION CONTROL PVT LTD	GREATER NOIDA	A		UPTO 3200MM DIA & THICKNESS UPTO 30 MM	
7	PUMPS- HORIZONTAL & VERTICAL CENTRIFUGAL -UP TO 300KW	(UP TO 60 KW CAT-II, ABOVE 60 KW CAT-I)			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			
					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	
					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			
					FLOWERVE 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	
8	PUMPS -VT -UP TO 300KW	I			FLOWMORE LTD	GHAZIABAD	A			WTP, CW
					KIRLOSKAR BROTHERS LIMITED	KIRLOSKARWADI	A			
					WPIL LTD	KOLKATA	A			
					WPIL LTD	GHAZIABAD	A			
					JYOTI LTD	VADODARA	A			
					XYLEM WATER SOLUTIONS INDIA PVT LTD	VADODARA	A			
					FLOWERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		UP TO 1025 KW	
					SINTECH PRECISION	GHAZIABAD	A			
					WILO MATHER & PLATT	PUNE	A			

एनटीपीसी NTPS Project/ परियोजना : TALCHER-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: मालिक/Owner/ आगंतक: 1791/2022/PS-PEM-MAX		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 : 04-02-2022 PAGE/ पृष्ठ :			118				
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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			TRILLIUM FLOW	HUBLI	A		SS BALL VALVES UP TO 500MM AND CLASS #600, CS BALL VALVES UP TO 250 MM AND CLASS# 900, CS/ SS BALL VALVES UP TO 100 MM AND CLASS # 1500.	WTP, CPU,FDPS,CAS,FOH,CHP, 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				
					PRECISION 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.				
					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 UPTO 2000NB	WTP, CW,CT,CPU,FDPS,CAS, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP			
					TRILLIUM FLOW	HUBLI	A		CI/ DI BUTTERFLY VALVE UP TO 1000MM AND PN16 AND UP TO 1800MM AND PN10,CCS UP TO 1050MM CLASS 150 AND UP TO 1800MM AND PN16 SS - UP TO 400NB PN-16 ,FABRICATED 800MM CLASS#150.				
					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 UPTO 2800NB, PN6.				
					FOURES ENGINEERING	BANGALORE	A		CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16 ,2400 MM				
					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 FABRICATED 2800NB, PN6.				
					R & D MULTIPLE	VALSAD	A		CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75, ,1100MM PN25,1400MM CLASS#150 .MS FABRICATED METAL SEATED, TRIPLE ECCENTRIC, SS BFV OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300.				
					ADVANCE VALVES PVT LTD	GREATER NOIDA	A						
					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				
			TECH SPEC NO.: PE-TS-497-163-A001										
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					आपूर्तिकर्ता					
					L & T VALVES LIMITED	COIMBATORE	A		UP TO 900MM CLASS 150	
					DEMBLA VALVES	THANE	A		UP TO 2200MM CLASS#75	
9.D	VALVE-CONVENTIONAL GATE / GLOBE / CHECK > 600NB OR CLASS > 300				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
		II			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			650 MM CLASS 600, 50 NB CLASS 800.	
					TRILLIUM FLOW	HUBLI	A		CONVENTIONAL CCS GATE / GLOBE / CHECK VALVES UP TO 600MM AND CLASS # 1500, CSS GATE/ GLOBE/ CHECK VALVES UP TO 200MM AND CLASS # 600, FCS GATE / GLOBE / CHECK VALVES UP TO 50MM AND CLASS # 2500.	
9.E	VALVE- DIAPHGRAGM TYPE				CRANE PROCESS FLOW	SATARA	A		UP TO 300NB PN10	WTP,CPU
		I			WEIR BDK	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)				TRILLIUM FLOW	HUBLI	A		SOFT SEATED 400MM AND CLASS #150,	WTP,CPU,CHP, LHP&GHP, FOH,AHP
		I							300NB CLASS#300	
					XOMOX SANMAR	TRICHY	A		UP TO 600MM AND CLASS#300	
					FLOWSERVE INDIA CONTROLS	CHENNAI	A		METALLIC SEATED 400NB CLASS#150, 300NB CLASS #300, 50NB CLASS #800	
10	PUMP -SUBMERSIBLE>= 30KW				KSB	NASHIK	A		130 KW	WTP,CT, CPU,CHP, LHP&GHP, FOH,AHP.LP PIPING,FDPS
		I			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)				CORI ENGINEERS PVT LTD	CHENNAI	A		UPTO 2800 MM	ACW, ECW, CW,CT
		I								
					SRM EXOFLEX PVT LTD	KOLKATA	A		UPTO 2800 MM	
12	FAN ASSEMBLY-COOLING TOWER				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	
					TECH SPEC NO.: PE-TS-497-1	63-A001				



Project/ परियोजना : TALCHER-III
Package/ पैकेज : EPC
Contract No./ अनुबंध सं.: 09/1/2022/PS-PEM-MAX

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
ह्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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		I			M/S COFIMCO FAN (CHANGSHU) CO. LTD.	CHINA	A		UP TO 11 METER FAN DIA	
					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			
16	PUMP-CW PUMP	I			KIRLOSKAR BROTHER'S LIMITED	KIRLOSKARWADI	A		BOTH CV & VT TYPE	CW
					WPIL LTD	KOLKATA	A		BOTH CV & VT TYPE	
					FLOWERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		CV TYPE ONLY	
					FLOWMORE LTD	GHAZIABAD	A		VT TYPE ONLY	
					XYLEM WATER SOLUTIONS INDIA PVT LTD	VADODARA	A		VT TYPE ONLY	
					JYOTI LTD	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) ,	CW
					HYDAC (INDIA) PVT. LTD	COIMBATORE	A		HYDRAULIC POWER PACK-HYDAC COIMBATORE, HYDRAULIC CYLINDER -HYDAC	
18	IMPELLER CASTING - CW PUMP	II			ISGEC	MUZAFAER NAGAR	A		FINISHED CASTING UP TO 4.0 MT APPROX	CW
					THE KOLHAPUR STEEL LTD,	KOLHAPUR	A		FINISHED CASTING UP TO 4.0 MT APPROX	
					WESTERN PRECICAST 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	
					MATHER FOUNDRY LTD	UK	A		FINISHED CASTING UP TO 3.6 MT APPROX	



Project/ परियोजना : TALCHER-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
1791/2022/PS-PEM-MAX

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
झवालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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19	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	
20	THRUST BEARING FOR CW PUMP	I			MICHEL	BANGLORE	A			CW
					KMP	GREATER NOIDA	A			
21	DELUGE VALVE WITH TRIMS	I			HD FIRE	THANE/JALGAON	A			FDPS
					CARRIER	GURGAON	A		FOR PISTON TYPE DELUGE VALVE ONLY	
22	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			
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			
26	CENTRIFUGAL FAN (≥ SKW) MOTOR FROM NTPC ACCEPTED SOURCE	I			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	
					C DOCTOR &CO PVT LTD	KOLKATA	A		UP TO 250000 CMH	
					SUVIDHA AIR ENGINEERS	AHMEDABAD	A		UP TO 190000 CMH	

एनटीपीसी NTPS Project/ परियोजना : TALCHER-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: माल/उपकरण/संयंत्र/सूची सं.: 1791/2022/PS-PEM-MAX		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ब्रवालिटो 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 : 04-02-2022 PAGE/ पृष्ठ :				122
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					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		
29	PLATE HEAT EXCHANGER	I			TRANTER INDIA	PUNE	A		HT PLATES & GASKETS FROM TRANTER SWIDEN/USA.HT PLATES FROM HISKA JAPAN	ECW	
					KELVION INDIA PVT LTD	PUNE	A				
					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 COPMPRESSOR: 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 MODELSH 300 (36 NM3/MIN) . AIR ENDS FROM GHH RAND - GERMANY & OTHER		
		I			ELGI	COIMBATORE	A		UPTO 2830 CFM, AIR ENDS FROM HITACHI- JAPAN. ASSEMBLY AND TESTING AT ELGI		
		I			KIRLOSKER PNEUMATIC COMP LTD	PUNE	A		FLOW CAPACITY 45.3 NM3/MIN , AND PRESSURE RATING 9.3 KG/CM2		
33	AIR DRYER	I			SUMMIT'S HYGRONICS	COIMBATORE	A		FOR REFRIGERANT DRYER, 11893 M3/HR , REGENERATIVE DRYERS BLOWER	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		
					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		
34	SCREW CHILLER	II			KIRLOSKAR CHILLER	PUNE	A		UP TO 350TR	AC& VENTILATION	
					DAIKIN TECH SPEC NO.: PE-TS-497-163-A001	KOCHI	A		UP TO 185 TR		

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Supplier/ आपूर्तिकर्ता :
Contract No./ अनुबंध सं. :
17-11/2022/PS-PEM-MAX

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)

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					आपूर्तिकर्ता					
					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			
					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			
38	DRY ASH UNLOADING CHUTE	I			MELCO	FARIDABAD				AHP
					MACAWBER BEEKAY	KESHWANA	A			
					MINING AND MATERIAL HANDLING EQUIPMENT	KOLKATA	A			
					DCL	HYDERABAD	A			
39	BAG FILTER / SILO VENT FILTER				FLAKT	KOLKATA	A			

एनटीपीसी NTPC Project/ परियोजना : TALCHER-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: 1791/2022/PS-PEM-MAX 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 : 04-02-2022 PAGE/ पृष्ठ : 124										
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		II			ORIENT FANS (ACCO)	KOLKATA	A			AHP,MRHS
					THERMAX	PUNE	A			
					RIECO	PUNE	A			
					MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	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	
					DELAIR	GURGAON	A		Upto 7500 m3/hr	
					ATLAS COPCO	BELGIUM	A		Upto model FD 1200. ASSEMBLY AND TESTING AT PUNE	
41	VACUUM PUMP / MECHANICAL EXHAUSTER [WATER SEAL RING TYPE]	I			KAKATI KARSHAK	HYDERABAD	A			AHP
					VACUNAIR	AHEMDABAD	A			
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	
44	FLY ASH DUTY KNIFE GATE VALVE	I			BRAY CONTROLS INDIA PVT LTD, VAAS KNIFE GATE VALVE DIVISION	CHENNAI	A			AHP
					FOURESS ENGINEERING	BANGALORE	A			
					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 INDUSTRIES	COIMBATORE	A			AHP



Project/ परियोजना : TALCHER-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
11/2022/PS-PEM-MAX

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
झवालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

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					आपूर्तिकर्ता 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			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A		AIR OIL TANK- ASANSOLE , AIR INTAKE VALVE - KUMARDUBHI	AHP
					MACAWBER BEEKAY	KESHWANA	A			
48	BOTTOM ASH HOPPER / BUFFER HOPPER/DUST COLLECTOR	I			MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			
					MELCO	FARIDABAD	A		ONLY FOR BUFFER HOPPER AND DUST COLLECTOR	AHP
					MACAWBER BEEKAY	KESHWANA	A			
49	CLINKER GRINDER	I			MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					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			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
51	FLUIDIZING PAD / FLUSHING APPARATUS	I			MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
52	FLY ASH STORAGE SILO/HCSO SILO	I			MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					MACAWBER BEEKAY	KESHWANA	A			
53	FEED SUMP / VACUUM BREAKER	I			MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					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			
					MCNALLY SAYAJI	KUMARDHUBI	A			AHP
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
55	HYDROMIX DUST CONDITIONER/ROTARY FEEDER	I			MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			AHP
					MACAWBER BEEKAY	KESHWANA	A			
					L&T	KANSBAHAL	A			



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					EXPONENTIAL ENGINEERING	PUNE	A			
56	JET PUMP / JETTING NOZZLE	I			MELCO	FARIDABAD	A		JET PUMP / JETTING NOZZLE	AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	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/KUMARDH UBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
58	PLATE VALVE AT DYKE END	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDH UBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
59	DESSICANT TYPE AIR DRYER	I			DELAIR	GURGAON	A			AHP
					INDCON	DELHI	A			
					MELLCON	GREATER NOIDA	A			
					SUMMITS HYGRONICS	COIMBATORE	A			
					TRIDENT	COIMBATORE	A			
60	STACKER RECLAIMER & RECLAIMER	I			MCNALLY	KUMARDHUBI / ASAN	A			CHP
					L&T	KANCHEEPURAM	A			
					THYSSENKRUPP	PUNE	A			
					ELECON	V V NAGAR	A			
					TRF	JAMSHEDPUR	A			
					SANDVIK	PUNE	A			
					PROMAC	BANGALORE	A			
					HUNAN CHANGZHONGMACHINERY CO. LTD	CHINA	A			
					THYSSENKRUPP	HYDERABAD	A		* Hyderabad works approved for some of assemblies for Stacker Reclaimer - Counter	
61	WAGON TIPPLER & SIDE ARM CHARGER	I			ELECON	V V NAGAR	A			CHP
					FAMAK S.A. (IN ASSOCIATIONWITH MBE-ASANSOL)	POLAND	A			
					L & T	KANSBAHAL	A			
					THYSSENKRUPP	PUNE	A			
					TRF	JAMSHEDPUR	A			
					PROMAC	BANGALORE	A			
62					THYSSENKRUPP	HYDERABAD	A		UPTO 2400 TPH	
					L&T	KANSBAHL	A		UPTO 2200 TPH	
					ELECON	BANGALORE	A		UPTO 2200 TPH	



	Project/ परियोजना : TALCHER-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता : Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL इवालिटी 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 : 04-02-2022 PAGE/ पृष्ठ :			127	
	91/2022/PS-PEM-MAX									
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	APRON FEEDER WITH DRIBBLE CONVEYOR (1600 TPH)	I			TRF	JAMSHEDPUR	A		UPTO 2400 TPH Extended Warranty of 3 years over & above of contractual warranty on parts other than the parts treated as consumables	CHP
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 2200 TPH	
63	RING GRANULATOR	I			PENNSYLVANIA CRUSHERCORPORATION	USA	A		UP TO 1760 TPH	
					AMERICAN PULVERISER	USA	A		UPTO 1875 TPH	
					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 Warranty	CHP
					L&T	KANSBAHAL	A		UP TO 1600 TPH	
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1000 TPH	
64.A	VIBRATING SCREEN FEEDER	I			TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					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 Warranty	CHP
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1210 TPH	
64.B	VIBRATING FEEDER	I			TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	
					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 Warranty	CHP
					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	
65	TRAVELLING TRIPPER	I			BENGAL TOOLS	KOLKATA	A			
					THYSENKRUPP	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			
66	FABRIC BELTING(FR GRADE) / STEEL CORD BELTING(FR GRADE)	I			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	
					NORTHLAND RUBBER	SONEPAT	A		FABRIC BELT UPTO 2200 MM WIDTH.	
					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)	CHP, LHP/GHP
					FORECH	CHENNAI	A		FABRIC BELT UPTO 2000 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2000 MM WIDTH)	
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					आपूर्तिकर्ता					
					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	
					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	
					ROLLWELL	HINDUPUR	A			
69	HELICAL GEARBOX	I			TRF	JAMSHEDPUR	A			CHP, LHP/GHP
					SHANTI GEARS	COIMBATORE	A		Upto size 560	
					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.r.l	ITALY	A		(Earlier name - BREVINI)	
71	FLUID COUPLING (SCOOP AND TRACTION TYPE)	I			SEW EURODRIVE GMBH & CO.	GERMANY	A			CHP,LHP/GHP
					FLUIDOMAT	DEWAS	A		Scoop type upto SC-1330	
					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 1000 times on first coupling of each model. 2. M/s Elecon will conduct full load test for each type and model of coupling as per approved quality plan.	
					VOITH	HYDERABAD	A		SCOOP TYPE UPTO SVNL 1330	
					TITANUS	SOUTH AFRICA	A			
72	SLEW RING	III			IMO	GERMANY	A			CHP, LHP/GHP
					SKF	FRANCE	A			
					ROTHERDE	GERMANY	A			
73.A	COAL SAMPLER SYSTEM	I			LIEBHERR	GERMANY	A			CHP
					EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	
					ERIEZ MAG EUROPE LTD	UK	A			
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTTLE COLLECTOR AT MULTOTEC SA	
					THERMO RAMSAY INC	USA	A			
					ADVANCE	USA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	



एनटीपीसी NTPC		Project/ परियोजना : TALCHER-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: आपूर्तिकर्ता का पता/ Address: 1791/2022/PS-PEM-MAX		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 : 04-02-2022 PAGE/ पृष्ठ :			129	
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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				
					BOSCH-REXROTH	AHMEDABAD	A				
76	HYDRAULIC MOTOR	I			Hydac	COIMBATORE	A			CHP , LHP/GHP	
					POCLAIN HYDRAULICS	FRANCE	A				
					BOSCH-REXROTH AB (FORMERLY HAGGLUNDS)	SWEDEN	A				
					PARKER CALZONI	ITALY	A				
					MAHA HYDRAULICS	CHENNAI	A		UP TO 100 LITRE CAPACITY		
77	HAMMER MILL CRUSHER FOR LIME STONE HANDLING SYSTEM	I			KAWASAKI	UK	A			LHP/GHP	
					INTERNATIONAL COMBUSTION	NAGPUR	A				
					MCNALLY SAYAJI	BARODA	A				
					MCNALLY SAYAJI	KUMARDHUBI	A				
					ELECON	V V NAGAR	A				
78	SHOP FABRICATED STRUCTURE	I			THYSSENKRUPP INDUSTRIES INDIA	PUNE	A			CHP/LHP/GHP	
					ECOMAN	BARODA	A		UPTO 150TPH		
					INDIANA GRATINGS PVT. LTD.	PUNE	A				
					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				
					FEDDERS LLOYD CORPORATION LTD	SIKANDRABAD	A				
					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				
					THYSSENKRUPP INDUSTRIES INDIA	BARODA	A				
ITEM WITH MAIN CONTRACTOR / BIS APPROVED SOURCES.						Page 124 of 700					

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एनटीपीसी NTPC		Project/ परियोजना : TALCHER-III 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 : 04-02-2022 PAGE/ पृष्ठ :				
S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप	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 प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Applicable Systems
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,FDPS,A C&VENTILATION,CHP,L HP&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					
7	PIPES FOR IDLERS IS 9295	III			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
8	BLOWERS -CENTRIFUGAL >=5KW	II			MAIN CONTRACTOR APPROVED SOURCES					WTP
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	DRIFT ELIMINATOR-PVC	II			MAIN CONTRACTOR APPROVED SOURCES					CT
20	FAN CYLINDER SEGMENTS-FRP-COOLING TOWER	II			MAIN CONTRACTOR APPROVED SOURCES					CT
21	COOLING TOWER FILLS	II			MAIN CONTRACTOR APPROVED SOURCES					CT
22	SHAFT-CARDON TYPE-CW PUMP	II			MAIN CONTRACTOR APPROVED SOURCES					CW
23	DUST EXTRACTION SYSTEM	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP
24	DUST SUPPRESSION SYSTEM (PLAIN WATER)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP
25	DUST SUPPRESSION SYSTEM (DRY FOG)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES	CHP, LHP/GHP
26	PIPE-SS ASTM A 312	II			MAIN CONTRACTOR's APPROVED SOURCES					
27	PIPE-CS SEAMLESS ASTM A 106	II			MAIN CONTRACTOR's APPROVED SOURCES					
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 ब्योरे 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										
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										
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 इकाइयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयाँ / कार्यों के मुख्य सप्लायर का स्थान.										
FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0										
Engg. Div. / QA&I										

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		Project/ परियोजना : Talcher - III Package/ पैकेज : TALCHER III EPC PACKAGE Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब –सप्लायर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: ELECTRICAL			Doc. No./ दस्तावेज सं.: REVISION NO : 01 DATE/ तिथि : 03.02.2022	
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 sub sch/ 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 (400 KV)	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	
					TELK	Angamally	A		Up to 400 KV Class	
4	Shunt Reactor (400 KV)	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	

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		Project/ परियोजना : Talcher - III Package/ पैकेज : TALCHER III EPC PACKAGE Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ज्वालितो भ्रान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: ELECTRICAL			Doc. No./ दस्तावेज सं.: REVISION NO : 01 DATE/ तिथि : 03.02.2022	
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	
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			
					Siemens	Kalwa	A			
					Schneider	Vadodara	A			
8	11KV/33KV 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	

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		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-सप्लायर के अनुमोदन सहित मदों की सूची			Doc. No./ दस्तावेज सं.:
		Package/ पैकेज : TALCHER III EPC PACKAGE							REVISION NO : 01
		Supplier/ आपूर्तिकर्ता:				SUB-SYSTEM उप-प्रणाली: ELECTRICAL			DATE/ तिथि : 03.02.2022
		Contract No./ अनुबंध सं.:							
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
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
					ULIN	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

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		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ज़वाबिलदारी धारण तथा सब –सप्लायर के अनुमोदन सहित मदों की सूची			Doc. No./ दस्तावेज सं.:	
		Package/ पैकेज : TALCHER III EPC PACKAGE				SUB-SYSTEM उप-प्रणाली: ELECTRICAL			REVISION NO : 01	
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 03.02.2022	
		Contract No./ अनुबंध सं.:								
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	
					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	
					TMEIC	BENGALURU	A		UPTO 11 KV 5000 KW	
10	H.T. CABLE upto 33KV	CAT I								
					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				

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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		
					Gemsabs 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		
					Gemsabs 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		
					Suyog Cables	Vadodara	A		
					Thermocables	Hyderabad	A		
					Tirupati Plastomatics	Jaipur	A		

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					Torrent Cable Ltd	Nadiad	A		
					Universal Cable Ltd.	Satna	A		
13	EHV Cables	CAT I							
					Iijin 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		
					Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur

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					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								
					HBL-Power System	Hyderabad	A		Up to 990 Ah with conditions	
							A		8Ah to 990Ah- KPH type	
					Saft India	Bangalore	A		10Ah to 1365 Ah- KPM type	
							A		11Ah to 1550Ah – KPL type	

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16	BATTERY CHARGER (48V/110V/220V)	CAT I								
					Amararaja	Tirupati	A			
					HBL- Power System	Hyderabad	A			
					Chhabhi 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								
18.1	OIP/CONDENSER BUSHING	I			BHEL	Bhopal	A		Up to 400 KV class	
					Crompton Greaves Ltd	Nasik	A		Up to 400 KV class	
					Crompton Greaves Ltd	Aurangabad	A		Up to 245 KV Class (excluding GT)	
					ABB Ltd.	Vadodara	A			
		II			ABB Switzerland Ltd. MICALFIL 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		

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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 Scahaffer	Canada	A			
21	GIS	CAT I			GE T&D	CHENNAI	A			
					ABB	BARODA	A			
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	

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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		

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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			
					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.	

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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	Pilkhwa	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		
					Skipper	Howrah	A		
					Transrail	Silvasa	A		

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33	132 KV cable termination & straight through jointing kits	CAT I							
					Iijin	South Korea	A		
					ABB Kabeldon	Sweden	A		
					Pfisterer AG	Switzerland	A		
					Tyco 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		
					Nitya Electrocontrols	Noida	A		
34.1	Sandwiched type LT Busduct	CAT I							
					Henikwon	Malaysia	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

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		Supplier/ आपूर्तिकर्ता:				सब-वैडर के अनुमोदन सहित मर्तों की सूची			DATE/ तिथि : 03.02.2022
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					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							
					Powertech	Sonepat			Upto 55 KW with following conditions: i) VFD from Schneider- France, upto 415V, 50KW.
							A		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			(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			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			VFD(NXP model) from VACON Finland, upto 400KW,415V and upto 900KW, 690V
							A		

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37.1	MV VFD Control Panel	CAT I								
					HITACHI HI REL POWER ELECTRONICS PVT. LTD.	SANAND	A		3.3 KV, 1050 KW	
					TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED	TUMKUR	A		2200 KVA, 1050 KW, 3.3 KV	
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			BHEL-HEEP	HARIDWAR	A		
44.1	STATOR FRAME MACHINING	CAT II			BHEL-HEEP	HARIDWAR	A		
45	SPRING BASKET	CAT II			BHEL-HEEP	HARIDWAR	A		

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45.1	CORE BAR	CAT II								
					BHEL-HEEP	HARIDWAR	A			
45.2	FLUX TRAP	CAT II								
					BHEL-HEEP	HARIDWAR	A		STAMPINGS FROM BHEL CSU JAGDISHPUR	
45.3	FLAT SPRINGS AND BASKET ASEMBLY	CAT II								
					BHEL-HEEP	HARIDWAR	A			
45.4	RIPPLE SPRING	CAT II								
					KREMPAL GMBH	GERMANY	A			
45.5	TENSION BOLT FOR STATOR CORE (INSULATED)	CAT II								
					BHEL-HEEP	HARIDWAR	A			
45.6	CORE PRESS RING	CAT II								
					BHEL-HEEP	HARIDWAR	A			
46	ETS MATERIAL	CAT II								
		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								
					BHEL-CSU	JAGDISHPUR	A			
48	BUS BAR CONNECTION TUBES	CAT II								
					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			
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			

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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			

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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			
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								

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					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			

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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			
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			

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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			
		I			LMTG	HAZIRA	A			
83	BUS RING FABRICATION (Phase Ring)	CAT I								
		II			MITSUBISHI ELECTRIC	JAPAN	A			
		I			LMTG	HAZIRA	A			

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एनटीपीसी NTPC		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL जवाबिलीटी भ्रम तथा			Doc. No./ दस्तावेज सं.:	
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84	RIPPLE SPRING	CAT III								
		III			MITSUBISHI ELECTRIC	JAPAN	A			
		III			AUGUST KREMPEL	GERMANY	A			
85	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	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)	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)	CAT II								
		II			EMIL HAFLEY(TRENCH)	SWITZERLAND	A			
		II			MITSUBISHI ELECTRIC	JAPAN	A			
		II			TRENCH	SWITZERLAND	A			
88	SUPPORT BRACKET	CAT I								
		II			MITSUBISHI ELECTRIC	JAPAN	A			
		I			LMB	HAZIRA	A			
89	CONNECTING BUS BAR (PHASE BELTS) FABRICATION	CAT II								
		II			SUMIKEI COPPER	JAPAN	A			
		II			MITSUBISHI ELECTRIC	JAPAN	A			
		II			HITACHI CABLE	JAPAN	A			
		II			ORIENTAL COPPER	THAILAND	A			

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90	INSULATING HOSES FOR STATOR (WATER SUPPLY HOSES)	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	CAT I							
		III			MITSUBISHI ELECTRIC	JAPAN	A		
		I			RV ENGG	FARIDABAD	A		
		I			AK Multi metal	PUNJAB	A		CS Casting for Generator Bracket Hub of Bearing bracket, Ni-alloy casting for Generator Blower Shroud & Shield clamper, nodular cast iron casting for Shroud support.
92	STATOR WINDING ASSLY	CAT I							
		I			MITSUBISHI ELECTRIC	JAPAN	A		
		I			LMTG	HAZIRA	A		
93	GENERATOR SHAFT FORGING	CAT II							
					SAARCSHMIIDE	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							
					SAARCSHMIIDE	GERMANY	A		
					JSW	JAPAN	A		
					KOBE STEEL	JAPAN	A		
					FORTEH	FRANCE	A		
97	RETAINING RING MACHINING	CAT I							

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		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							
					MITSUBISHI ELECTRIC	JAPAN	A		
101	ROTOR COIL FORMING	CAT I							
		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		
					FIAY	ITALY	A		
					OTOKUMUPORI (LUVATA)	FINLAND	A		
					METALLURGICA MINOTI	ITALY	A		
					Damper Wedges - Gindre India Components Pvt. Ltd	Gurgaon	A		

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104	ROTOR WINDING ASSLY (GEN) INCL ROTOR WEDGES (Rotor winding)	CAT I							
					MITSUBISHI ELECTRIC LMTG	JAPAN HAZIRA	A A		
105	GENERATOR ROTOR-FINAL assembly & Balancing Process (Rotor final assembly & HSB)	CAT I							
					MITSUBISHI ELECTRIC LMTG	JAPAN HAZIRA	A A		
106	COMPRESSOR BLADE ASLY ON ROTOR (Part of generator final assembly)	CAT I							
					MITSUBISHI ELECTRIC LMTG	JAPAN HAZIRA	A A		
107	D LEAD (FL CORE BAR) & CONTACT BOLT FOR SLIP RING (Axial lead)	CAT II							
					MITSUBISHI ELECTRIC	JAPAN	A		

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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
					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		

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					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		
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		

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		I			STAR WIRE	BALLABHGARH	A		
		II			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		
128	HYDROGEN COOLER (Gas cooler)	CAT I			Shree sarjan	Vadodara	A		
					KITASHIBA ELECTRIC	JAPAN	A		
					ENERGEN	KOREA	A		
					GEA	GERMANY	A		
129	CARBON BRUSH	CAT II			LAXMI	BHOPAL	A		
					MERSEN	CHINA	A		
					MORGAN	KOREA	A		
					MERSEN	BANGLORE	A		
					VIDYUT CARBON	HARDWAR	A		
					ASSAM CARBON	KOLKATA	A		

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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							
					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)	

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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			
					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	

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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 Pressure 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 Cooductor 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			

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156	Connection Bus Bar (Phase Connector)	CAT II			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 Permail	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	Italy	A		
					ASTICO LOCALITA				
					Bay Forge	Chennai	A		
163	Centering Ring Machining	CAT II			Alstom (Switzerland) Ltd.	Switzerland	A		
					Bharat Forge Limited	Satara	A		

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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								
					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			

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174	Terminal Box Fabrication	CAT II			ALSTOM Power Sp. z o.o., ISGEC Shape Engg	Poland Yamunanagr Haridwar	A A A			
174.1	Terminal Box Machining	CAT II			ALSTOM Power Sp. z o.o., Energy machines	Poland Ahmedabad	A A			
175	End Shield Fabrication	CAT I			ALSTOM Power Sp. z o.o., Shape Engg ISGEC	Poland Haridwar Yamunanagr	A A A			
175.1	End Shield Machining	CAT I			ALSTOM Power Sp. z o.o., ISGEC Energy Machines	Poland Yamunanagr Ahmedabad	A A A			
176	Seal Assembly (Ring & Housing)	CAT II			ALSTOM Power Sp. z o.o.,	Poland	A			
177	Stator water cooler	CAT I			Alpha Laval GEA TRANTER IDMC Ltd	Sweden Germany Pune Anand	A A A A			
178	Stator water cooling unit	CAT II			Rockfin	Poland	A			
179	Stator water cooling pump	CAT II			ALWELLER KSB Ebera SULZER	GERMANY Pune Japan Navi Mumbai	A A A A			
180	Slip Ring Shaft Forging	CAT II			See Generator Forging Suppliers Bharat forge BAY FORGE	 Pune Chennai	 A A			
180.1	Slip Ring Shaft Machining	CAT II			Alstom (Switzerland) Ltd. Euroflex Transmission(india) pvt. Ltd.	Switzerland Hydrabad	A A			

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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			
		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			

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190	Radial Leads (Slip Ring Shaft)	CAT II							ALSO FOR SL NO 71	
191	Connection Rod for main Rotor	CAT II			Schmelzmetall AG	Switzerland	A			
					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							for Cast Resin	
					Etacom	Belgium	A			
					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								
		I			TOSHIBA	JAPAN	A			
					TJPS	CHENNAI	A			
199.1	End Pressure Plate - Machining	CAT II								
					TJPS	CHENNAI	A			
					Sharp Engineering	Pune	A			
					N.S Engg	Hyderabad	A			

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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		
		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	GENERATOR 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		

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210	RETAINING RING FORGING (MAT-CrMn 18-18)	CAT II							
					SAARCSHMEDE	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		
215	ROTOR SLOT WEDGES & DAMPER WEDGES FABRICATION & MACHINING	CAT II							
					MURUKAMI	JAPAN	A		
					FIAV	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		

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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							
					JINDAL ELECTRONICS	ROORKEE	A		
					MELCON ENGG	GREATER NOIDA	A		
					SPAN MANUFACTURING CO PVT LTD	ROORKEE	A		
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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 & OLTC 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 OLTC	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								

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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								
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								

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		Project/ परियोजना : Talcher - III Package/ पैकेज : TALCHER III EPC PACKAGE Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-सप्लायर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: ELECTRICAL			Doc. No./ दस्तावेज सं.: REVISION NO : 01 DATE/ तिथि : 03.02.2022	
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	
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								
	L2 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								
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								

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		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN			Doc. No./ दस्तावेज सं.:
		Package/ पैकेज : TALCHER III EPC PACKAGE				AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा			REVISION NO : 01
		Supplier/ आपूर्तिकर्ता:				सब-वेंडर के अनुमोदन सहित मर्चें की सूची			DATE/ तिथि : 03.02.2022
		Contract No./ अनुबंध सं.:				SUB-SYSTEM उप-प्रणाली: ELECTRICAL			
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
11	ON LOAD TAP CHANGER	CAT III							
12	OFAF COOLER	CAT III							
13	RADIATORS	CAT II							
14	REGENERATIVE MAINTENANCE FREE BREATHING	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.									

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		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ज़वालिटी प्लान तथा			Doc. No./ दस्तावेज सं.:	
		Package/ पैकेज : TALCHER III EPC PACKAGE							REVISION NO : 01	
		Supplier/ आपूर्तिकर्ता:				सब-सप्लायर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: ELECTRICAL			DATE/ तिथि : 03.02.2022	
		Contract No./ अनुबंध सं.:								
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	
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					
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				

		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL जवाबिली भूतन तथा सब-वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: ELECTRICAL			Doc. No./ दस्तावेज सं.:
		Package/ पैकेज : TALCHER III EPC PACKAGE							REVISION NO : 01
		Supplier/ आपूर्तिकर्ता:							DATE/ तिथि : 03.02.2022
		Contract No./ अनुबंध सं.:							
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 sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
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 एस्टीपीसी 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 एस्टीपीसी को स्वीकार्य है। अनुमोदन की शर्त, , यदि कोई हो, के साथ-साथ यह “क” में इंगित किया जाए । DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एस्टीपीसी द्वारा इन मदों की समीक्षा के लिए “विवृत जरूर की आवश्यकता” होती। सूची में “DR” यह 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 एस्टीपीसी द्वारा अनुमोदित किया जाता है और एस्टीपीसी 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 एस्टीपीसी द्वारा अनुमोदित किया जाता है। हालांकि एस्टीपीसी द्वारा कोई भी भौतिक निरीक्षण नहीं किया जाएगा। एस्टीपीसी 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-इकाईयों / कार्यों के मुख्य सप्लायर का स्थान. : Control measure of item covered in quality plan of main item.									

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 एन टी पी सी एक महारत्न कंपनी		PROJECT : Talcher-III (2X660MW)					LIST OF C&I ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00	
		PACKAGE : EPC PACKAGES									DATE :04.02.2022	
		CONTRACTOR:										
		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	
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 envoiroment 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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 एक महान् कर्मवीर		PROJECT : Talcher-III (2X660MW)					LIST OF C&I ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00
		PACKAGE : EPC PACKAGES									DATE :04.02.2022
		CONTRACTOR:									
		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
		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.PI 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/Sweeden	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			
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.PI refer Note-07
		III				Raman Instruments (System Integrator of M/S Procon UK)	Delhi	A			1.M/S Procon UK Make system 2.PI refer Note-07
		III				BHEL Ltd	Trichurapalli	A			
		III				Instrotech (PTY) Ltd	South Africa	A			

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 एक महारत्न कम्पनी		PROJECT : Talcher-III (2X660MW)					LIST OF C&I ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00	
		PACKAGE : EPC PACKAGES									DATE :04.02.2022	
		CONTRACTOR:										
		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	
		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											

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9-A	Control Valves for Aux PRDS system including desuperheater											
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to A182F92 material with conditions as per approval letter Up to A182F92 material with conditions as per approval letter Up to A182F92 material with conditions as per approval letter As per approval Ref: 02/CQA/SG/Tanda/MIL Dated 30.09.2015 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	
		I				Koso India Pvt limited	Nasik	A				
		I				Bomafa Special Valve solutions Pvt ltd	Ahmedabad	A				
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A				
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A				
		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. Up To size 20 Inches & 2500 ANSI Class	
		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				
		II				Nihon Koso Co Ltd	Japan	A				
		II				HORA	Germany	A				
		II				CCI	S.Korea	A				
		II				Emerson (Fisher)	USA/France/Japan	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. Up to 10 Inches & 3400 ANSI class	
		I				KOSO India Pvt Ltd	Nasik	A				
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A				

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		II				Dresser Produits industriels Industriels S.A.S	France	A				
		II				Nihon Koso Co Ltd	Japan	A				
		II				CCI	USA	A				
		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	

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		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	
		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				

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		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				
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	

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		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	
		III				Flowserve	USA	A			Also acceptable for Field Bus based applicable	
		III				Bernard Controls	France	A				
12-C	Electrical actuator for ID/FD/PA Blade pitch ,IGV &SCOOP											
		III				Harold Beck & Sons Inc	USA	A				
		III				SIPOS Aktrorik 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	
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 Khrone 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	

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		I				HI Tech System & services Ltd (System Integrator of BFI Germany)	Kolkata	A			1.For BFI Germany make system 2. Pl Refer Note-7	
		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.Pl 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				Code1	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)											

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		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	
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Germany/ USA make Hot Extractive SO2, NOx Analyser	
		III				Enviroinment 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				Analyser 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.PI 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											

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		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	
		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.PI 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.PI refre Note-07	
		III				Toshniwal Industries (System Integrator of M/S Mirion UK make system)	Ajmer	A			1. M/S Mirion UK make system 2.PI refer Note-07	
		III				Diamond Power	USA / Sweden	A				

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		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
		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				Mahrashtra 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
29	Instrument Cables (F.G & T/C Cables)										

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		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				
		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				Gemsab 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 electra 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.PI 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.PI refer Note-07	
		II				BHEL	Trichurapalli	A				
		III				Emerson -Mobrey (Solartron mobrey)	UK	A				
		III				Levelstate Svstems Ltd	UK	A				

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		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				
		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				Analyser 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			Analyser from M/s Verewa Umwelt Germany	
		III				Mercury Instruments GmbH	Germany	A				
		III				SICK AG	Germany	A				
		III				Themofisher	USA	A				
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	

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		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	
37	PLC System											
		I				Emerson Automation solution Intellegent 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 Comptel	Kolkata	A			For M/s Emerson make system	

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		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	
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				

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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, Disslolved 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)	
		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,Disslolved Oxygen,Hydrazine	
		III				ABB	UK	A			For Chloride,Disslolved 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 Disslolved 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	
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	

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		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	
		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 160 KVA,	

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		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.	
		II				IRD Mechanalysis 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	

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		PACKAGE : EPC PACKAGES									DATE :04.02.2022	
		CONTRACTOR:										
		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	
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	
		I				EIP Enviro	Noida	A			For 3D profiling / 1-Tripple-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 managemment 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						

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 एन टी पी सी एक महान् कल्पनी		PROJECT : Talcher-III (2X660MW)					LIST OF C&I ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00	
		PACKAGE : EPC PACKAGES									DATE :04.02.2022	
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		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	
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						
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, Vaccum 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						

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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 dispalcement 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						
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 Bolloard	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						

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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 along with the condition of approval, if any.												
2.0 QP INSPECTION CATEGORY :												
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 inspection 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 ACCEPTED IN QP. IF THE TOTAL INTEGRATED PANEL AND FAT IS CONDUCTED INDEGENEOUSLY												
NOTE-8 : For the C & I instruments 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 component of main equipments like DDCMIS ,PLC,TSI,CCTV ,PA system etc												
NOTE-10- For these controlled items, vendor shall be proposed for owner acceptance 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 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.												

एनटीपीसी NTPC		Project/ परियोजना : TALCHER TPP STAGE-III (2X660 MW) Package/ पैकेज : EPC PACKAGE 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 SUB-SYSTEM उप-प्रणाली: CIVIL WORKS		DOC. NO./ दस्तावेज सं.: CS-4540-001-2		
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S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यू पी. सं.	QP Sub. Sched ule क्यूपी उप.अ नुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submissio n schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकर ण की सूची	Remarks/ टिप्पणी
1.	GALAVANISED 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			
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					SUB-SYSTEM उप-प्रणाली: CIVIL WORKS		PAGE/ पृष्ठ : PAGE 2 OF 7		
					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
					RICHARDSON & CRUDDAS (1972) LTD	NAGPUR	A		
					TATA STEEL BSL LIMITED	RAIGAD	A		
2.	COLOUR COATED METAL DECK & CLADDING/ROOFING SHEET (COIL)	I			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	KALMESHWAR (NAGPUR)	A		
					JSW LTD	THANE	A		
					BHUSHAN POWER & STEEL LTD	SAMBALPUR (ODISHA)	A		

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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.	HDPE LINER (GEOMEMBRANE)	I			MAIN CONTRACTOR APPROVED SOURCE	-	-		
5.	ELECTROFORGED GRATING	II			INDIANA GRATINGS PVT. LTD	PUNE	A		
					KANADE ANAND UDYOG	THANE	A		
					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		
					VINFAB ENGINEERS INDIA PVT LTD. (For Galvanising) VINFAB GRATINGS (For Fabrication)	THANE	A		

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6.	PROFILERS FOR COLOUR COATED METAL DECK & CLADDING/ROOFING SHEETS	II			MAIN CONTRACTOR APPROVED SOURCE	-	-			
7.	FABRIC EXPANSION COMPENSATOR (FOR CHIMNEY)	II			MAIN CONTRACTOR APPROVED SOURCE	-	-			
8.	MINERAL WOOL FOR THERMAL INSULATION (FOR CHIMNEY)	II			MAIN CONTRACTOR APPROVED SOURCE	-	-			
9.	STOP LOG GATES, TRASH RACK AND LIFTING BEAM	II			MAIN CONTRACTOR APPROVED SOURCE	-	-			
10.	REINFORCEMENT STEEL	III			STEEL AUTHORITY OF INDIA LTD. (SAIL)		A			
					JINDAL STEEL & POWER Ltd. (JSPL)		A			
					TATA STEEL LIMITED.		A			
					RASHTRIYA ISPAT NIGAM LTD. (RINL)	VISAKHAPATNAM	A			
					JSW STEEL LTD.	RAIGAD, MAHARASHTRA; BELLARY	A			
					ESL STEEL LTD.	BOKARO	A			
					JSW ISPAT SPECIAL PRODUCTS LTD.	RAIGARH, CHHATTISGARH	A			
11.	HIGH PERFORMANCE MOISTURE COMPATIBLE CORROSION RESISTANT COATING SYSTEM	III			CECRI LICENSED SOURCES	-	-			
12.	BITUMEN	III			ALL GOVERNMENT REFINARIES	-	-			
13.	PTFE BEARING / ELASTOMERIC BEARING	III			MORTH / RDSO APPROVED VENDORS	-	-			
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		Project/ परियोजना : TALCHER TPP STAGE-III (2X660 MW) Package/ पैकेज : EPC PACKAGE 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 SUB-SYSTEM उप-प्रणाली: CIVIL WORKS			DOC. NO./ दस्तावेज सं.: CS-4540-001-2		
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14.	CEMENT	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
15.	CI PIPES	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
16.	RCC PIPES	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
17.	CPVC/UPVC PIPES	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
18.	PVC WATER STOP	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
19.	POLYTHENE WATER STORAGE TANKS	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
20.	CERAMIC / VITRIFIED TILES	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
21.	PARTICLE BOARDS, PLYWOOD, MDF	III			BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-			
22.	FIRE PROOF DOORS	III			MAIN CONTRACTOR APPROVED SOURCES WITH VALID PROTOTYPE TEST REPORT FROM CBRI/CPRI/GOV. LAB.)	-	-			
23.	CONSTRUCTION CHEMICALS/ADMIXTURE, WATER PROOFING COMPOUNDS AND GROUTS	III			MAIN CONTRACTOR APPROVED SOURCE	-	-			
24.	PAINT AND PAINTING SYSTEM	III			MAIN CONTRACTOR APPROVED SOURCE	-	-			
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		Project/ परियोजना : TALCHER TPP STAGE-III (2X660 MW) Package/ पैकेज : EPC PACKAGE 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 SUB-SYSTEM उप-प्रणाली: CIVIL WORKS		DOC. NO./ दस्तावेज सं.: CS-4540-001-2		
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25.	HIGH SOLID CONTENT LIQUID APPLIED URETHANE BASED ELASTOMERIC MEMBRANE FOR WATER PROOFING	III			MAIN CONTRACTOR APPROVED SOURCE	-	-		
26.	INSTRUMENTATIONS (Porous Tube Piezometer, Surface settlement point, Water level sounder etc.) FOR ASH DYKE	III			MAIN CONTRACTOR APPROVED SOURCE	-	-		
27.	PRE-ENGINEERED BUILDINGS	III			MAIN CONTRACTOR APPROVED SOURCE	-	-		
28.	FOUNDATION BOLTS	III			MAIN CONTRACTOR APPROVED SOURCE	-	-		

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	Project/ परियोजना : TALCHER TPP STAGE-III (2X660 MW) Package/ पैकेज : EPC PACKAGE 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 SUB-SYSTEM उप-प्रणाली: CIVIL WORKS	DOC. NO./ दस्तावेज सं.: CS-4540-001-2
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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: 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.

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 ब्यौरे 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 इकाईयां / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयों / कार्यों के मुख्य सप्लायर का स्थान.

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DM PLANT
TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)

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DRAWING DOCUMENTS SUBMISSION PROCEDURE

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S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	▪ Layout (A0&A1 sizes)	4	-
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-
	▪ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	Operation & Maintenance manual	1 set	--
	i) First Submission		
	ii) Final Submission (Directly to site)	4 sets	2
4	Plant Hand Book		
	i) First Submission	1	1
5	Commissioning and Performance Test Procedure manual	1 set	--
	i) First Submission		
	ii) Final Submission (Directly to site)	4 sets	2

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S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
6	Performance and Functional Guarantee Test Report i) First Submission	2 sets	--
	ii) Approved Copies (Direct to Site)	4 sets	2
7	Project Completion Report (Directly to site)	6 sets	2
8	QA programme including Organisation for implementation and QA system manual(with revisions)	1	--
9	Vendor details in respect of proposed vendors including contractor's evaluation report.	2	--
10	Manufacturing QPs, Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc i) For review/comment	1	--
	ii) Approved final copies of Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc (Direct to Site)	4	2
11	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals i) For review/comment	1 set	--
	ii) Approved copies (Direct to Site)	4 sets	2
12	QA Documentation Package for items / equipment manufactured and despatched to site	2 sets	2
13	QA Documentation Package for field activities on equipment/systems at site	2 sets	2

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Note:

- Quantity of prints may change during detailed engineering stage based on BHEL / Customer requirement. However the same will be adhered by the bidder without any delivery/commercial implication to BHEL.
- All the drawing documents along with the O&M manual (of all the revisions) are necessarily to be submitted in soft copies in addition to hard copies.
- Bidder to submit soft copies of all the drawing and document along with quality plans for BHEL review and approval (P&ID in A2 size, Layout (electrical/piping/equipment) in A1/A0, QAP/Data Sheet in A4 size).
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copies whichever is later.
- All the drawings shall be prepared on computer auto cad and other documents (like datasheet etc.) on MS office software. Bidder not complying to the requirement shall not be considered. For the execution of the contract regular meeting (generally once in 15 days or as per project requirement) is required.
- Bidder has to come for meeting with the concerned dealing persons as per BHEL or customer requirement in a short notice.
- Bidder to submit instrument schedule, cable schedule and valve schedule in MS- Excel format during detailed engineering.
- Bidder to also furnish the auto cad copy / MS-word (as applicable)/MS-Excel (as applicable) of the following documents after award of contract. However any other auto cad copy/MS-Excel/MS-word of any other document as per the insistence of BHEL / customer will also be submitted by the bidder without any delivery/commercial implication to BHEL.
 - P&IDs.
 - Equipment lay out.
 - Equipment Cable tray layout.
 - Equipment earthing layout.
 - Civil scope drawings.
 - Piping lay out drawing.
 - Valve schedule.
 - Instrument schedule.
 - 3D Modeling

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LIST OF MANDATORY SPARES



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LIST OF MANDATORY SPARES

Sl. No.	Name of Items/Particulars	QUANTITY
1)	ACTIVATED CARBON FILTER	
a)	Strainers for activated (of DM Stream) carbon filters or Header lateral	No / Set / Min.100 nos or 1 Set whichever is more
b)	Activated Carbon filter media (for both DM stream & alkali filter application)	1.1 times of One AC filter
	Note: One set consists of quantity required for complete replacement for one AC filter of each type /application as the case may be.	
2)	CATION EXCHANGERS	
a)	Middle collector assembly for each stream of MSRL (In case of counter current regeneration system)	No / 1 Nos for each DM Stream
b)	Strong Acid Cation resin	1.1 times of One (1) full charge of One (1) cation vessel
c)	Weak Acid Cation resin	1.1 times of One (1) full charge of One (1) cation vessel
d)	Strainers for Strong Acid Cation Exchanger or Header lateral	No / Set / Min.100 nos or 1 Set whichever is more
e)	Strainers for Weak Acid Cation Exchanger or Header lateral (if applicable)	No / Set / Min.100 nos or whichever is more
3)	ANION EXCHANGERS	
a)	Middle collector assembly. for each stream of MSRL (In case of counter current regeneration system)	No / 1 Nos for each DM Stream
b)	Weak Base Anion resin	1.1 times charge of vessel
c)	Strong Base Anion resin	1.1 times charge of vessel
d)	Strainers for Strong Base Anion Exchanger or Header lateral	No / Set / Min.100 nos or whichever is more
4)	MIXED BED EXCHANGERS	
a)	Middle collector assembly for Mixed Bed	No / 1 Nos for each DM Stream
b)	Strong Acid Cation resin	1.1 times charge of bed vessel
c)	Strong Base Anion resin	1.1 times charge of bed vessel
d)	Strainers for MB exchanger or Header lateral	No / Set / Min. 50 nos or whichever is more
5)	VALVES (DM PLANT)	
a)	Manual Diaphragm valves and Pneumatic operated diaphragm valves with actuators	Lot / 1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos
b)	Diaphragm for above valves	Lot / 1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos
c)	Butterfly Valves (manual and pneumatic operated valves with actuators)	Lot / 1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos
d)	Check Valves /Non-return Valve	Lot / 1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos



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e)	Gate Valves	Lot / 1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos
6)	Horizontal Centrifugal Pumps – (For Each Type & Size)	
a)	Impeller	1 Set
b)	Wearing rings – Impeller (if applicable)	1 Set
c)	Wearing rings – Casing (if applicable)	1 Set
d)	Shaft	1 Set
e)	Shaft Sleeves	1 Set
f)	Mechanical Seal	1 Set
g)	Pump bearings	1 Set
	Note : One set consists of quantity required for complete replacement for one pump	
7)	Vertical Sump Pumps (For Each Type & Size)	
a)	Complete Casing including suction (if applicable) bell	1 Set
b)	Impeller	1 Set
c)	Wearing rings – Impeller (if applicable)	1 Set
d)	Wearing rings – Casing (if applicable)	1 Set
e)	Impeller Shaft, line shaft and head shaft	1 Set
f)	Shaft Sleeves	1 Set
g)	Stuffing box	1 Set
h)	Line Shaft Couplings (if applicable)	1 Set
i)	Impeller, Line and Head shaft bearings (as applicable)	1 Set
	Note : One set consists of quantity required for complete replacement for one pump	
8)	DEGASSER BLOWERS , MIXED BED BLOWERS	
a)	Impeller with lock nuts & washers	1 Set
b)	Shaft	1 Set
c)	Bearings of Blowers	1 Set
d)	Suction filter Assembly	2 Set
	Note : One set consists of quantity required for complete replacement for one blower of each type /Rating	
9)	Agitators	
a)	Agitator Assembly with Gear Box – Alkali Preparation Tank	1 Set
b)	Agitator Assembly with Gear Box – Alkali Day Tank	1 Set
c)	Agitator Assembly with Gear Box – Lime Tank near N.Pit	1 Set
d)	Agitator Assembly with Gear Box – Brine Preparation tank	1 Set
10)	DOSING EJECTORS	
a)	Complete Ejector Assembly	
	For Acid application	1 Set
	For Alkali application	1 Set
	Note : One set consists of quantity required for complete replacement for one ejector of of each type & capacity .	
11)	Electronic Transmitters	



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(i)	Transmitters of all types and model. (for the measurement of Pressure, differential pressure, flow, level, etc.) including local indication (if applicable)	2 Nos. of each type and model
12)	Temperature elements	
(i)	Temperature Transmitter	2 Nos. of each type and model
(ii)	RTD's*	1 no. of each type
(iii)	Thermo well	1 no. of each type
	* (With head assembly, terminal block and nipple)	** (to be divided into various insertion lengths in proportion to main population)
13)	Local Indicators (Non-Electrical type) -As applicable for the package as per the following items	
(i)	Temperature gauges	1 no. of each range and type
(ii)	Pressure gauges	1 no. of each range and type
(iii)	Differential Pressure Gauges,	1 no. of each range and type
(iv)	Level gauges	1 no. of each range and type
(v)	Flow gauges excluding Rota meters	1 no. of each range and type
(vi)	All types of Rota meters	1 no. of each range and type.
14)	Process Actuated Switch Devices -As applicable for this package, as per the following items	
(i)	Temperature switches	1 no. of each range and type
(ii)	Pressure switches	1 no. of each range and type
(iii)	Differential Pressure switches	1 no. of each range and type
(iv)	level switches	1 no. of each range and type
(v)	Flow switches	1 no. of each range and type
15)	Solenoid Valves	2 Nos. of each type and model
16)	Limit Switches (for Pneumatic Valves and Manual valves)	2 no. of each type
17)	ANALYSERS	
a)	Complete PH Analyzer (including Flow Through type cell and Electrode, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	1 Set of each type
b)	Complete Conductivity Analyzer (including Flow Through type cell and Electrode, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	1 Set of each type
c)	Complete Turbidity Analyzer (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	1 Set of each type
d)	Complete Residual Chlorine Analyzer (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	1 Set of each type
18)	CONTROL VALVES, ACTUATORS AND ACCESSORIES	
18.1)	Control valve Smart Positioner Unit	1 No. of each type
19)	MANDATORY SPARES FOR ELECTRICAL ITEMS	
19.1	Acid Unloading Pump motor	1 no.
19.2	Alkali Unloading Pump motor	1 no.
19.3	Brine solution transfer pumps motor	1 no.
19.4	Waste water recirculation pumps (N.Pit) motor	1 no.

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19.5	Filtered water transfer pumps motor	1 no.
19.6	Back Wash Waste Water Recirculation cum disposal pumps motor	1 no.
19.7	Alkali transfer cum re-circulation Pumps motor	1 no.
19.8	Degassed water pumps motor	1 no.
19.9	DM Regeneration pumps motor	1 no.

Notes:

- 1) Identification: Each spare shall be clearly marked and labelled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
- 2) Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidder's scope of supply.
- 3) Unless stated otherwise, a "set" or "Lot" means items required for complete replacement in one equipment of each type/ size/ range.
- 4) In case of Bought Out items, itemized spares list may be vendor specific and may differ from the list of spares mentioned above. In such cases, the quoted price shall be considered for applicable items only without any change in the contract price.
- 5) In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.
- 6) Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications.

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PAINTING SPECIFICATION

SURFACE PREPARATION & PAINTING

1.00.00	Specification of surface preparation & painting														
1.01.00	Surface preparation methods and paint/primer materials shall be of the type specified herein. If the contractor desires to use any paint/primer materials other than that specified, specific approval shall be obtained by the contractor in writing from the employer for using the substitute material.														
1.02.00	All paints shall be delivered to job site in manufacturers sealed containers. Each container shall be labelled by the manufacturer with the manufacturer's name, type of paint, batch number and colour.														
1.03.00	Unless specified otherwise, paint shall not be applied to surfaces of insulation, surfaces of stainless steel/nickel/ copper/brass/ monel/ aluminum/ hastelloy/lead/ galvanized steel items, valve stem, pump rods, shafts, gauges, bearing and contact surfaces, lined or clad surfaces.														
1.04.00	All pipelines shall be Colour coded for identification as per the NTPC Colour-coding scheme, which will be furnished to the contractor during detailed engineering.														
1.05.00	SURFACE PREPARATION														
1.05.01	All surfaces to be painted shall be thoroughly cleaned of oil. Grease and other foreign material. Surfaces shall be free of moisture and contamination from chemicals and solvents.														
1.05.02	The following surface preparation schemes are envisaged here. Depending upon requirement any one or a combination of these schemes may be used for surface preparation before application of primer.														
	<table> <tr> <td>SP1</td><td>Solvent cleaning</td></tr> <tr> <td>SP2</td><td>Application of rust converter (Ruskil or equivalent grade)</td></tr> <tr> <td>SP3</td><td>Power tool cleaning</td></tr> <tr> <td>SP4</td><td>Shot blasting (shot blasting shall be used as surface preparation method for hot worked pipes prior to application of primer)</td></tr> <tr> <td>SP4*</td><td>Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns</td></tr> <tr> <td>SP5</td><td>Shot blasting/ abrasive blasting.</td></tr> <tr> <td>SP6</td><td>Emery sheet cleaning/Manual wire brush cleaning.</td></tr> </table>	SP1	Solvent cleaning	SP2	Application of rust converter (Ruskil or equivalent grade)	SP3	Power tool cleaning	SP4	Shot blasting (shot blasting shall be used as surface preparation method for hot worked pipes prior to application of primer)	SP4*	Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns	SP5	Shot blasting/ abrasive blasting.	SP6	Emery sheet cleaning/Manual wire brush cleaning.
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SP6	Emery sheet cleaning/Manual wire brush cleaning.														
1.06.00	APPLICATION OF PRIMER/PAINT														
1.06.01	The paint/primer manufacturer's instructions covering thinning, mixing, method of application, handling and drying time shall be strictly followed and considered as part of this specification. The Dry film thickness (DFT) of primer/paint shall be as specified herein.														
1.06.02	Surfaces prepared as per the surface preparation scheme indicated herein shall be applied with primer paint within 6 hours after preparation of surfaces.														
1.06.03	Where primer coat has been applied in the shop, the primer coat shall be carefully examined, cleaned and spot primed with one coat of the primer before applying intermediate and finish coats. When the primer coat has not been applied in the shop, primer coat shall be applied by brushing, rolling or spraying on the same day as the surface is prepared. Primer coat shall be applied prior to intermediate and finish coats.														
1.06.04	Steel surfaces that will be concealed by building walls shall be primed and finish painted before the floor is erected. Tops of structural steel members that will be covered by grating shall be primed and finish painted before the grating is permanently secured.														

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1.06.05	Following are the Primer/painting schemes envisaged herein: PS3 - Zinc Chrome Primer (Alkyd base) by brush/Spray to IS104. PS3* - Zinc Chrome primer (Alkyd base) by dip coat. PS4 - Synthetic Enamel (long oil alkyd) to IS2932. PS5 - Red Oxide Zinc Phosphate primer (Alkyd base) to IS 12744 PS9 - Aluminum paint to IS 2339. PS9* - Heat resistant Aluminum paint to IS-13183 Gr.-I (for temperature 400 degC – 600 degC), IS-13183 Gr.-II (for temperature 200 degC- 400 degC and IS-13183 Gr.-III (for temperature upto 200 degC) PS13 - Rust preventive fluid by spray, dip or brush. PS14 - Weldable primer-Deoxaluminatate or equivalent. PS16 - High Build Epoxy CDC mastic `15'. PS17 - Aliphatic Acrylic Polyurethane CDE134, %V=40.0(min.) PS18 - Epoxy based TiO2 pigmented coat PS19 - Epoxy Zinc rich primer (92% zinc in dry film (min.), %VS=35.0(min.) PS-20 - Epoxy based finish paint
1.06.06	All weld edge preparation for site welding shall be applied with one coat of weldable primer.
1.06.07	For internal protection of pipes/tubes, VCI pellets shall be used at both ends after sponge testing and ends capped. VCI pellets shall not be used for SS components and composite assemblies.
1.06.08	SG membrane walls and other Flue gas swept pressure part surfaces shall be applied with appropriate primer for protection of surfaces during transit, storage and erection.
1.06.09	a) All un-insulated equipments, pipes, valves etc covered in sub-section A-08 (Steam Turbine & Auxiliary system) shall be painted with paint not inferior to Epoxy resin based paints with minimum DFT of 150 micron. The paint shall be applied in three stages i.e. primer, intermediate and finish coats in following manner: ▪ Primer coat – Epoxy based zinc phosphate ▪ Intermediate - Epoxy based TiO2 pigmented coat ▪ Finish coat - Epoxy based finish coat/Two pack polyurethane coat b) Equipment, pipes etc. with high temperature shall be painted with heat resistant aluminum paint (to be selected based on the service condition of component as per IS-13183). Two coats of paint shall be applied with total DFT 40 micron. c) Surface preparation before painting shall be carried out according to requirement indicated in this sub-section and international standard
1.06.10 A)	Specification for the application of Epoxy coating for internal protection of DM tank & other vessels/tanks (as applicable) shall be as follows: Primer : One coat of unmodified epoxy resin along with polyimide hardener. Paint : Two (2) coats unmodified epoxy resin along with Aromatic adduct
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hardener.

Total thickness of primer and paint should not be less than 400 microns.

B) Specification for application of chlorinated Rubber paint for external protection vessel, tanks, piping, valves & other equipments shall be as follows:

i) For Indoor vessel, tanks, piping, valves & other equipments:

- (a) Surface preparation shall be done either manually or by any other approved method.
- (b) Primer coat shall consist of one coat of chlorinated rubber based zinc phosphate primer having minimum DFT of 50 microns.
- (c) Intermediate coat (or under coat) shall consist of one coat of chlorinated rubber based paint pigmented with Titanium dioxide with minimum DFT of 50 microns.
- (d) Top coat shall consist of one coat of chlorinated rubber paint of approved shade and colour with glossy finish and DFT of 50 microns.

Total DFT of paint system shall not be less than 150 microns.

ii) For Outdoor vessel, tanks, piping, valves & other equipments:

- (a) Surface preparation shall be blast cleared using non-siliceous abrasive after usual wire brushing, which shall conform to Sa 2-1/2 Swiss Standard.
- (b) Primer coat shall consist of one coat of epoxy resin based zinc phosphate primer having minimum DFT of 100 microns.
- (c) Intermediate coat (or under coat) shall consist of epoxy resin based paint pigmented with Titanium dioxide with minimum DFT of 100 microns.
- (d) Top coat shall consist of one coat of epoxy paint suitable pigmented of approved shade and colour with glossy finish and DFT of 75 microns. Additionally finishing coat of polyurethane of minimum DFT of 25 microns shall be provided.

The paint may be applied in one coat, in case high built paint is used, otherwise two coats shall be applied.

Total DFT shall not be less than 300 microns.

1.06.11 Primer/Painting Schedule

Sl. No	Description	Surface Preparation	Primer Coat			Intermediate Coat			Finish Coats			Total Min. Painting DFT (Microns)	Colour Shade	
			Type of Primer	No. of Coats	Min. DFT / coat (Microns)	Type of coating	No. Coats	Min. DFT/ Coat (Microns)	Type of coating	No. Coats	Min. DFT/ Coat (Microns)			
A) Power Cycle Piping														As per NTPC Colour shade/ coding scheme
1.	All insulated Pippings, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40		
2.	All un-insulated Pippings, fittings/ components, Pipe clamps, Vessels/Tanks, Equipment etc.	Design temperature < or equal to 60°C	SP3/SP4	PS 5	2	25	-	-	-	PS 4	3 \$	35 \$	155 \$	
		Design temperature above 60°C- 200°C	SP3/SP4	PS 9*	1	20	-	-	-	PS9*	1	20	40	
		Design temperature > 200°C	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40	
3	Constant Load Hanger (CLH) and Variable Load Hanger (VLH)	SP4*	PS19	1	40	-	-	-	PS17	1	30	70		
4	Piping hangers / supports (other than (3) above. (un-insulated)	SP3/SP5	PS5	2	25	-	-	-	PS4	2	25	100		

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	Valves												
5.	Cast/Forged	Design temperature < or equal to 60 degC #	SP3/SP5	PS5	2	35	-	-	-	PS4	2	25	120
		Design temperature above 60 degC	SP3/SP5	PS9*	1	20	-	-	-	PS9*	1	20	40
6.	All auxiliary Structural Steel components for pipe supports	Outside TG building and in SG envelope	SP4*	Inorganic Ethyl Zinc Silicate	1	75	PS18	1	75	a) Epoxy coat b) Final coat of paint PS17	2 1	35 30	250
		Within TG building	SP4*	-do-	1	35	PS18	1	35	a) Epoxy coat b) Final coat of paint PS17	2 1	25 30	150
7.	Weld Edges		SP6 (Hand cleaning by wire brushing)	PS13 (Weldable primer)	1	25	-	-	-	-	-	-	25

1. \$ - The first 2 finished coats (total min.DFT of 70 microns) shall be done at shop and the 3rd finish coat (min.DFT 35 Microns) shall be applied at site.
2. For valves below 65NB and temperature upto and including 540 DegC, Parkerizing/zinc phosphate corrosion resistant coating as per ASTM F1137 is also acceptable in lieu of Aluminum paint.
3. For corrosion protection of threaded hanger rods and variable spring cages, electro galvanizing in full compliance to minimum Corrosion category C3 as per EN ISO12944 is also acceptable.
4. For spring cages, 2 coats of 30 µm (min) zinc-rich epoxy resin primer with zinc content > 80 weight% in dry film followed by 2 coats of 30 µm (min) top coat of Acrylic resin Co-polymerisate with a total combined minimum DFT of 120µm is also acceptable in lieu of above specified paint scheme.
5. For corrosion protection, all inner parts of the hangers (CLH/VLH) shall be at least in full compliance to Corrosion category C3 as per EN ISO12944.
6. # - For Cast/forged valves upto & including design temperature 60Deg.C, Aluminium painting as per IS-13183 Gr-3 or better with total DFT 40Micron is also acceptable.

B) Steam Generator & Auxiliaries:

1	All surfaces with temperature 95°C or less and which are insulated	SP3/SP4	PS 5	2	30	-	-	-	PS 4	2 \$	20 \$	100 \$
2	All surfaces with temperature above 95°C and which are insulated	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40

Note: 1) SG membrane walls and other Flue gas swept pressure part surfaces shall be applied with appropriate primer for protection of surfaces during transit, storage and erection.

2) Painting specification for all other exposed steel surfaces not covered above shall be same as that given in Civil Sub-section, Part-B, Section VI for corrosion protection of steel structures.

C) LOW PRESSURE PIPING

1	All Piping, fittings / components, valves, Equipments etc.	SP3/SP5	PS3/ PS5	2	25	PS 4	1	30	PS 4	2	35	150	As per NTPC Color shade/ coding scheme.
2	Stainless steel surface, Galvanized steel surface and gun metal surface.	No Painting											
3	On the internal surface for pipes 1000 Nb and above	A coat of primer followed by hot coal-tar enamel or coal tar epoxy painting (cold) shall be applied.											

D) Fire Detection & Protection System, Compressed air system and Air-conditioning & Ventilation System

For Fire Detection & Protection System, Surface preparation and painting of Fire Water Storage Tanks, all Steel Surfaces (external) exposed to atmosphere (outdoor & indoor installation), Deluge Valves, Alarm Valves, Foam monitors, Water monitors, Foam Proportioning equipments, Foam makers, etc. should be as per the Part-B, Sub Section-A-18, Fire Detection & Protection System

For Air Conditioning System, Surface preparation and painting of all the steel surfaces (external) exposed to atmosphere (outdoor & indoor installation), centrifugal fans – Casing etc. should be as per the Part-B, Sub Section-A-17, Air Conditioning System.

For Ventilation System, Surface preparation and painting of all the steel surfaces (external) exposed to atmosphere (outdoor & indoor installation), centrifugal fans – Casing etc. should be as per the Part-B, Sub Section-A-17, Ventilation System.

For compressed air system, Surface preparation and painting of all the steel surfaces should be as per the Part-B, Sub Section--A-16 compressed air system.

E) ESP

1	All surfaces with surface temperature 95°C or less (with or without insulation)	SP3/SP4	PS3/ PS3*	1	25	-	-	-	PS 4	1	30	55
2	All surfaces with surface temperature above 95°C (with or without insulation)	SP3/SP4	PS5	2	30	-	-	-	-	-	-	60

General Notes (Applicable for all above points A to E)

- i) Painting specification for all surfaces with surface temperature 95°C or less (un-insulated) that are not covered above shall be same as that given in Civil Sub-section, Part-B, Section-VI for corrosion protection of steel structures.
- ii) Painting specification for inside surfaces (such as inner surfaces of ducts/ tanks/ mills/ dampers/ ESP etc.) that are not covered specifically in above clauses, shall be provided with 2 coats of suitable primer i.e. PS5/ PS9 (Total DFT 60/40 micron) based on the temperature.

F) FGD System

- (i) Surface preparation shall be blast cleaned conforming to Sa 2-1/2 Swiss Standard.
- (ii) Primer coat shall consist of epoxy resin based zinc phosphate primer having minimum DFT of 100 microns.
- (iii) Intermediate coat (or under coat) shall consist of epoxy resin based paint pigmented with Titanium dioxide with minimum DFT of 100 microns.
- (iv) Top coat shall consist of one coat of epoxy paint suitable pigmented of approved shade and colour with glossy finish and DFT of 75 microns.
Additionally finishing coat of polyurethane of minimum DFT of 25 microns shall be provided.



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TALCHER THERMAL POWER PROJECT
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VOLUME: II-B

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CLARIFIED WATER ANALYSIS (DM PLANT FEED WATER)

RAW WATER ANALYSIS			
SL NO.	CONSTITUENT	AS	PPM (EXCEPT PH AND TURBIDITY)
1	Calcium	CaCO ₃	80
2	Magnesium	CaCO ₃	35
3	Sodium	CaCO ₃	20
4	Potassium	CaCO ₃	5
5	Total Cation	CaCO ₃	140
6	HCO ₃	CaCO ₃	85
7	P Alkalinity	CaCO ₃	0
8	Chlorides	CaCO ₃	35
9	Sulphate	CaCO ₃	20
10	Total Anion	CaCO ₃	140
11	Reactive Silica	CaCO ₃	25
12	Silica no-Reactive	CaCO ₃	5
13	Total Iron	CaCO ₃	0.5
14	pH	---	6.8-8.0
15	Turbidity	----	2
16	TDS	----	109
17	Temp	CaCO ₃	20-35
18	KMnO ₄	CaCO ₃	2
19	TOC	CaCO ₃	5
20	Total Suspended Solids	CaCO ₃	2

Note: The clarified water analysis shall be derived considering following dosing at PT plant in Raw Water which is coming to DM Plant after Clarification through Clarifier and Gravity filter :

- Alum Dosing @ 70 ppm.
- Lime Dosing @ 30 ppm.
- Poly Electrolyte Dosing @ 2 ppm.
- PAC Dosing @ 2ppm.

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DATA SHEET-A

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DATA SHEET-A

1.0	DM PLANT STREAMS	
1.1	Number	Two (2) [1 working +1 standby].
1.2	Stream Capacity	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr and Head to meet the system requirement.
2.0	DM PLANT SUPPLY (FEED) PUMP (FILTERED WATER PUMPS)	
2.1	Number	3X100% (1W+2S)
2.2	Service	Continuous
2.3	Design Flow/Capacity and Head of each pump	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.
2.4	Operating Speed (Maximum)	-----1500 rpm -----
2.5	Pumps & Drives to be designed for	-----Outdoor Duty -----
2.6	Service of duty	-----Continuous -----
2.7	Type of pump	Vertical Turbine (wet pit) Type and non-pull out type.
2.8	Type of Working Fluid	Filter water
2.9	Maximum water temperature	36 deg C
2.10	Minimum water temperature	25 deg C
2.11	Type of Discharge	-----Above Floor discharge -----
2.12	Type of impeller	-----Closed / Semi-open -----
2.13	Type of lubrication	-----Self water or grease -----
2.14	Suction condition	-----Submerged -----
2.15	Sump Invert level	Consider 4.5 meter Depth (min)
2.16	Operating floor level	-----Minimum 500 mm above FGL -----
2.17	Type of shaft coupling	-----Flexible / Rigid -----
2.18	Material of Construction	
2.18.1	Suction Bell	2.5%NiCl; IS: 210Gr FG 260; S-0.1% & P-0.15% max.
2.18.2	Casing / Bowl	2.5%NiCl;IS:210Gr FG 260;S-0.1% & P-0.15% max.
2.18.3	Impeller	ASTM A351 CF8M
2.18.4	Wearing rings (if applicable)	-----As per manufacturer's Std -----
2.18.5	Impeller Shaft, Pump & line shaft	-----SS ASTM A 276 Gr. 410. -----
2.18.6	Shaft coupling	----- SS ASTM A 276 Gr. 410 -----
2.18.7	Shaft sleeves	-----SS -ASTM -A 276 - 410 -----
2.18.8	Shaft bearings	Cutless rubber with bronze retainer for bearings below minimum water level and Thordon type bearing for bearings above minimum water level
2.18.9	Column pipe/Discharge Head	Fabricated steel as per IS: 2062 (minimum thickness shall not be less than 8 mm) with 2 coats of epoxy coating inside & outside.
2.18.10	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
2.19	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
3.0	ACTIVATED CARBON FILTER (ACF)	
3.1	Type	Vertical Shell Type with dished ends
3.2	Number	2x100 % (1W+1S), One number per stream
3.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
3.4	Period Between Two (Design) Successive back wash	24 Hrs
3.5	Design Surface Flow Rate at design flow (max)	15 CuM/Hr/SqM.
3.6	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)

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3.7	Type of Filter Media/Resin	Activated Carbon
3.8	Minimum Bed Depth Of Filter media/resin	1200 mm (excluding supporting bed)
3.9	Supporting material for the fill	Graded gravel
3.10	Outlet Quality	Free Chlorine: Non Detectable as per latest ASTM procedure. Organic Matter: Below Detectable limit. Turbidity: Less Than 0.5 NTU.
3.11	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
3.12	Internal painting	Epoxy paint
3.13	External Painting	Chlorinated Rubber paint
3.14	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
3.15	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
3.16	Location	Indoor
3.17	Free board	100%
3.18	Accessories	Ladder and operating platform.
3.19	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
4.0	ION EXCHANGER UNIT (WEAK ACID CATION EXCHANGER)-WAC	
4.1	Type	Vertical Shell Type with Torishpherical dished ends
4.2	Number	2x100 % (1W+1S), One number per stream
4.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
4.4	Period Between Two (Design) Successive back wash	12 Hrs
4.5	Design Surface Flow Rate at design flow (max)	35 CuM/Hr/SqM.
4.6	Net Output between two successive regeneration	1440 CuM.
4.7	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
4.8	Type of Filter Media/Resin	Weakly Acidic Carboxylic Group Resin
4.9	Minimum Resin Bed Dept	1000 mm
4.10	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
4.11	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
4.12	External Painting	Chlorinated Rubber paint
4.13	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).

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4.14	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
4.15	Location	Indoor
4.16	Free board	100%
4.17	Accessories	Ladder and operating platform.
4.18	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
4.19	Regeneration Chemical	HCl as per IS 265 Tech. Grade.
5.0	ION EXCHANGER UNIT (STRONG ACID CATION EXCHANGER)-SAC	
5.1	Type	Vertical Shell Type with Torishpherical dished ends
5.2	Number	2x100 % (1W+1S), One number per stream
5.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
5.4	Period Between Two (Design) Successive back wash	12 Hrs
5.5	Design Surface Flow Rate at design flow (max)	35 CuM/Hr/SqM.
5.6	Net Output between two successive regeneration	1440 CuM.
5.7	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
5.8	Type of Filter Media/Resin	Strongly Acidic Acidic High Capacity Polystyrne resin in Bead form.
5.9	Minimum Resin Bed Dept	1000 mm
5.10	Outlet Quality	Sodium leakage less than 2 ppm.
5.11	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
5.12	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
5.13	External Painting	Chlorinated Rubber paint
5.14	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
5.15	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
5.16	Location	Indoor
5.17	Free board	100%
5.18	Accessories	Ladder and operating platform.
5.19	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
5.19	Regeneration Chemical	HCl as per IS 265 Tech. Grade.
6.0	DEGASSER TOWER	
6.1	Type	Forced Draft Type
6.2	Number	2x100 % (1W+1S), One number per stream
6.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
6.4	Fill material	Polypropylene or Equivalent
6.5	Shell Material	IS 2062
6.6	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)

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6.7	External Painting	Chlorinated Rubber paint
6.8	Outlet Quality	CO2 less than 2 ppm.
6.9	Location	Outdoor
6.10	Accessories	Ladder and operating platform.
6.11	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
7.0	DEGASSER WATER STORAGE TANK	
7.1	Type	Horizontal cylindrical atmospheric with dished ends
7.2	Number	2x100 % (1W+1S), One number per stream
7.3	Capacity (Net)	To hold 30 minutes flow of each stream (Minimum 60 CuM)
7.4	Design Standard (for Diameter, Length & Thickness)	As per BS 2594. However, dished ends shall be of Torispherical type.
7.5	Shell/Dished Material	IS 2062
7.6	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
7.7	External Painting	Chlorinated Rubber paint
7.8	Location	Outdoor
7.9	Free board	300 mm
7.10	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
7.11	Accessories	Ladder and operating platform.
7.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
8.0	DEGASSED WATER PUMPS	
8.1	Type	Horizontal Centrifugal
8.2	Number	3x100 % (1W+2S)
8.3	Design Flow/Capacity and Head of each pump	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.
8.4	Location	Indoor
8.5	Type of Casing	Radially Split type
8.6	Material of Construction	
8.6.1	Casing	ASTM A 351 CF8M
8.6.2	Impeller	ASTM A 351 CF8M
8.6.3	Wearing Rings	SS 316
8.6.4	Shaft, Shaft Sleeves, Coupling	SS 410
8.7	Operating Speed (Maximum)	-----1500 rpm -----
8.8	Duty	Continuous
8.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
8.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
9.0	DEGASSER BLOWER	
9.1	Type	Centrifugal, Oil Free.
9.2	Number	2x100 % (1W+1S) Per stream, Two (2) Numbers per stream. Total Four (4) Numbers.
9.3	Design Flow/Capacity and Head of each Blower	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.
9.4	Location	Indoor
9.5	Material of Construction	
9.5	Casing	Cast Iron to IS 210 FG 260
9.5.1	Impeller	ASTM A 351 CF8M

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9.5.2	Shaft	EN-8 to BS-970
9.6	Operating Speed (Maximum)	-----1500 rpm -----
9.7	Duty	Continuous
9.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
9.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
10.0	ION EXCHANGER UNIT (WEAK BASIC ANION EXCHANGER)-WBA	
10.1	Type	Vertical Shell Type with Torishpherical dished ends
10.2	Number	2x100 % (1W+1S), One number per stream
10.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
10.4	Period Between Two (Design) Successive back wash	12 Hrs
10.5	Design Surface Flow Rate at design flow (max)	35 CuM/Hr/SqM.
10.6	Net Output between two successive regeneration	1440 CuM.
10.7	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
10.8	Type of Filter Media/Resin	Weak Base Tertiary Ammonia Group Resin
10.9	Minimum Resin Bed Dept	1000 mm
10.10	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
10.11	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
10.12	External Painting	Chlorinated Rubber paint
10.13	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
10.14	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
10.15	Location	Indoor
10.16	Free board	100%
10.17	Accessories	Ladder and operating platform.
10.18	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
10.19	Regeneration Chemical	NaOH as per IS 252 Pure Grade available in Flakes or Lye Form.
11.0	ION EXCHANGER UNIT (STRONG BASIC ANION EXCHANGER)-SBA	
11.1	Type	Vertical Shell Type with Torishpherical dished ends
11.2	Number	2x100 % (1W+1S), One number per stream
11.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
11.4	Period Between Two (Design) Successive back wash	12 Hrs
11.5	Design Surface Flow Rate at design flow (max)	35 CuM/Hr/SqM.
11.6	Net Output between two successive regeneration	1440 CuM.
11.7	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)

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11.8	Type of Filter Media/Resin	Strongly Base Type-I, High Capacity Polystyren resin in bead form.
11.9	Minimum Resin Bed Dept	1000 mm
11.10	Outlet Quality	Reactive Silica: Less than 0.2 ppm as SiO ₂ . Conductivity: Less than 10 micromhos/cm at 25 Deg C.
11.11	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
11.12	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
11.13	External Painting	Chlorinated Rubber paint
11.14	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
11.15	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
11.16	Location	Indoor
11.17	Free board	100%
11.18	Accessories	Ladder and operating platform.
11.19	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
11.20	Regeneration Chemical	NaOH as per IS 252 Pure Grade available in Flakes or Lye Form.
12.0	ION EXCHANGER UNIT (MIXED BED EXCHANGER)-MB	
12.1	Type	Vertical Shell Type with Torishpherical dished ends
12.2	Number	2x100 % (1W+1S), One number per stream
12.3	Design Flow per Unit (Net)	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
12.4	Period Between Two (Design) Successive back wash	108 Hrs
12.5	Design Surface Flow Rate at design flow (max)	40 CuM/Hr/SqM.
12.6	Net Output between two successive regeneration	12960 CuM.
12.7	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
12.8	Type of Filter Media/Resin	Strongly Acidic and Strongly Basic type-I resins. Both resins of high capacity Polystyren resin in bead form.
12.9	Minimum Resin Bed Dept	1000 mm
12.10	Outlet Quality	Reactive Silica: Less than 0.01 ppm as SiO ₂ . Conductivity: Less than 0.1 micromhos/cm at 25 Deg C. pH: 6.8 to 7.3 Iron: Not Detectable. Total Hardness: Not Detectable.

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12.11	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
12.12	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
12.13	External Painting	Chlorinated Rubber paint
12.14	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
12.15	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
12.16	Location	Indoor
12.17	Free board	100%
12.18	Accessories	Ladder and operating platform.
12.19	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
12.20	Regeneration Chemical	HCl as per IS 265 Tech. Grade and NaOH as per IS 252 Pure Grade available in Flakes or Lye Form.
13.0	BLOWER FOR MB (COMMON FOR MB AND N-PIT)	
13.1	Type	Rotary Twin Lobe type.
13.2	Number	2x100 % (1W+1S).
13.3	Design Flow/Capacity and Head of each Blower	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.
13.4	Location	Indoor
13.5	Material of Construction	
13.5	Casing	Cast Iron to IS 210 FG 260
13.5.1	Lobes	CS to BS 970, EN9 Forged
13.5.2	Shaft	CS to BS 970, EN9 Forged
13.6	Operating Speed (Maximum)	-----1500 rpm -----
13.7	Duty	Intermittent
13.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
13.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
14.0	UF FEED TANK	
14.1	Type	Vertical cylindrical atmospheric
14.2	Design Standard (for diameter,length & thickness)	As per BS: 2594.
14.3	Number	2x100 % (1W+1S), One number per stream
14.4	Net Capacity (minimum)	1 Hr storage Capacity of one UF stream to match with net output (Post UF) 120 CuM/Hr + Water required for backwashing of UF membrane Chemical preparation requirements Plus 5% margin over the above total requirements.
14.5	Shell/Dished Material	IS 2062
14.6	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
14.7	External Painting	Chlorinated Rubber paint
14.8	Free board	300 mm

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14.9	Location	Outdoor
14.10	Free board	300 mm
14.11	Accessories	Ladder and operating platform.
14.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
15.0	UF FEED PUMPS	
15.1	Type	Horizontal Centrifugal
15.2	Number	3x50 % (2W+1S)
15.3	Design Flow/Capacity and Head of each pump	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.
15.4	Location	Indoor
15.5	Type of Casing	Radially Split type
15.6	Material of Construction	
15.6.1	Casing	ASTM A 351 CF8M
15.6.2	Impeller	ASTM A 351 CF8M
15.6.3	Wearing Rings	SS 316
15.6.4	Shaft, Shaft Sleeves, Coupling	SS 420
15.7	Operating Speed (Maximum)	-----1500 rpm -----
15.8	Duty	Continuous
15.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
15.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
16.0	BASKET STRAINER FOR UF	
16.1	Type	Horizontal Centrifugal
16.2	Number	3x100 % (1W+2S)
16.3	Design Flow	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr
16.4	Location	Indoor
16.5	MOC	SS 316
16.6	Size	100 microns
17.0	UF SKID	
17.1	Streams	2 Nos. (2x100%)
17.2	Feed temperature	20-36 Deg.C
17.3	Each Capacity (net) in cu.m/hr	To Suit the net DM Plant output (Post UF) per stream of 100 cum/hr
17.4	Type Of Operation	Automatic Back wash
17.5	UF membrane	MWCO not greater than 10000 Daltons.
17.6	Type of membrane mounting	Horizontal/Vertical
17.7	Colloidal silica removal efficiency	99.8%
17.8	UF recovery	Not less Than 95%
17.9	Make	KOCH/MEMCOR/NORRIT/DOW/TEAM.
17.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
18.0	UF BACKWASH/FAST FLUSH PUMPS	
18.1	Type	Horizontal Centrifugal
18.2	Number	2x100 % (1W+1S)
18.3	Design Flow/Capacity and Head of each pump	To suit net DM Plant output (Post UF) per stream of 120 CuM/Hr. Head as required for system requirement.

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18.4	Location	Indoor
18.5	Type of Casing	Radially Split type
18.6	Material of Construction	
18.6.1	Casing	ASTM A 351 CF8M
18.6.2	Impeller	ASTM A 351 CF8M
18.6.3	Wearing Rings	SS 316
18.6.4	Shaft, Shaft Sleeves, Coupling	SS 420
18.7	Operating Speed (Maximum)	-----1500 rpm -----
18.8	Duty	Continuous and to be suitable for parallel operation.
18.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
18.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
19.0	DM REGENERATION PUMPS	
19.1	Type	Horizontal Centrifugal
19.2	Number	2x100 % (1W+1S)
19.3	Design Flow/Capacity and Head of each pump	As required to regenerate WBA, SBA, MB Units and N-Pit + 20% margin. Head as required for system requirement.
19.4	Location	Indoor
19.5	Type of Casing	Radially Split type
19.6	Material of Construction	
19.6.1	Casing	ASTM A 351 CF8M
19.6.2	Impeller	ASTM A 351 CF8M
19.6.3	Wearing Rings	SS 316
19.6.4	Shaft, Shaft Sleeves, Coupling	SS 420
19.7	Operating Speed (Maximum)	-----1500 rpm -----
19.8	Duty	Continuous and to be suitable for parallel operation.
19.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
19.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
20.0	NEUTRALISATION PIT (N-PIT)	
20.1	Type	Under ground, rectangular or square
20.2	Number	One (1) with Two compartment
20.3	Material of Construction	RCC with Acid/Alkali proof Tiles.
20.4	Capacity of each compartment (Net)	150% of waste effluent from one regeneration of complete stream of Cation (Weak and Strong), Anion (Weak and strong) and MB + 20% margin (Minimum 250 CuM Capacity of each compartment)
20.5	Isolation Gate	Three (3) number at inlet of N-Pit with Acid/Alkali proof chlorinated paint and rubber lined in wetted parts.
20.6	Free board	500 mm
20.7	Location	Outdoor
20.8	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
21.0	N-PI WASTE RE-CIRCULATION CUM DISPOSAL PUMPS	
21.1	Type	Horizontal Centrifugal
21.2	Number	3x100 % (1W+1S+1 Under Maintenance)
21.3	Design Flow/Capacity and Head of each pump	Capacity to evacuate total pit in 3 hours. Head as required for system requirement.

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21.4	Location	Outdoor
21.5	Type of Casing	Radially Split type
21.6	Material of Construction	
21.6.1	Casing	ASTM A 351 CF8M
21.6.2	Impeller	ASTM A 351 CF8M
21.6.3	Wearing Rings	SS 316
21.6.4	Shaft, Shaft Sleeves, Coupling	SS 420
21.7	Operating Speed (Maximum)	-----1500 rpm -----
21.8	Duty	Continuous and to be suitable for parallel operation.
21.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
21.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
22.0	ACF AND UF BACK WASHED WATER PIT	
22.1	Type	Under ground, rectangular or square
22.2	Number	One (1) with Two compartment
22.3	Material of Construction	RCC with Acid/Alkali proof Tiles.
22.4	Capacity of each compartment (Net)	Minimum 150 CuM.
22.5	Isolation Gate	Three (3) number at inlet of Pit with Acid/Alkali proof chlorinated paint and rubber lined in wetted parts.
22.6	Location	Outdoor
22.7	Free board	300 mm
22.8	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
23.0	ACF AND UF BACK WASHED WATER PUMPS	
23.1	Type	Horizontal Sump Pump, Non Clog Type.
23.2	Number	2x100 % (1W+1S)
23.3	Design Flow/Capacity and Head of each pump	Capacity to evacuate each section in 2 hours. Head as required for system requirement.
23.4	Location	Outdoor
23.5	Type of Impeller	Open Type
23.6	Material of Construction	
23.6.1	Casing, Suction Bell	ASTM A 351 CF8M, SS 316
23.6.2	Impeller, Shaft Sleeve	ASTM A 351 CF8M, SS 316
23.6.3	Column Pipe & Discharge Pipe	SS 316
23.6.4	Shaft (Line and Pump)	ASTM A 276 Gr. 420
23.7	Operating Speed (Maximum)	-----1500 rpm -----
23.8	Duty	Continuous and to be suitable for parallel operation.
23.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
23.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
24.0	FILTER WATER OVERHEAD TANK	
24.1	Type	Rectangular or square
24.2	Number	One (1)
24.3	Material of Construction	RCC
24.4	Capacity (Net)	Minimum 2 CuM.
24.5	Location	Outdoor
24.6	Free board	300 mm

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24.7	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
25.0	CHEMICAL UNLOADING PUMP (FOR HCl)	
25.1	Type	Horizontal Centrifugal
25.2	Number	2x100 % (1W+1S)
25.3	Duty	Intermittent
25.4	Capacity and Head	20 CuM/Hr and 20 MWC
25.5	Chemical to be handled	30-33% HCl as per IS 265
25.6	Material of Construction	Casing, impeller, wearing rings: PP; Shaft, shaft sleeve: PP/EN8.
25.7	Sets of Hoses with coupling & Diaphragm type Isolation Valves	2 Sets each of 20 Meter. Material of Hose: Chemical resistant, UV inhibited PVC
25.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
25.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
26.0	CHEMICAL UNLOADING PUMP (FOR NaOH)	
26.1	Type	Horizontal Centrifugal
26.2	Number	2x100 % (1W+1S)
26.3	Duty	Intermittent
26.4	Capacity and Head	20 CuM/Hr and 20 MWC
26.5	Chemical to be handled	48% NaOH as per IS 252
26.6	Material of Construction	Casing, impeller, wearing rings: SS 316; Shaft, shaft sleeve: SS 410.
26.7	Sets of Hoses with coupling & Diaphragm type Isolation Valves	2 Sets each of 20 Meter. Material of Hose: Chemical resistant, UV inhibited PVC
26.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
26.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
27.0	BULK CHEMICAL STORAGE TANK (FOR HCl)	
27.1	Type	Horizontal Cylindrical with Dished End
27.2	Number	3x100 % (1W+2S)
27.3	Design Standard	As per BS: 2594, Dished ends shall be of Torispherical type
27.4	Chemical to be handled	30-33% HCl as per IS 265
27.5	Capacity of Each Tank (Net)	To store 30 Days requirement of Chemical for regeneration of all operating DM Stream & N-pit neutralization + 5% margin.
27.6	Free board	300 mm
27.7	Shell/Dished Material	IS 2062 with minimum Thickness 12 mm.
27.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
27.9	External Painting	Chlorinated Rubber paint
27.10	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
27.11	Location	Outdoor
27.12	Accessories	Ladder and operating platform.
27.13	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
28.0	BULK CHEMICAL STORAGE TANK (FOR NaOH)	
28.1	Type	Horizontal Cylindrical with Dished End
28.2	Number	2x100 % (1W+1S)
28.3	Design Standard	As per BS: 2594, Dished ends shall be of Torispherical type
28.4	Chemical to be handled	48% NaOH as per IS 252

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28.5	Capacity of Each Tank (Net)	To store 30 Days requirement of Chemical for regeneration of all operating DM Stream & N-pit neutralization + 5% margin.
28.6	Free board	300 mm
28.7	Shell/Dished Material	IS 2062 with minimum Thickness 12 mm.
28.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
28.9	External Painting	Chlorinated Rubber paint
28.10	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
28.11	Location	Outdoor
28.12	Accessories	Ladder and operating platform.
28.13	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
29.0	ALKALI TRANSFER CUM RECIRCULATION PUMP	
29.1	Type	Horizontal Centrifugal
29.2	Number	2x100 % (1W+1S)
29.3	Duty	Intermittent
29.4	Capacity and Head	15 CuM/Hr and 20 MWC
29.5	Chemical to be handled	48% NaOH as per IS 252
29.6	Location	Indoor
29.7	Material of Construction	Casing, impeller, wearing rings: SS 316; Shaft, shaft sleeve: SS 410.
29.8	Sets of Hoses with coupling & Diaphragm type Isolation Valves	2 Sets each of 20 Meter. Material of Hose: Chemical resistant, UV inhibited PVC
29.9	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
29.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
30.0	ACID MEASURING TANK	
30.1	Type	Horizontal Cylindrical
30.2	Number	2x100 % (1W+1S)
30.3	Design Standard	As per BS: 2594
30.4	Chemical to be handled	30-33% HCl as per IS 265
30.5	Capacity of Each Tank (Net)	To Hold Chemical for one regeneration of one DM Stream (including MB) & N-pit neutralization + 25% margin or Minimum 2 CuM.
30.6	Free board	300 mm
30.7	Shell/Dished Material	IS 2062 with minimum Thickness 10 mm.
30.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
30.9	External Painting	Chlorinated Rubber paint
30.10	Location	Indoor
30.11	Accessories	Ladder and operating platform.
30.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
31.0	ALKALI PREPARATION TANK	
31.1	Type	Horizontal Cylindrical
31.2	Number	2x100 % (1W+1S)
31.3	Design Standard	As per BS: 2594
31.4	Chemical to be handled	48% NaOH as per IS 252
31.5	Capacity of Each Tank (Net)	To Hold Chemical for one regeneration of one DM Stream (including MB) & N-pit neutralization + 25% margin or Minimum 5 CuM.
31.6	Free board	300 mm

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31.7	Shell/Dished Material	IS 2062 with minimum Thickness 10 mm.
31.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
31.9	External Painting	Chlorinated Rubber paint
31.10	Location	Indoor
31.11	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
31.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
32.0	ALKALI DAY TANK	
32.1	Type	Horizontal Cylindrical
32.2	Number	2x100 % (1W+1S)
32.3	Design Standard	As per BS: 2594
32.4	Chemical to be handled	NaOH as per IS 252
32.5	Capacity of Each Tank (Net)	To Hold Chemical for one regeneration of one DM Stream (including MB) & N-pit neutralization+ 25% margin or Minimum 2 CuM.
32.6	Free board	300 mm
32.7	Shell/Dished Material	IS 2062 with minimum Thickness 10 mm.
32.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
32.9	External Painting	Chlorinated Rubber paint
32.10	Location	Indoor
32.11	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
32.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
33.0	BRINE SOLUTION PREPERATION TANK	
33.1	Type	Horizontal Cylindrical
33.2	Number	1x100 % (1W+0S)
33.3	Design Standard	As per BS: 2594
33.4	Chemical to be handled	Brine Solution (NaCl + NaOH)
33.5	Capacity of Each Tank (Net)	To store One Brine treatment requirement for one stream + 25% margin or Minimum 3 CuM.
33.6	Free board	300 mm
33.7	Shell/Dished Material	IS 2062 with minimum Thickness 10 mm.
33.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
33.9	External Painting	Chlorinated Rubber paint
33.10	Location	Indoor
33.11	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
33.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
34.0	BRINE SOLUTION TRANSFER PUMP	
34.1	Type	Horizontal Centrifugal
34.2	Number	2x100 % (1W+1S)
34.3	Duty	Intermittent
34.4	Capacity and Head	10 CuM/Hr and 20 MWC
34.5	Chemical to be handled	Brine Solution (NaCl + NaOH)
34.6	Location	Indoor
34.7	Material of Construction	Casing, impeller, wearing rings: SS 316; Shaft, shaft sleeve: SS 410.

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34.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
34.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
35.0	ACID MEASURING TANK (FOR N-PIT)	
35.1	Type	Horizontal Cylindrical
35.2	Number	1x100 % (1W+0S)
35.3	Design Standard	As per BS: 2594
35.4	Chemical to be handled	30-33% HCl as per IS 265
35.5	Capacity of Each Tank (Net)	1 CuM (Minimum) .
35.6	Free board	300 mm
35.7	Shell/Dished Material	IS 2062 with minimum Thickness 8 mm.
35.8	Internal Lining	Rubber Lining (Minimum 4.5 mm Thick)
35.9	External Painting	Chlorinated Rubber paint
35.10	Location	Outdoor
35.11	Accessories	Ladder and operating platform.
35.12	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
36.0	LIME PREPARATION TANK (FOR N-PIT)	
36.1	Type	Horizontal Cylindrical/Rectrangular
36.2	Number	1x100 % (1W+0S)
36.3	Chemical to be handled	Lime solution.
36.4	Capacity of Each Tank (Net)	2 CuM (Minimum) .
36.5	Free board	300 mm
36.6	Shell/Dished Material	RCC
36.7	Internal Lining	Epoxy painted.
36.8	Location	Outdoor
36.9	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
36.10	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
37.0	ACTIVATED CARBON FILTER (ACF) FOR ALKALI	
37.1	Type	Vertical Shell Type with dished ends
37.2	Number	1x100 % (1W+0S)
37.3	Design Flow per Unit (Net)	To suit the process requirement or minimum 10 CuM/Hr.
37.4	Design Surface Flow Rate at design flow (max)	15 CuM/Hr/SqM.
37.5	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
37.6	Type of Filter Media/Resin	Activated Carbon
37.7	Minimum Bed Depth Of Filter media/resin	1200 mm (excluding supporting bed)
37.8	Supporting material for the fill	Graded gravel
37.9	Outlet Quality	Free Chlorine: Non Detectable as per latest ASTM procedure.

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37.10	Shell & Dish End Material	- The pressure vessels shall be fabricated from carbon steel plates conforms to SA 515 Gr.70 or SA 516 Gr. 70 if the pressure vessels are designed as per ASME Section VIII. - If the pressure vessels are designed as per IS 2825 following criterion shall be followed: The pressure vessels shall be fabricated of steel as per IS: 2002 Gr. 3 (normalized condition) or SA: 515/516 Gr. 70 (normalized), in case the vessels are designed as per Class 1 or Class 2 of IS: 2825. If the pressure vessels are designed as per Class 3 of IS: 2825, the material of construction shall conform to IS: 2062 or IS: 2002 Gr. 3 (Normalized quality).or SA 515 /516 Gr. 70
37.11	Internal painting	Epoxy paint
37.12	External Painting	Chlorinated Rubber paint
37.13	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
37.14	Sight Window with minimum clear width of 75 mm	Two (2) Nos.
37.15	Location	Indoor
37.16	Free board	100%
37.17	Accessories	Ladder and operating platform.
37.18	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
38.0	ALKALI DILUTION WATER HEATING TANK	
38.1	Type	Vertical Shell Type with dished ends
38.2	Number	1x100 % (1W+0S)
38.3	Design Flow per Unit (Net)	The tank shall be sized based on 125% of the regeneration water requirement of one anion and one mixed bed or minimum 10 CuM/Hr.
38.4	Design Pressure Of Vessel (Min)	8 Kg/Sq.cm (g)
38.5	Type of Heater	2x50% Electric.
38.6	Design Temperature	80 Deg C
38.7	Shell & Dish End Material	SS 316
38.8	Manhole per vessel	Two (2) Nos (each of minimum 600 MM).
38.9	Location	Indoor
38.10	Accessories	Ladder and operating platform.
38.11	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
39.0	UF CIP TANK	
39.1	Type	Horizontal Cylindrical
39.2	Number	2x100 % (1W+1S)
39.3	Capacity of Each Tank (Net)	Cleaning requirement of one UF System+ 25% margin or Minimum 3 CuM.
39.4	Free board	300 mm
39.5	Shell/Dished Material	FRP with minimum Thickness 10 mm.
39.6	Location	Indoor
39.7	Accessories	Agitator (MS-FRP) with reduction gear, Ladder and operating platform.
39.8	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
40.0	UF CIP DOSING PUMP	
40.1	Type	Horizontal Centrifugal
40.2	Number	2x100 % (1W+1S)
40.3	Duty	Continuous and to be suitable for parallel operation

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40.4	Capacity and Head	As per system requirement.
40.5	Chemical to be handled	Chemical cleaning for UF system,
40.6	Location	Indoor
40.7	Material of Construction	Casing, impeller, wearing rings: SS 316; Shaft, shaft sleeve: SS 410.
40.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
40.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
41.0	UF CEB TANK (FOR TYPE-I)	
41.1	Type	Horizontal Cylindrical
41.2	Number	2x100 % (1W+1S)
41.3	Capacity of Each Tank (Net)	Cleaning requirement of one UF System+ 25% margin or Minimum 0.5 CuM.
41.4	Free board	300 mm
41.5	Shell/Dished Material	FRP with minimum Thickness 10 mm.
41.6	Location	Indoor
41.7	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
41.8	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
42.0	UF CEB DOSING PUMP (FOR TYPE-I)	
42.1	Type	Simplex positive displacement hydraulic operated diaphragm type
42.2	Number	2x100 % (1W+1S)
42.3	Duty	Intermittent
42.4	Capacity and Head	As per system requirement.
42.5	Chemical to be handled	Chemical cleaning for UF system,
42.6	Location	Indoor
42.7	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP for all wetted parts
42.8	Diaphragm material	PTFE
42.9	Packing material	PTFE
42.10	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
42.11	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
43.0	UF CEB TANK (FOR TYPE-2-OPTIONAL)	
43.1	Type	Horizontal Cylindrical
43.2	Number	2x100 % (1W+1S)
43.3	Capacity of Each Tank (Net)	Cleaning requirement of one UF System+ 25% margin or Minimum 0.5 CuM.
43.4	Free board	300 mm
43.5	Shell/Dished Material	FRP with minimum Thickness 10 mm.
43.6	Location	Indoor
43.7	Accessories	Agitator (SS 316) with reduction gear, Dissolving Basket (SS 316), Ladder and operating platform.
43.8	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
43.9	UF CEB DOSING PUMP (FOR TYPE-2-OPTIONAL)	
43.10	Type	Simplex positive displacement hydraulic operated diaphragm type
44.0	Number	2x100 % (1W+1S)

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44.1	Duty	Intermittent
44.2	Capacity and Head	As per system requirement.
44.3	Chemical to be handled	Chemical cleaning for UF system,
44.4	Location	Indoor
44.5	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP for all wetted parts
44.6	Diaphragm material	PTFE
44.7	Packing material	PTFE
44.8	Hardware	Base plate: Fabricated Steel as per IS 2062, Bolts & Nuts SS 316.
44.9	Instruments, Valves, Piping, etc	Shall be provided as indicated in 'Flow Diagram-1' as minimum and as per system requirement.
45.0	SAFETY EQUIPMENTS	Six sets of safety equipment comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided. A personnel water drench safety shower with eye bath (2 Nos) shall be provided near acid alkali unloading/handling area.
46.0	PIPING	
46.1	Filtered water, Service Water	Stainless Steel: Stainless Steel ASTM A 312 Gr. 304 Sch. 40 /Equivalent Seamless for Sizes 50 and above and welded for sizes 65 mm NB and above.
46.2	Demineralized water including UF.ACF and UF backwashed water.	Stainless Steel: Stainless steel to ASTM A312, Gr. 304 Sch.40s seamless for sizes 50mm and below and welded for sizes 65 mm NB and above.
46.3	Decationised & Deanionised water and N-pit waste,	Rubber lined Carbon Steel: IS:1239 Part-I (Heavy grade-Black), ASTM-A-53 Type-E Grade B / ASTM A 36 / IS:3589 – Grade 410;/ ASTM A-36/ASTM - 53 Type- E, Grade B/ Equivalent and Galvanized to IS: 4736 or Equivalent internally lined with 3 mm thick Rubber of shore hardness 65 ± 5°A) Note: The inside surface of pipes shall be completely de-beaded and made suitable for rubber lining
46.4	Concentrated Hydrochloric Acid (5-30% Conc.)	CPVC Sch 80 as per ASTM F441 CPVC 4120
46.5	Dilute Hydrochloric Acid(Less than 5% Conc.)	CPVC Sch 80 as per ASTM F441 CPVC 4120
46.6	Alkali (Sodium Hydroxide) a) Strong (5% and above) b) Dilute (below 5%)	a) Stainless Steel SS-316L b) Polypropylene lined steel/CPVC as per ASTM F441 CPVC 4120 Schedule 80
46.7	Lime slurry/Solution/ Suspensions	CPVC Sch 80 as per ASTM F441 CPVC 4120
46.8	Cleaning Solution Line	SS316 Sch. 40 /CPVC Sch 80 as per ASTM F441 CPVC 4120
46.9	Chemical Waste from vessels and tanks	CPVC Sch 80 as per ASTM F441 CPVC 4120
46.10	Instrument air	CS Galvanized as per IS 1239 Gr.B Galvanized
46.11	UF frontal	CPVC, Sch-80.
47.0	VALVES	As specified elsewhere in this specification.

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QUALITY PLAN

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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	



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 ≥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. Y ⁶ : Blue Matching, Wear Travel for Gate Valves and reduced pressure test
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 ⁸ , Y ¹²	
6. Diaphragm Valves	Y ^a				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	
7.3 Shaft	Y ^a		Y ^b		Y					Y ^c	
8. Plug/ Ball Valves (Low Pr.)	Y ^a		Y ^b	Y	Y		Y	Y	Y	Y ³	

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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	Y ⁷ : 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.
11. Rubber Lining	Y ^a				Y				Y	Y ⁹	Y ⁸ : RT as per fabrication code requirements. However, dished ends welds, if manufactured by using welded plates shall be subjected to 100% RT.
12. Strainers	Y ^a	Y	Y ^b	Y	Y		Y		Y		Y ⁹ : 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.
13. Pipe & Pipe Fittings	Y ^a	Y	Y		Y	Y ⁸	Y		Y		Y ¹⁰ : 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.
14. Agitators /Flash Mixer/ Flocculator	Y ^a	Y	Y ^b	Y	Y			Y		Y ¹⁰	Y ¹¹ : 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.
15. Ventilation/Exhaust Fan	Y ^a		Y ^b	Y	Y			Y ¹ ₁	Y	Y ^c , Y ^d	Y ¹² : Dry cycle test on valve spring for 1, 00,000 cycles shall be carried out as
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	

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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
Items / Components											

2. Pressure / Vacuum Relief valve / Pressure Regulating Valve	Y ^a			Y	Y		Y	Y	Y		type test, if not carried out earlier, for the similar MOC, size and type of spring.
DM PLANT											Y ¹³ : Test as per approved supplier practice.
1. Resins / Activated Carbon									Y		Y ¹⁴ : Electronic leak test for condenser & evaporator unit.
2. Filter Membrane					Y				Y		Note:
3. RO Pressure tube	Y ^a				Y		Y		Y		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.

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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.	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 ^e		
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 RESPECTIVE QA CHAPTERFOR FOR CHECKS ON EOT CRANES AND HOISTS													

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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 Granular 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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TITLE:

TECHNICAL SPECIFICATION FOR DM PLANT

TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)

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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														
	<table> <tr> <th>Tests</th><th>Quantum of Check</th></tr> <tr> <td>WPS, PQR, Welder Qualification Test</td><td>100%</td></tr> <tr> <td>DPT on root run</td><td>100% for pipes up to 1200 mm diameter</td></tr> <tr> <td>DPT after back gauging</td><td>100% for pipes above 1200 mm diameter</td></tr> <tr> <td>RT/ UT by TOFD Technique/PAUT</td><td>5%</td></tr> <tr> <td>DPT on finished butt weld joints</td><td>10%</td></tr> <tr> <td>Hydraulic Test</td><td>100%, 1.5 times the design pressure or 2 times the working pressure which ever is higher.</td></tr> </table>	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.
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	- All pipes and fittings shall be tested as per applicable code. - All strainers shall be subjected to Hydraulic pressure test for leakage. - 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 for hydro test in unpainted condition. - Functional checks of the valves for smooth opening and closing shall also be done. - Anti-corrosive protection shall be tested as per applicable code.														

1) The above mentioned requirement are bare minimum. However any additional comments provided by BHEL / Customer shall be adhered by successful bidder without any commercial and delivery implication to BHEL/Customer.

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TITLE:

TECHNICAL SPECIFICATION FOR
DM PLANT
TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)

SPEC NO: PE-TS-497-163-A001

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QAP FOR LOW PRESSURE PIPING (LP PIPING)

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**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/operatio nal 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 ³		
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) |
| DPT on finished butt weld joints | 10% |

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	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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QAP FOR EOT CRANES AND HOISTS

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	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.

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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.

PERFORMANCE AND GUARANTEE TEST

TECHNICAL REQUIREMENTS

PG Test Procedure for DM Plant (Ion Exchange Resin-based)

Scope: PG Test shall be conducted after successful trial run to establish:

2. Quality and quantity of water produced from different filter/exchanger beds of DM streams as per technical specification
3. Time requirement for regeneration as per technical specification
4. Chemical requirement for regeneration as per technical specification
5. Functioning of the plants in manual, semi-auto and auto modes (as specified).
6. To establish the performance under actual installed conditions with the pumps as a part of the system & when operating against the system resistance. The purpose of the test will be to confirm whether the equipment meets specifications in respect of following parameters as per the technical specification with respect to Capacity, Total dynamic head (TDH) and Power.
7. Noise , vibration levels, protection & interlock and other functional guarantees of different rotating machines and equipment

The purpose of the test will be to confirm whether the equipment meets specifications w.r.t. the guaranteed parameters. The acceptance criteria will be as per the defined technical specifications.

Test Methodology:

S.N.	Unit	Test Objective	Test Procedure	Remarks
	Activated Carbon Filters	To Check: a. The capacity of each filter. b. The effluent quality from each filter. c. Backwash & rinse time requirement of each filter d. The guarantee parameters.	a. Backwash & run each filter at the design flow rate with the corresponding D.M. stream by the mode at which the stream is running. b. Check the effluent quality of the outlet of each filter for the guaranteed parameters. c. The end of run of filter will be considered when the rated throughput is achieved or the differential pressure becomes 80% of the maximum tolerable pressure difference, whichever is earlier.	a. In case pressure difference exceeds 80% of max tolerable then the test will be repeated. Reason for high pressure difference & action taken shall be recorded in PG test report. b. The activated carbon shall work for a period of not less than 3 years without any regeneration / activation. <i>Along with P.G. Test evaluation report, a certificate in this respect shall be issued by the vendor.</i>
	DM STREAM	To Check: a. The quantity & quality of water produced from each cation, anion & MB unit. b. The time requirement for regeneration.	a. Run the units to exhaustion or to the calculated output. Single regenerate the units & consider the subsequent run at design flow as the test run for the cation, anion & MB units. b. Total backwash of counter current strong exchanger shall be done only when the DP across the strong exchanger units is more than 80% of the maximum tolerable	a. If there is an interruption of more than 2 hours during service run due to any reason, extra rinse water quantity is to be added in the output of respective units. Record the total time of regeneration and backwash required for ACF, Cation, Anion and MB along with chemical consumption. b. Inlet water analysis shall be determined by making arithmetic average of all two hourly

TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION- VI, PART - B BID DOC. NO. CS-4540-001A-2	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE	Page 110 of 224

TECHNICAL REQUIREMENTS

		c.The chemical requirement for regeneration. d. The guarantee parameters.	pressure difference. c. Double regeneration is necessitated to the anion if it is subjected to alkaline brine wash or total backwash; double regeneration of cation is necessitated if it is subjected to total backwash. There after run the unit with single qty of chemicals and run the unit up to calculated throughput for P.G. Test. d. The end of cation exchanger will be considered when the calculated output has been reached or the effluent quality as per guarantee is not met from the cation or when the strong base anion exchanger of the relevant stream has reached its end point, whichever occurs earlier. e. Demonstrate total time of regeneration of cation & anion units within the guaranteed time and also demonstrate regeneration time for cation, anion and MB units within the guaranteed time. f. The end of run of anion exchanger will be considered when the calculated output has reached or the effluent quality as per guarantee is not met from the strong base anion or when the cation exchanger of the relevant stream has reached its end points, whichever occurs earlier. g. The end of run of MB exchanger will be considered when the guaranteed parameters are not met with for the effluent or when the desired output is achieved, whichever is earlier. h. All exchanger and degasser shall be checked for the guaranteed parameters. i. Before & after the test, check the resin volume in all the exchanger beds.	readings of filtered water taken during the test. Based on this inlet water analysis, regeneration level employed, resin volume provided the guaranteed capacity of the stream in terms of total volume (gross output) of treated water (cu.m) between two regenerations shall be calculated before test. c. Quantity of treated water as determined by this test shall be checked against calculated quantity of treated water as in b) and must be equal to or more than the calculated amount.
	D.M Stream parallel run of all	To Check: The functional requirement.	a. Regenerate the exhausted units. b. Run all the streams in parallel for at least 8 hours.	Ideally start all streams service run together to try to get 8 hours' parallel run together.

TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION- VI, PART - B BID DOC. NO. CS-4540-001A-2	SUB SECTION- G-04 STANDARD PG TEST PROCEDURE	Page 111 of 224

TECHNICAL REQUIREMENTS

	the streams		c. Check the functional requirement including DCS.	Samples of water will be analyzed every two hours from outlet of activated carbon filter, cation exchanger, degasser pump, anion exchanger and mixed beds exchanger.

Table A: CHEMICAL PARAMETERS (OUTPUT QUALITY)

Sample_ID	Organic Matter in ppm (as KMnO ₄ consumption)	Turbidity (NTU)	Sodium (as ppm CaCO ₃)	pH	Spec Conductivity (us/cm) at 25 deg C	Free CO ₂ as CO ₂ (ppm)	Reactive Silica as SiO ₂ (ppm)	Iron as Fe (ppm)	Free residual ClO ₂ (ppm)	Total Hardness as ppm CaCO ₃
ACF Outlet	*BDL	<0.5	---	---	---	---	---	---	#ND	---
Cation Outlet	---	---	Sodium leakage through cation shall not exceed 2ppm throughout the period between two regenerations.	---	---	---	---	---	---	---
Degassed Outlet	---	---	---	---	---	< /= 5.0	---	---	---	---
Anion Outlet	---	---	---	---	Not more than 10.0	---	Not to exceed 0.2	---	---	---
MB Outlet	---	---	---	6.8-7.3	Not more than 0.1	---	Not to exceed 0.01	#ND	---	#ND

Among all the parameters pH & Conductivity shall be measured by online analysers while others will be measured by mutually agreed standard test procedures.

*BDL: Below Detectable Limit, #ND: Not Detected

CYCLE OF STREAM OPERATION:

Three regeneration and service cycle (One in manual and two in auto mode) shall be carried out for each stream. And one regeneration & service cycle shall be carried out for MB exchanger. The average value for each DM stream shall be taken for evaluation.

OTHER GUARANTEES & NORMS:

- All the instruments and interlocks provided with requisite controls and alarms shall be checked during period of test record.
- List of instruments shall be provided by the vendor. All the instruments required for the P.G test should be calibrated by the contractor in presence of NTPC representative prior to the start of the Test. Whenever this is not possible, valid calibration certificate by an independent NABL-accredited calibration agency shall be submitted by the contractor.
- Before starting PG test, output calculation based on present feed water analysis will be submitted by vendor.
- Before the start of PG test, resin and ACF quantity is to be recorded for each vessel.
- Agency should submit complete resin literature details alongwith output calculation for verification by NTPC.
- If any of the guaranteed parameters cannot be tested at site NTPC laboratory, the agency shall arrange for the testing of the same at NTPC approved laboratory or NABL – accredited laboratory. After the completion of the above, the result copy to be duly signed and submitted.

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TECHNICAL REQUIREMENTS

NOTE:

- 1) Agency should submit the detailed PG test procedure based on the above details for approval of NTPC.
- 2) Instruments for PG test and instruments for process control of similar applications are envisaged to be of same make and model having same accuracy level. However, instruments for PG test are also acceptable as per standard and proven practice of the contractor/OEM and in such case, instruments for process control shall be as per requirements specified technical specifications. Instruments to be used for PG test shall be additionally supplied over and above the instruments shown in tender P&IDs. PG test equipment being supplied, installed and commissioned for each unit, shall be retained by employer after completion of PG test.

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DM PLANT (ION EXCHANGE DM PLANT)**A) ACTIVATED (AC) CARBON FILTERS**

- a) Each filter shall be guaranteed for the design capacity. A.C. filter shall be backwashed once in 24 hours.
- b) Free chlorine content in effluent water shall not be detectable as per latest ASTM procedure.
- c) Organic matter in the effluent water shall be below detectable level.
- d) Turbidity in the effluent water shall be less than 0.5 NTU.

B) ION-EXCHANGER UNITS

- a) Each ion exchange unit shall be guaranteed for design capacity meeting the effluent quality as mentioned below. However, each ion exchange unit shall be guaranteed for a Design flow (net) after meeting the water requirement for various regeneration steps. Service Cycle (Period between two successive regenerations) shall be 12 hours for each stream of cation and anion exchangers and 108 hours for each MB exchanger. Net output from each cation-anion unit between two regenerations shall not be less than Design flow (net) x 12 m³/hr and for mixed bed Design flow (net) x 108 m³/hr of treated water.
- b) Chemical consumption of the ion exchange units shall be guaranteed against the regeneration level employed and resin volume provided. Total time requirement for regeneration and backwash operation for each stream (AC filter, cation, and anion) shall not exceed four (4) hours. With mixed bed in regeneration, total time of regeneration of stream shall not exceed six (6) hours. The guaranteed values of chemical consumption shall hold good for chemical conforming to following:
 - HCl - As per IS: 265 Tech. Grade
 - NaOH – As per IS: 252 Pure Grade available in Flakes or lye form
- c) Effluent from the mixed bed unit shall be guaranteed to meet the following requirements, at rated capacity, throughout the period between two successive regenerations:
 - i. Reactive Silica not to exceed: 0.01 ppm as SiO₂
 - ii. Iron as Fe: Not detectable as per ASTM (ASTM-D-1068)
 - iii. Total Hardness: Not detectable
 - iv. pH Value: 6.8 – 7.3
 - v. Conductivity: Not more than 0.1 micromhos/cm at 25 deg.C.
- d) Effluent from the anion exchanger shall be guaranteed as follows at rated capacity throughout the period between two regenerations:

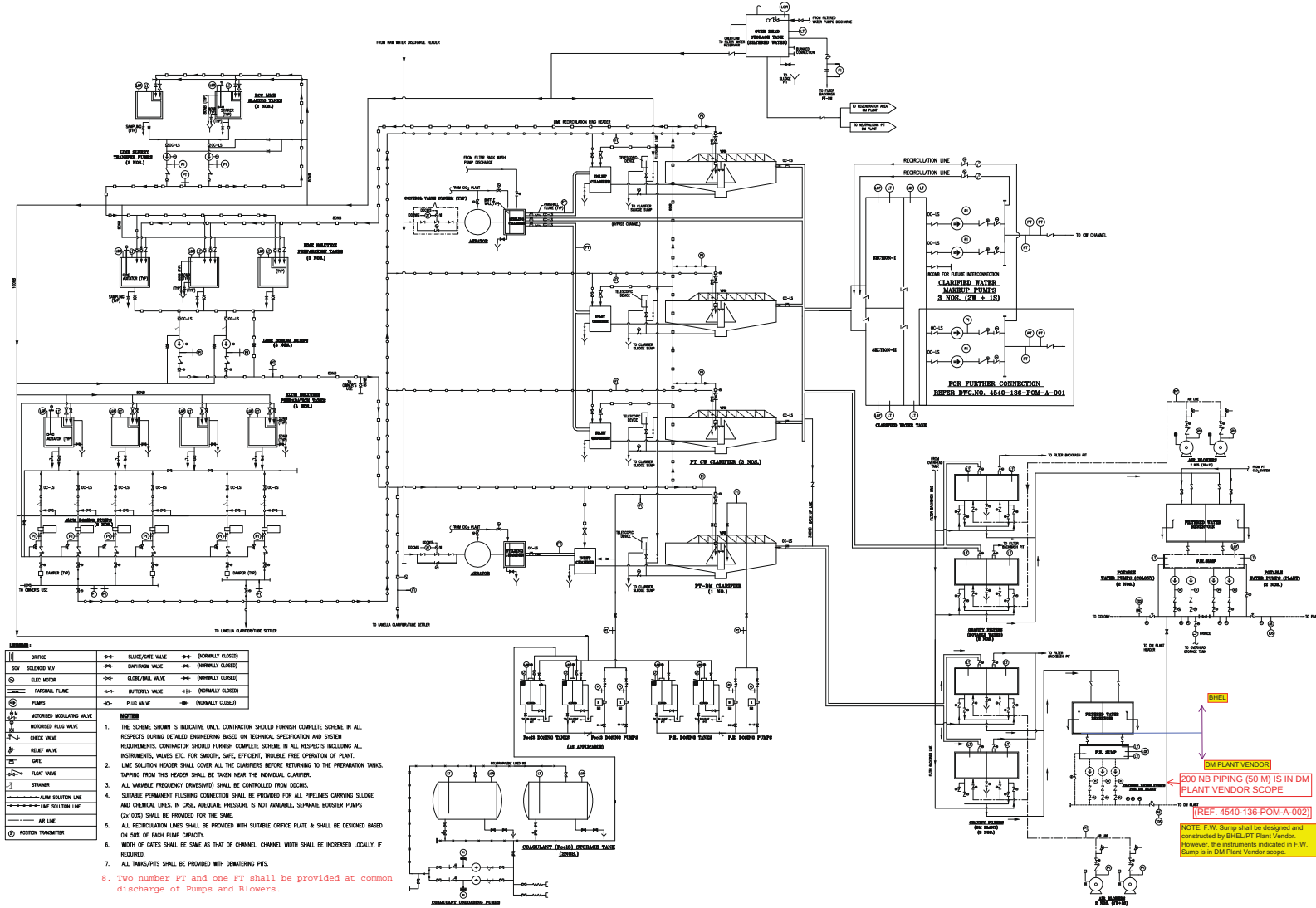
- i) Reactive silica not to exceed: Not to exceed 0.2 ppm as SiO₂
- ii) Conductivity at 25 deg.C : Not more than 10 micro mhos/cm
- e) Sodium leakage through cation shall not exceed 2 ppm as CaCO₃ throughout the period between two regenerations.
- f) Effluent from degassifier should not have CO₂ content more than 5 ppm.
- g) Life of cation resin shall be minimum five (5) years and life of anion resin shall be minimum three (3) years.

C) POLSHING UF SYSTEM

1. Net permeate flow rate from each UF train shall be guaranteed for design capacity meeting the effluent quality as mentioned below.
2. Colloidal Silica shall be ≤ 0.01 ppm as SiO₂.
3. SDI shall be limited to 3.
4. Life of Ultrafiltration membranes shall be guaranteed for minimum five (5) years.
5. For the guaranteed water quality and the permeate water capacity, UF plant shall give an undiminished recovery of 92% up to the end of 5 years of operation with replacement guarantee of membrane elements.

P&ID

INDICATIVE FLOW DIAGRAM FOR DM PLANT



(FLOW DIAGRAM-1)

**NTPC Limited**
(A GOVT. OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT
TALCHER SUPER THERMAL POWER PROJECT
STAGE-III (2 X 660MW)

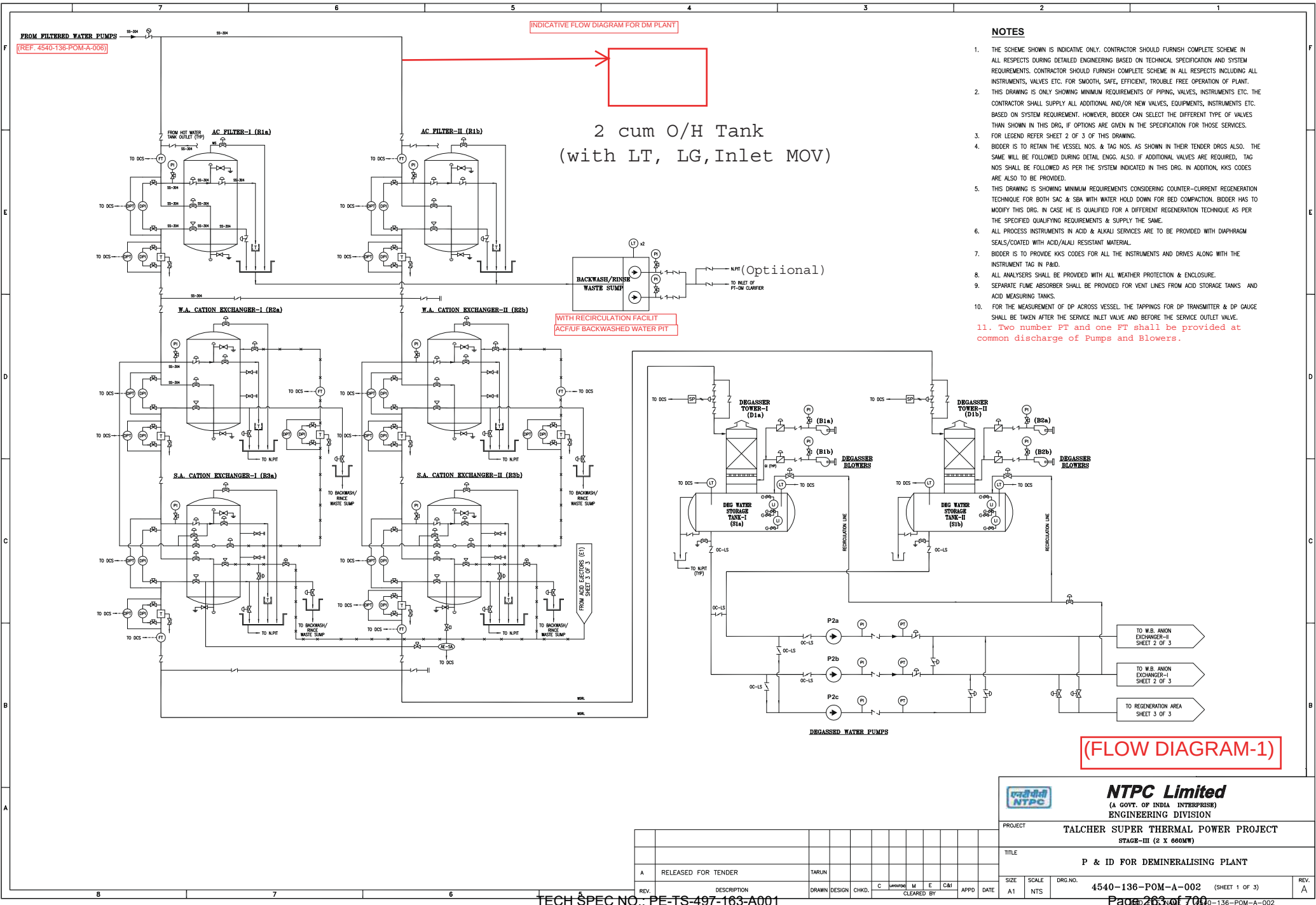
TITLE
SINGLE LINE FLOW & INSTRUMENTATION DIAGRAM
OF PRE-TREATMENT PLANT

SIZE A1
SCALE NTS
DRG.NO. 4540-136-POM-A-006
REV. A

REV.	DESCRIPTION	DRAWN	DESIGN	CHKD.	C	LD	M	E	C&I	APPD	DATE
A	RELEASED FOR TENDER	TARUN									

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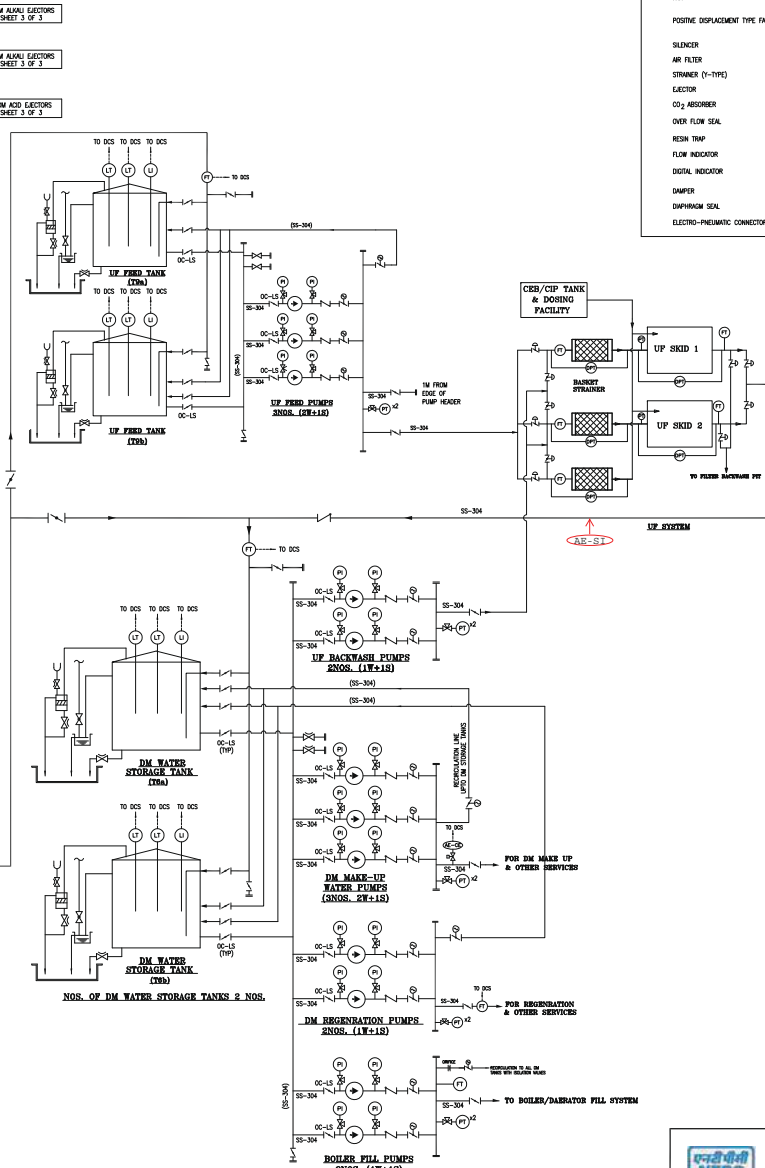
- NOTES**
1. THE SCHEME SHOWN IS INDICATIVE ONLY. CONTRACTOR SHOULD FURNISH COMPLETE SCHEME IN ALL RESPECTS DURING DETAILED ENGINEERING BASED ON TECHNICAL SPECIFICATION AND SYSTEM REQUIREMENTS. CONTRACTOR SHOULD FURNISH COMPLETE SCHEME IN ALL RESPECTS INCLUDING ALL INSTRUMENTS, VALVES ETC. FOR SMOOTH, SAFE, EFFICIENT, TROUBLE FREE OPERATION OF PLANT.
 2. THIS DRAWING IS ONLY SHOWING MINIMUM REQUIREMENTS OF PIPING, VALVES, INSTRUMENTS ETC. THE CONTRACTOR SHALL SUPPLY ALL ADDITIONAL AND/OR NEW VALVES, EQUIPMENTS, INSTRUMENTS ETC. BASED ON SYSTEM REQUIREMENT. HOWEVER, BIDDER CAN SELECT THE DIFFERENT TYPE OF VALVES THAN SHOWN IN THIS DRG, IF OPTIONS ARE GIVEN IN THE SPECIFICATION FOR THOSE SERVICES.
 3. FOR LEGEND REFER SHEET 2 OF 3 OF THIS DRAWING.
 4. BIDDER IS TO RETAIN THE VESSEL NOS. & TAG NOS. AS SHOWN IN THEIR TENDER DRGS ALSO. THE SAME WILL BE FOLLOWED DURING DETAIL ENGG. ALSO. IF ADDITIONAL VALVES ARE REQUIRED, TAG NOS SHALL BE FOLLOWED AS PER THE SYSTEM INDICATED IN THIS DRG. IN ADDITION, KKS CODES ARE ALSO TO BE PROVIDED.
 5. THIS DRAWING IS SHOWING MINIMUM REQUIREMENTS CONSIDERING COUNTER-CURRENT REGENERATION TECHNIQUE FOR BOTH SAC & SBA WITH WATER HOLD DOWN FOR BED COMPACTION. BIDDER HAS TO MODIFY THIS DRG. IN CASE HE IS QUALIFIED FOR A DIFFERENT REGENERATION TECHNIQUE AS PER THE SPECIFIED QUALIFYING REQUIREMENTS & SUPPLY THE SAME.
 6. ALL PROCESS INSTRUMENTS IN ACID & ALKALI SERVICES ARE TO BE PROVIDED WITH DIAPHRAGM SEALS/COATED WITH ACID/ALKALI RESISTANT MATERIAL.
 7. BIDDER IS TO PROVIDE KKS CODES FOR ALL THE INSTRUMENTS AND DRIVES ALONG WITH THE INSTRUMENT TAG IN P&ID.
 8. ALL ANALYSERS SHALL BE PROVIDED WITH ALL WEATHER PROTECTION & ENCLOSURE.
 9. SEPARATE FUME ABSORBER SHALL BE PROVIDED FOR VENT LINES FROM ACID STORAGE TANKS AND ACID MEASURING TANKS.
 10. FOR THE MEASUREMENT OF DP ACROSS VESSEL. THE TAPPINGS FOR DP TRANSMITTER & DP GAUGE SHALL BE TAKEN AFTER THE SERVICE INLET VALVE AND BEFORE THE SERVICE OUTLET VALVE.
 11. Two number PT and one FT shall be provided at common discharge of Pumps and Blowers.

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ENGINEERING DIVISION

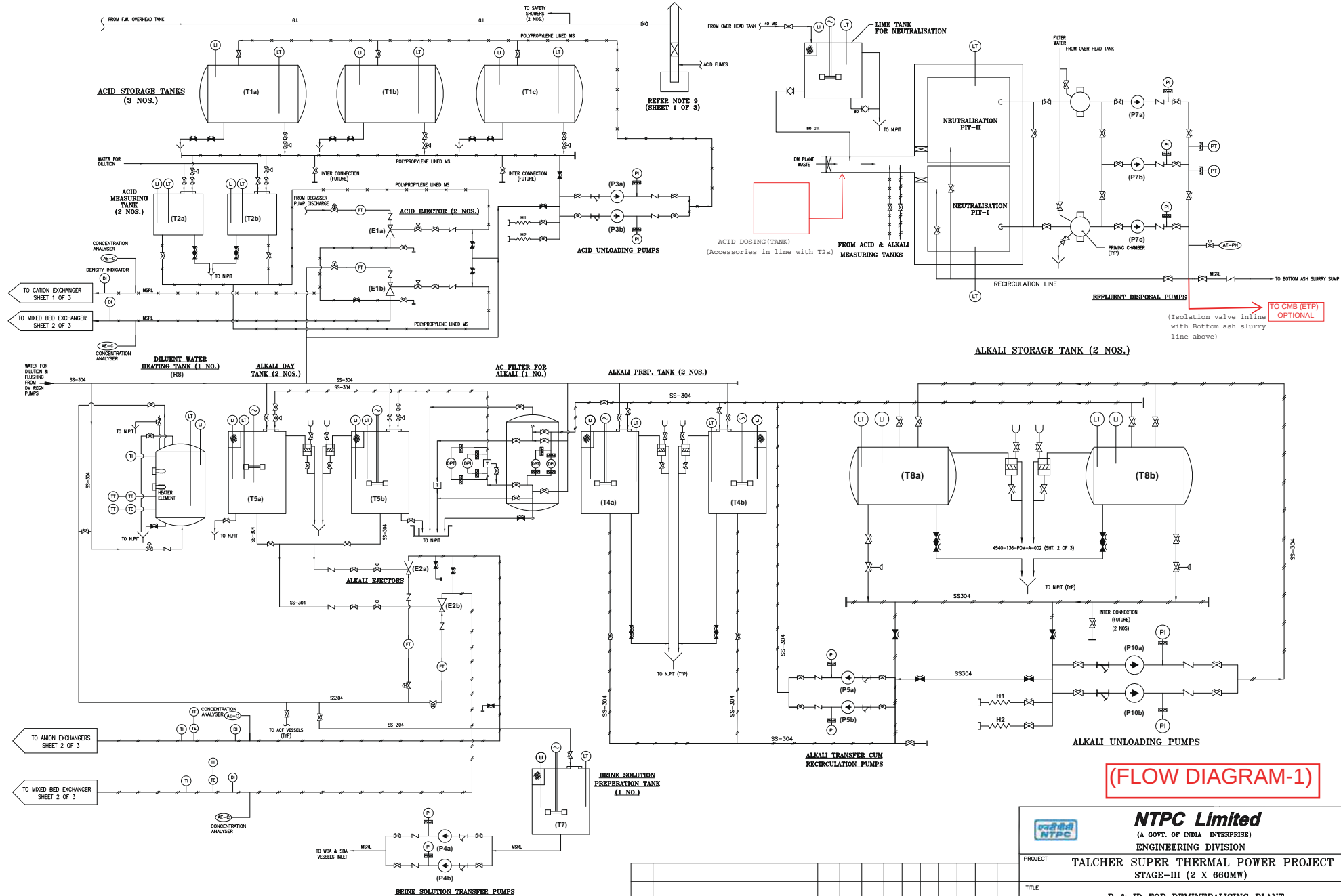
PROJECT		TALCHER SUPER THERMAL POWER PROJECT STAGE-III (2 X 660MW)	
TITLE		P & ID FOR DEMINERALISING PLANT	
SIZE	SCALE	DRG. NO.	REV.
A1	NTS	4540-136-POM-A-002	A
		(SHEET 1 OF 3)	

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LEGEND



(FLOW DIAGRAM-1)



(FLOW DIAGRAM-1)

NTPC Limited

(A GOVT. OF INDIA INTERPRISE)

ENGINEERING DIVISION

PROJECT	TALCHER SUPER THERMAL POWER PROJECT STAGE-III (2 X 660MW)

TITLE	P & ID FOR DEMINERALISING PLANT

SIZE	SCALE	DRG.NO.	4540-136-POM-A-002 (SHEET 3 OF 3)	REV.
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KEY PLAN

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DM PLANT
TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)

SPEC NO: PE-TS-497-163-A001

VOLUME: II-B

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REV NO: 00

DATE:

SECTION – C2

(SPECIFIC TECHNICAL REQUIREMENTS FOR ELECTRICAL)

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TITLE:
EM-MAX TECHNICAL SPECIFICATION FOR
DM PLANT
TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)

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ELECTRICAL EQUIPMENT SPECIFICATION

1151791/2022/PS-PEM-MAX



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
DM/-PT PLANT (ELECTRICAL PORTION)
2 X 660 MW TALCHER TPP**

SPECIFICATION NO.

VOLUME NO. : **II-B**SECTION: **C**REV NO. : **00** DATE: 07.09.22SHEET: **OF****SPECIFIC TECHNICAL REQUIREMENTS:****1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:**

The equipment and services to be provided by bidder under this specification shall be as detailed here below but shall not be limited to the following:

- a) Services and Equipment as per "Electrical Scope between BHEL and Vendor".
- b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The bidder without any extra charge shall provide the same.
- c) Supply of mandatory spares as specified in the specifications of mechanical equipments.
- d) Electrical load requirement for DM/-PT PLANT package.
- e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.
- f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer / BHEL approval without any commercial and delivery implications to BHEL.
- g) Various drawings including GA drg, data sheet as per required format, quality plans, calculations, test reports, test certificates, operation and maintenance manuals, characteristic curves, wiring diagrams/schemes etc. shall be furnished as specified at contract stage. All documents shall be subject to customer / BHEL approval without any commercial implications to BHEL.
- h) The sub-vendor list for various electrical items is subject to BHEL/Customer approval without any commercial implications.
- i) Motors shall meet minimum requirement of Electric motor specification.
- j) Purchaser will furnish data sheets to the vendor after award of contract. Vendor shall furnish filled in data sheets meeting the specification requirements.
- k) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL.
- l) Cable BOQ worked out based on routing of cable listing provided by the vendor for "both end equipment in vendor's scope" shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.
- m) All Structural steel required for electrical equipment supplied by Vendor- as per scope split, shall be in Vendor's scope.

2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS:

Refer "Electrical Scope between BHEL and Vendor".

3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID

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**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
DM/PT PLANT (ELECTRICAL PORTION)

2 X 660 MW TALCHER TPP**

SPECIFICATION NO.

VOLUME NO. : **II-B**SECTION: **C**REV NO. : **00** DATE: 07.09.22SHEET: **OF**

- 3.1 Bidder shall confirm total compliance to the electrical specification without any deviation from the technical/ quality assurance requirements stipulated. In line with this, the bidder as technical offer shall furnish two signed and stamped copies of the following:
- A copy of this sheet "Electrical Equipment Specification for DM/PT PLANT package and sheet "Electrical Scope between BHEL and Vendor" with bidder's signature and company stamp.
 - Electrical load requirement.
- 3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc, is required during tender stage. Any such submission even if made, shall not be considered as part of offer.
- 4.0 **LIST OF ENCLOSURES**
- Electrical scope between BHEL & vendor
 - Customer (NTPC) specification for Motors & Cabling (for vendor scope as per scope split)
 - Quality plan for motors & NTPC quality assurance
 - Datasheet A & C (~~ANNEX-I~~)
 - ~~List of Mandatory Spares (ANNEX-II)~~
 - Electrical Load data format (~~ANNEX-III~~)
 - BHEL cable listing format (~~ANNEX-IV~~)



TITLE:
EM-MAX TECHNICAL SPECIFICATION FOR
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STAGE-III (2X660 MW)

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ELECTRICAL LOAD FORMAT

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STAGE-III (2X660 MW)

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ELECTRICAL SCOPE FOR VENDOR AND BHEL

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : DM/ ~~PT~~ PLANT

SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT: 2 X 660MW TALCHER TPP (EPC)

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC	BHEL	BHEL	240 V AC (supply feeder)/415 V AC (3 PHASE 4 WIRE) supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	BHEL BHEL BHEL	BHEL Vendor BHEL	1. For 3.b) & c): Sizes of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL) in the form of cable listing. Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly. 2. Termination at BHEL equipment terminals by BHEL. 3. Termination at Vendor equipment terminals by Vendor.
4	Junction box for control & instrumentation cable	Vendor	Vendor	Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 10-12 mtrs) and trunk cable.
5	Any special type of cable like compensating, co-axial, prefab, MICC, optical fibre etc.	Vendor	Vendor	Refer C&I portion of specification for scope of fibre Optical cables if used between PLC/ microprocessor & DCS.
6	Cable trays, accessories & cable trays supporting system 100/ 50 mm cable trays/ Conduits/ Galvanised steel cable troughs for local cabling	BHEL Vendor	BHEL Vendor	Local cabling from nearby main route cable tray (BHEL scope) to equipment terminal (vendor's scope) shall be through 100/ 50 mm. cable trays/ conduits/ Galvanised steel cable troughs, as per approved layout drawing during contract stage.
7	Cable glands ,lugs and bimetallic strip for equipment supplied by Vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
8	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	Vendor	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537.
9	Lighting	BHEL	BHEL	
10	Equipment grounding (including electronic earthing) &	BHEL	BHEL	Refer note no. 4 for electronic earthing

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : DM/ ~~PT~~ PLANT

SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT: 2 X 660MW TALCHER TPP (EPC)

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
	lightning protection			
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	Vendor	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	Vendor	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable and electronic earthing cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Electrical Equipment & cable tray layout drawings	Vendor	-	For ensuring cabling requirements are met, vendor shall furnish Electrical equipment layout & cable tray layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling, and shall incorporate cable trays routing details marked on the drawing as per PEM interface comments. Cabling arrangement of the same (wherever overhead cable trays, trenches, cable ducts, conduits etc.) shall be decided during contract stage. Electrical equipment layout & cable tray layout drawing shall be subjected to BHEL/ customer approval without any commercial implications to BHEL.
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipment/ items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR**PACKAGES : DM/~~PT~~ PLANT****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT: 2 X 660MW TALCHER TPP (EPC)**

3. In case the requirement of Junction Box arises on account of Power Cable size mis-match due to vendor engineering at later stage, vendor shall supply the Junction Box for suitable termination.
4. Vendor shall indicate location of Electronic Earth pit in their Civil assignment drawing.

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SECTION – C3

(SPECIFIC TECHNICAL REQUIREMENTS FOR C&I)

	2X660 MW Talcher STPP	SECTION: C SUB SECTION : C&I
	SPECIFIC TECHNICAL REQUIREMENTS (C&I) DM PLANT	
1. The control system for DM plant shall be DDCMIS based (BHEL's scope). Profibus based controls and conventional controls (hardwired 4-20mA/DI/DO) are envisaged for this package. 2. Bidder to provide Profibus PA protocol compatible PT(Pressure Transmitters),DPT(Differential Pressure Transmitters),TT(Temperature Transmitters) and Flow/Level Transmitters(DP type) for entire DM Plant package. 3. All motorized valves shall be supplied with Non-intrusive Profibus based Electric Actuator(with integral starter) for DM plant package along with necessary interface units for linking to corresponding Control System as applicable. 4. Profibus based electronic positioner (as per standard and proven practice of valve OEM) is to be provided with all the pneumatic operated control valves. 5. The Profibus protocol design shall be further validated by BHEL and approved by NTPC during detailed engineering and any variation/changes required based on DDCMIS system requirements and actual field installation, operational philosophy etc. shall be considered by bidder without any implications 6. Bidder to note that all transmitters(except Profibus compatible transmitters) shall be smart type and shall have 4-20mA DC signal with superimposed digital communication(HART) 7. Profibus DP based IMC in LV SWGR/MCC (BHEL's scope) shall be provided. 8. Redundancy of instruments to be provided by bidder shall be as follows:- (i) Triple redundancy for all analog and binary inputs required for protection of system/drives. (ii) For all other control functions dual redundancy of the sensors shall be provided by the bidder. 9. Bidder to provide Comprehensive Annual Maintenance Services (AMS) for three (03) years after warranty period for the Analyser instruments and Profibus instruments of DM plant.		

	2X660 MW Talcher STPP	SECTION: C SUB SECTION : C&I
	SPECIFIC TECHNICAL REQUIREMENTS (C&I) DM PLANT	
10. Bidder shall provide the following :- a) Configuration/ diagnostic tool for Non-intrusive profibus based actuators - 5 Nos. or 5% of total quantity of actuator whichever is more. b) Configuration/ diagnostic tool for all Profibus based instruments – 2 Nos of each make. Bidder shall also provide all required software (lifetime licensed) and hardware (cables/connectors, Tablet/ Laptop etc.) along with these tools. 11. Bidder to provide all the instruments envisaged for sea water applications, with wetted parts made of Monel/ Hastelloy C For Chlorine application: Instruments shall be provided with wetted parts (e.g. diaphragm seal, etc.) made of Hastelloy C. Also, filled liquid shall be Fluorolube oil/ Inert Hydrocarbon /CTFE etc., for these applications. For applications of FECL3 solution: Instruments shall be provided with wetted parts (e.g. diaphragm seal, etc.) made of Tantalum. Diaphragm seal shall be provided with Instruments having contact with corrosive media. 12. Bidder to provide Junction Boxes in field for termination of all the instruments. 13. Bidder to provide atleast 20% spare terminals in Junction boxes,LIE/LIRs etc. 14. All the transmitters supplied by Bidder shall be LIE/LIR mounted . The LIE/LIRs shall be in Bidder's scope of supply. 15. All the instruments having contact with corrosive media shall be provided with chemical/diaphragm seal. 16. All weather Local Panel fitted with integral Air Conditioner shall be provided by the Bidder for housing analyzers etc if the same are not kept in AC rooms. 17. For level transmitters, electronics items etc. all weather canopy\ rack enclosures shall be provided by Bidder for protection from direct sunlight and rain for open locations. For applications where transmitter location is not accessible, the transmitter shall have separate sensor unit and electronic unit for such applications. It should be mounted at accessible location. 18. All field instruments/analyzers/actuators/sov/control valves etc. shall be hooked with DDCMIS based control system as per requirement mentioned elsewhere in the specification.		

	2X660 MW Talcher STPP	SECTION: C SUB SECTION : C&I
	SPECIFIC TECHNICAL REQUIREMENTS (C&I) DM PLANT	
19. The necessary root valves, impulse piping, drain cocks, gauge-zeroing cocks, valve manifolds and all the other accessories required for mounting/erection of these local instruments shall be furnished, even if not specifically asked for, on as required basis. Double root valves shall be provided for all pressure tapping where the pressure exceeds 40 Kg./sq.cm. 20. All electrical devices like switches/ transmitters/ controller/ analyzer/ solenoid valves which are located in the in hazardous areas shall be made intrinsically safe by providing suitable type of transformer isolated barrier / Zener barrier of standard make & shall be provided with explosion proof enclosure suitable for hazardous areas described in National Electric Code (USA), Article 500, Class-I, Division-I or EN60079-14 or shall comply with the essential requirements of ATEX directives. 21. All measuring instruments/equipment/analysers and subsystems offered by the Bidder shall be from reputed experienced manufacturers ((from BHEL/customer approved vendor list) of specified type and range of equipment, whose guaranteed and trouble free operation has been proven. Further, all instruments shall be of proven reliability, accuracy, and repeatability requiring a minimum of maintenance and shall comply with the acceptable international standards. Further, Bidder to meet the provenness criteria for all the supplied C&I items mentioned elsewhere in the specification 22. 230 V AC UPS Power supply shall be provided by BHEL at a single point, further distribution to various instruments/equipment of the system shall be in bidder scope. Bidder to include necessary power distribution board in his scope. Any power supply other than the above, if required by any instrument/equipment has to be derived by the bidder from the above supply & all necessary hardware for the same shall be in bidder scope. Further, Bidder to furnish UPS load data during detailed engineering in BHEL format. 23. Bidder to provide mandatory spares for C&I items as per mandatory spares list 24. Bidder to perform tests of C&I items/instruments/systems as per Quality plans/type test attached in the specification. 25. Bidder's representative shall be present at BHEL-PEM for 3 man-days, for preparation of Control scheme of DM PLANT. All the expenses like boarding, lodging and travel, air fare etc. shall be in bidder's scope.		

	2X660 MW Talcher STPP	SECTION: C SUB SECTION : C&I
	SPECIFIC TECHNICAL REQUIREMENTS (C&I) DM PLANT	
26. Bidder's presence is required for 3 Man days (Excluding travel time) at EDN Bangalore during FAT of DDCMIS for certifying correctness & completeness of implementation of Control logic. Intimation regarding FAT shall be given 2 days in advance. All the expenses like boarding, lodging and travel, air fare etc. shall be in bidder's scope. 27. Bidder's presence is required for 15 Man days (in three visits) at site during commissioning of DDCMIS for assistance related to process correctness. Three visits shall be made with total 15 Man days(excluding travel time) in which one visit shall be of 5 man days each. All the expenses like boarding, lodging and travel, air fare etc. shall be in bidder's scope. 28. Bidder shall furnish Instrument Schedule, Control Scheme, I/O list, Drive list, Cable Schedule, Cable interconnection, Instrument/SOV/Analyzers Installation diagram, Instrument/Analyzer datasheets, JB grouping, SOV grouping,Annunciation list, List of Instruments/devices for Profibus/HART,configuration diagram for Profibus based actuators/instruments in BHEL approved format. Also, editable database format like MS Excel, MS Access etc. of these documents shall also be provided by Bidder. 29. Bidder shall provide complete Instrumentation for control, monitoring and operation of entire DM PLANT. The requirements given are to be read in conjunction with detailed Technical specification. Further in case of any discrepancy in the requirement, the more stringent requirement as per interpretation of BHEL/customer shall prevail without any commercial implication.		

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		VOLUME: II-B	
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SECTION-D**(GENERAL TECHNICAL REQUIREMENT)**

1151791/2022/PS-PEM-MAX

	TITLE: TECHNICAL SPECIFICATION FOR DM PLANT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	SPEC NO: PE-TS-497-163-A001	
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SECTION-D1**(GENERAL TECHNICAL REQUIREMENT FOR MECHANICAL)**

1151791/2022/PS-PEM-MAX

	TITLE: TECHNICAL SPECIFICATION FOR DM PLANT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	SPEC NO: PE-TS-497-163-A001	
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GENERAL TECHNICAL REQUIREMENT FOR THE PROJECT/PACKAGE

1.00.00	INTRODUCTION This part covers technical requirements which will form an integral part of the Contract. The following provisions shall supplement all the detailed technical specifications and requirements brought out in Section-VI, the Technical Specification and the Technical Data Sheets.
2.00.00	BRAND NAME Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific item mentioned shall be understood to be indicative of the function and quality desired, and not restrictive; other manufacturer's products may be considered provided sufficient information is furnished to enable the Employer to determine that the products proposed are equivalent to those named.
3.00.00	BASE OFFER & ALTERNATE PROPOSALS The Bidder's proposal shall be based upon the use of equipment and material complying fully with the requirements specified herein. It is recognized that the Contractor may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered, provided the base offer is in line with technical specifications and such proposals meet the specified design standards and performance requirement and are acceptable to the Employer. Sufficient amount of information for justifying such proposals shall be furnished to Employer alongwith the bid to enable the Employer to determine the acceptability of these proposals.
4.00.00	COMPLETENESS OF FACILITIES
4.01.00	Bidders may note that this is a EPC Package contract. Each of the plant shall be engineered and designed in accordance with the specification requirement. All engineering and associated services are required to ensure a completely engineered plant shall be provided.
4.02.00	All equipments furnished by the Contractor shall be complete in every respect, with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or those needed for erection, completion and safe operation of the equipment and for the safety of the operating personnel, as required by applicable codes, though they may not have been specifically detailed in the respective specifications, unless included in the list of exclusions. All same standard components/ parts of same equipment provided, shall be interchangeable with one another.

4.03.00	For the C&I systems, the Contractor shall be required to provide regular information about future upgrades and migration paths to the Employer.
5.00.00	CODES & STANDARDS
5.01.00	In addition to the codes and standards specifically mentioned in the relevant technical specifications for the equipment / plant / system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following : a) Indian Electricity Act b) Indian Electricity Rules c) Indian Explosives Act d) Indian Factories Act and State Factories Act e) Indian Boiler Regulations (IBR) f) Regulations of the Central Pollution Control Board, India g) Regulations of the Ministry of Environment & Forest (MoEF), Government of India h) Pollution Control Regulations of Department of Environment, Government of India i) State Pollution Control Board. (j) Rules for Electrical installation by Tariff Advisory Committee (TAC). (k) Building and other construction workers (Regulation of Employment and Conditions of services) Act, 1996 (l) Building and other construction workers (Regulation of Employment and Conditions of services) Central Rules, 1998 (m) Explosive Rules, 1983 (n) Petroleum Act, 1984 (o) Petroleum Rules, 1976, (p) Gas Cylinder Rules, 1981

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GENERAL TECHNICAL REQUIREMENTS



	(q) Static and Mobile Pressure Vessels (Unified) Rules, 1981 (r) Workmen's Compensation Act, 1923 (s) Workmen's Compensation Rules, 1924 (t) NTPC Safety Rules for Construction and Erection (u) NTPC Safety Policy (v) Any other statutory codes / standards / regulations, as may be applicable.
5.02.00	Unless covered otherwise in the specifications, the latest editions (as applicable as on the date of bid opening), of the codes and standards given below shall also apply: a) Bureau of Indian standards (BIS) b) Japanese Industrial Standards (JIS) c) American National Standards Institute (ANSI) d) American Society of Testing and Materials (ASTM) e) American Society of Mechanical Engineers (ASME) f) American Petroleum Institute (API) g) Standards of the Hydraulic Institute, U.S.A. h) International Organization for Standardization (ISO) i) Tubular Exchanger Manufacturer's Association (TEMA) j) American Welding Society (AWS) k) National Electrical Manufacturers Association (NEMA) l) National Fire Protection Association (NFPA) m) International Electro-Technical Commission (IEC)/ European Norm (EN) n) Expansion Joint Manufacturers Association (EJMA) o) Heat Exchange Institute (HEI) p) IEEE standard

	q) JEC standard
5.03.00	Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Bidder shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English.
5.04.00	As regards highly standardized equipments such as Steam Turbine and Generator, National /International standards such as JIS, DIN, VDI, ISO, SEL, SEW, VDE, IEC & VGB shall also be considered as far as applicable for Design, Manufacturing and Testing of the respective equipment. However, for those of the above equipment not covered by these National / International standards, established and proven standards of manufacturers shall also be considered.
5.05.00	In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.
5.06.00	Two (2) English language copies of all national and international codes and/or standards used in the design of the plant and equipment shall be provided by the Contractor to the Employer within two calendar months from the date of the Notification of Award.
5.07.00	In case of any change in codes, standards & regulations between the date of bid opening and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect.
5.08.00	A detailed list of standards apart from those mentioned in the respective detailed specifications in other parts of Section-VI to which all equipment/systems/civil works should conform as indicated in this Part C and elsewhere in the specification.
6.00.00	EQUIPMENT FUNCTIONAL GUARANTEE
6.01.00	The functional guarantees of the equipment under the scope of the Contract is given in Section-VI Part - A & B of Technical Specifications. These guarantees shall supplement the general functional guarantee provisions covered under Defect liabilities Section-IV, General Conditions of Contract.

6.02.00	Liquidated damages for shortfall in meeting functional guarantee(s) during the performance and guarantee tests shall be assessed and recovered from the Contractor as specified elsewhere in this specification.
7.00.00	DESIGN OF FACILITIES/ MAINTENANCE & AVAILABILITY CONSIDERATIONS
7.01.00	DESIGN OF FACILITIES All the design procedures, systems and components proposed shall have already been adequately developed and shall have demonstrated good reliability under similar conditions elsewhere. The Contractor shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic requirements are detailed out in various clauses of the Technical Specifications. The design of various components, assemblies and subassemblies shall be done so that it facilitates easy field assembly and dismantling. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical or close to the operating range of the unit.
7.02.00	MAINTENANCE AND AVILABILITY CONSIDERATIONS Equipment/works offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/ availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list. Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation. The intervals for each type of maintenance namely inspection of the furnace, inspection of the entire hot gas path, turbine & equipments, inspection of the steam path and the minor and major overhauls shall be specified in terms of fired hours, clearly defining the spare parts and man-hour requirement for each stage. Lifting devices i.e. hoists and chain pulley jacks, etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities. Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist / crane shall be provided by the contractor for lifting the equipment and accessories covered under the specification.

8.00.00	DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR
8.01.00	Bidders may note that this is an EPC Package contract. Each of the plant and equipment shall be fully integrated, engineered and designed to perform in accordance with the technical specification. All engineering and technical services required to ensure a completely engineered plant shall be provided in respect of mechanical, electrical and power systems, control & instrumentation, civil & structural works as per the scope. Each main and auxiliary equipment/item of the plant including instruments shall be assigned a unique tag number. The assignment of tag numbers shall be in accordance with KKS system. In all drawings/documents/data sheet etc. KKS tag number of the equipment/item/instrument etc. shall be indicated. The Contractor shall furnish engineering data /drawings in accordance with the schedule of information as specified in Technical Data Sheets and Technical Specification. A comprehensive engineering and quality coordination procedure shall be finalized with the successful bidder covering salient features as described in this section of specifications.
8.02.00	The number of copies/prints/CD-ROMs/manuals to be furnished for various types of document is given in Annexure-VI to this Part-C, Section-VI of the Technical Specification.
8.03.00	The documentation that shall be provided by the Contractor is indicated in the various sections of specification. This documentation shall include but not be limited to the following:
8.03.01	A) BASIC ENGINEERING DOCUMENTATION Prior to commencement of the detailed engineering work, the Contractor shall furnish a Plant Definition Manual within 12 weeks from the date of the Notification of Award. This manual shall contain the following as a minimum: i) System description of all the mechanical, electrical, control & instrumentation & civil systems. ii) Technology scan for each system / sub-system & equipment. iii) Selection of appropriate technology / schemes for various systems/ subsystems including techno-economic studies between various options.

- iv) Optimization studies including thermal cycle optimization.
- v) Sizing criteria of all the systems, sub-systems/ equipments/ structures/ equipment foundations alongwith all calculations justifying and identifying the sizing and the design margins.
- vi) Schemes and Process & Instrumentation diagrams for the various systems/ sub-system with functional write-ups.
- vii) Water Balance diagram.
- viii) Operation Philosophy and the control philosophy of the Main Plant and other plants.
- ix) General Layout plan of the power station incorporating all facilities in Bidder's as well as those in the Employer's scope. This drawing shall also be furnished in the form of CD-ROMs to the Employer for engineering of areas not included in bidder's scope.
- x) Basic layouts and cross sections of the main plant building (various floor elevations), boiler, fuel oil area, transformer yard, switchyard and other areas included in the scope of the bidder.
- xi) Documentation in respect of Quality Assurance System as listed out elsewhere in this specification.

The successful bidder shall furnish within three (3) weeks from the date of Notification of Award, a list of contents of the Plant Definition Manual (PDMs) including techno-economic studies, which shall then be mutually discussed & finalised with the Employer.

B) DETAILED ENGINEERING DOCUMENTS

- i) General layout plan of the station.
- ii) Layouts, general arrangements, elevations and cross-sections drawings for all the equipment and facilities of the plant.
- iii) Flow diagram, Process and Instrumentation diagrams along with write up and system description.
- iv) Start-up curves for boiler and both turbines and boiler combined together as a unit for various start-ups, viz. Cold, Warm and Hot start up.
- v) Piping isometric, composite layout and fabrication drawings.

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- vi) Piping engineering diagrams, pipe and fittings schedules, valve schedules, hanger and support schedules, insulation schedules.
- vii) Technical data sheets for all bought out and manufactured items. Contractor shall use the Employer's specifications as a base for placement of orders on their sub vendors.
- viii) Detailed design calculations for components, system, piping etc., wherever applicable including sizing calculations for all auxiliaries like Mills, Fans, BFPs, CEPs, Heaters/ Deaerators, Air cooled Condensers, Vacuum pumps etc.
- ix) Boiler pressure part schedule and sizing calculations. Boiler performance data and boiler design dossier.
- x) Transient, hydraulic and thermal stress analysis of piping and system wherever applicable & input and output data alongwith stress analysis isometrics showing nodes.
- xi) Thermal cycle information (heat balance diagrams, boiler performance calculations, condenser and heat exchanger thermal calculations etc.).
- xii) Characteristic Curves/ Performance Correction Curves. Hydraulic & Mechanical design calculations for condensers & heaters.
- xiii) Comprehensive list of all Terminal Points which interface with Employer's facilities, giving details of location, terminal pressure, temperature, fluid handled & end connection details, forces, moments etc.
- xiv) Power supply single line diagram, block logics, control schematics, electrical schematics, etc.
- xv) Protection system diagrams and relay settings.
- xvi) Cables schedules and interconnection diagrams.
- xvii) Cable routing plan.
- xviii) Instrument schedule, measuring point list, I/O list, Interconnection & wiring diagram, functional write-ups, installation drawings for field mounted instruments, logic diagrams, control schematics, wiring and tubing diagrams of panels and enclosures etc. Drawings for open loop and close loop controls (both hardware and software). Motor list and valve schedule including type of actuator etc.

- xix) Alarm and annunciation/ Sequence of Event (SOE) list and alarms & trip set points.
- xx) Sequence and protection interlock schemes.
- xxi) Type test reports, insulation co-ordination study report and power system stability study report.
- xxii) Control system configuration diagrams and card circuit diagrams and maintenance details.
- xxiii) Detailed DDCMIS system manuals.
- xxiv) Detailed flow chart for digital control system.
- xv) Mimic diagram layout, Assignment for other application engg.
- xxvi) Civil and Structural works drawings and documents for all structures, facilities, architectural works, foundations underground and overground works and super-structural works as included in the scope of the bidder civil calculation sheets including structural analysis and design alongwith output results.
- xxvii) Underground facilities, levelling, sanitary, land scaping drawings.
- xxviii) Geotechnical investigation and site survey reports (if and as applicable).
- xxix) Model study reports wherever applicable.
- xxx) Functional & guarantee test procedures and test reports.
- xxxi) Documentation in respect of Quality Assurance System, and Documentation in respect of Commissioning, as listed out elsewhere in this specification.

The Contractor's while submitting the above documents/ drawings for approval/ reference as the case may be, shall mark on each copy of submission the reference letter alongwith the date vide which the submissions are made.

8.03.02

INSTRUCTION MANUALS

The Contractor shall submit to the Employer, draft Instruction Manuals for all the equipments covered under the Contract by the end of one year from the date of his acceptance of the Letter of Award. The Instruction manuals shall contain full details required for erection, commissioning, operation and maintenance of each

equipment. The manual shall be specifically compiled for this project. After finalisation and approval of the Employer the Instruction Manuals shall be submitted as indicated in **Annexure-IV**. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals have been supplied to the Employer. The Instruction Manuals shall comprise of the following.

A) ERECTION MANUALS

The erection manuals shall be submitted at least three (3) months prior to the commencement of erection activities of a particular equipment/system. The erection manual should contain the following as a minimum.

- a) Erection strategy.
- b) Sequence of erection.
- c) Erection instructions.
- d) Critical checks and permissible deviation/tolerances.
- e) List of tools, tackles, heavy equipments like cranes, dozers, etc.
- f) Bill of Materials
- g) Procedure for erection and General Safety procedures to followed during erection/installation.
- h) Procedure for initial checking after erection.
- i) Procedure for testing and acceptance norms.
- j) Procedure / Check list for pre-commissioning activities.
- k) Procedure / Check list for commissioning of the system.
- l) Safety precautions to be followed in electrical supply distribution during erection.

B) OPERATION & MAINTENANCE MANUALS

- a) The manual shall be a two rim PVC bound stiff sided binder able to withstand constant usage or where a thicker type is required it shall have locking steel pins, the size of the manual shall not be larger than international size A3. The cover shall be printed with the Project

Name, Services covered and Volume / Book number Each section of the manual shall be divided by a stiff divider of the same size as the holder. The dividers shall clearly state the section number and title. All written instructions within the manual not provided by the manufacturers shall be typewritten with a margin on the left hand side.

b) The arrangement and contents of O & M manuals shall be as follows:

1) Chapter 1 - Plant Description: To contain the following sections specific to the equipment/system supplied

- (a) Description of operating principle of equipment / system with schematic drawing / layouts.
- (b) Functional description of associated accessories / controls. Control interlock protection write up.
- (c) Integrated operation of the equipment alongwith the intended system. (This to be given by the supplier of the Main equipment by taking into account the operating instruction given by the associated suppliers).
- (d) Exploded view of the main equipment, associated accessories and auxiliaries with description. Schematic drawing of the equipment alongwith its accessories and auxiliaries.
- (e) Design data against which the plant performance will be compared.
- (f) Master list of equipments, Technical specification of the equipment/ system and approved data sheets.
- (g) Identification system adopted for the various components, (it will be of a simple process linked tagging system).
- (h) Master list of drawings (as built drawing - Drawings to be enclosed in a separate volume).

2) Chapter 2.0 - Plant Operation: To contain the following sections specific to the equipment supplied

- (a) Protection logics provided for the equipment alongwith brief philosophy behind the logic, Drawings etc.
- (b) Limiting values of all protection settings.
- (c) Various settings of annunciation/interlocks provided.

- (d) Startup and shut down procedure for equipment alongwith the associated systems in step mode.
- (e) Do's and Don'ts related to operation of the equipment.
- (f) Safety precautions to be taken during normal operation. Emergency instruction on total power failure condition/lubrication failure/any other conditions.
- (g) Parameters to be monitored with normal value and limiting values.
- (h) Equipment isolating procedures.
- (i) Trouble shooting with causes and remedial measures.
- (j) Routine testing procedure to ascertain healthiness of the safety devices alongwith schedule of testing.
- (k) Routine Operational Checks, Recommended Logs and Records
- (l) Change over schedule if more than one auxiliary for the same purpose is given.
- (m) Preservation procedure on long shut down.
- (n) System/plant commissioning procedure.

3) Chapter 3.0 - Plant Maintenance- To contain the following sections specific to the equipment supplied.

- (a) Exploded view of each of the equipments. Drawings alongwith bill of materials including name, code no. & population.
- (b) Exploded view of the spare parts and critical components with dimensional drawings (In case of Electronic cards, the circuit diagram to be given) and spare parts catalogue for each equipment.
- (c) List of Special T/ P required for Overhauling /Trouble shooting including special testing equipment required for calibration etc.
- (d) Stepwise dismantling and assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained etc. Clearance to be maintained etc.

- (e) Preventive Maintenance schedules linked with running hours/calendar period alongwith checks to be carried out.
- (f) Overhauling schedules linked with running hours/calendar period alongwith checks to be done.
- (g) Long term maintenance schedules
- (h) Consumables list alongwith the estimated quantity required during normal running and during maintenance like Preventive Maintenance and Overhauling.
- (i) List of lubricants with their Indian equivalent, Lubrication Schedule including charts showing lubrication checking, testing and replacement procedure to be carried daily, weekly, monthly & at longer intervals to ensure trouble free operation and quantity required for complete replacement.
- (j) Tolerance for fitment of various components.
- (k) Details of sub vendors with their part no. in case of bought out items.
- (l) List of spare parts with their Part No, total population, life expediency & their interchangeability with already supplied spares to NTPC.
- (m) List of mandatory and recommended spare list along with manufacturing drawings, material specification & quality plan for fast moving consumable spares.
- (n) Lead time required for ordering of spares from the equipment supplier, instructions for storage and preservation of spares.
- (o) General information on the equipment such as modification carried out in the equipment from its inception, equipment population in the country / foreign country and list of utilities where similar equipments have been supplied.

8.03.03

After finalization and approval of the Employer, the O & M Manuals shall be submitted as indicated in Annexure-VI. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals (both erection and O & M manuals have been supplied to the Employer.

If after the commissioning and initial operation of the plant, the instruction manuals (Erection and /or O &M manuals) require modifications/additions/ changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by

8.03.03	the Contractor to the Employer for records and number of copies shall be as mentioned in Annexure-VI. PLANT HANDBOOK AND PROJECT COMPLETION REPORT
8.03.03.01	PLANT HANDBOOK The Contractor shall submit to the Employer a preliminary plant hand book preferably in A-4 size sheets which shall contain the design and performance data of various plants, equipments and systems covering the complete project including i) Design and performance data. ii) Process & Instrumentation diagrams. iii) Single line diagrams. iv) Sequence & Protection Interlock Schemes. v) Alarm and trip values. vi) Performance Curves. vii) General layout plan and layout of main plant building and auxiliary buildings viii) Important Do's & Don't's The plant handbook shall be submitted within twelve (12) months from the date of award of contract. After the incorporation of Employer's comments, the final plant handbook complete in all respects shall be submitted three (3) months before start-up and commissioning activities.
8.03.03.02	PROJECT COMPLETION REPORT The Contractor shall submit a Project Completion Report at the time of handing over the plant.
8.03.04	DRAWINGS a) i) All the plant layouts shall be made in computerized 3D modelling system. The Employer reserves the right to review the 3D model at different stages during the progress of engineering. The layout drawings submitted for Employer's review shall be fully dimensioned and extracted from 3D model after interference check. ii) All documents submitted by the Contractor for Employer's review shall be in electronic form (soft copies) along with the desired number

of hard copies as per **Annexure-VI** of Part-C. The soft copies shall be uploaded by the vendors in C-folders, a Web-based system of NTPC ERP, for which a username and password will be allotted to the new vendor by NTPC.

Similarly, the vendor can download the drawings/documents, approved/ commented by NTPC, through above site.

The soft copies of identified drawings/documents shall be in pdf format, whereas the attachments/reply to the submitted document(s) can be in .doc, .xls, .pdf, .dwg or .std formats.

iii) Final copies of the approved drawings along with requisite number of hard copies shall be submitted as per **Annexure-VI** of Part-C.

iv) Contractor shall prepare the model of all the facilities located within plant boundary covering facilities in Main Plant Block area and Balance of plant (BOP) area in an integrated & intelligent 3D software solution. Main Plant Block area shall include Transformer Yard, TG building (including all facilities), Boiler area, ESP area, chimney area, FGD area and any other facility located in main plant block. BOP area shall include all facilities pertaining to AHP, CHP, LHP, GHP, DM PT plant, pipe & cable racks and any other facility located within plant boundary.

All piping layouts, equipment layouts, floor plans, ducting layout (Air/flue gas, A/C, Ventilation etc.), General Arrangement drawings and RCC layout of major buildings and structural arrangement drawings shall necessarily be extracted from the aforesaid 3D model and submitted for employer's review along with the 3D review model to enable NTPC to review and approve these drawings.

Contractor shall prepare and provide 3D design review model (network ready, which shall include visual interference check, walk-through animation, video simulation for major equipment placement and removal, visual effect, photo realism etc.), which is extracted from intelligent 3D model and shall make a presentation of the same every 3 months from LOA to enable NTPC to review the progress of engineering or as & when required by employer.

The complete 3D data (editable model) which shall be utilised for all future detailed engineering related to maintenance, operation, R&M, efficiency improvement of the project etc. Complete 3D model along with as built GADs, layout, isometrics, reports extracted and 3D models for all disciplines, with any other document generated from 3D model and naming conventions with as-built updates along with complete reference databases, component catalogues for all the size range shall be handed over to owner. Apart from the 3D Model, all

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drawings like GADs, Isometrics etc. extracted from the model shall also be submitted by the Contractor in Electronic form. 3D model along with complete Project databases shall be submitted at each model review stage and as final as-built. The contractor shall also submit all the configuration files, customization files, templates and all referenced databases.

All input files of software used for design of Equipments / Piping like CAESAR2 files, input files for Pressure vessel design, data sheets etc., shall be handed over to NTPC as per NTPC specifications for hand over of Engineering Information.

Further, two Licenses of the used 3D Modelling Software (One for Engineering View and One for Site View) shall be provided along with compatible Hardware for possible review and study of the Model Files being submitted by the Bidder Time to time.

All software provided shall necessarily include cost for perpetual license(s) for use on all the machines and an Annual maintenance contract (AMC) which shall include software upgrades as & when released by the software agency for a period of three years after warranty/guarantee period.

Hand over Plan: There shall be continuous hand over of documents and data at various stages of the project including rules and trigger points for hand over of data to NTPC shall be at 30%, 60% and 90 % of 3D model stage.

Database backup shall be taken every month and handed over to NTPC.

- b) All documents/text information shall be in latest version of MS Office/MS Excel/PDF format as applicable.
- c) All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail indicating the type, size, arrangement, weight of each component for packing and shipment, the external connection, fixing arrangement required, the dimensions required for installation and interconnections with other equipments and materials, clearance and spaces required between various portions of equipment and any other information specifically requested in the drawing schedules.
- d) Each drawing submitted by the Contractor (including those of sub-vendors) shall bear a title block at the right hand bottom corner with clear mention of the name of the Employer, the system designation, the specifications title, the specification number, the name of the Project, drawing number and revisions. If standard catalogue pages are submitted the applicable items shall be indicated therein. All titles, notings, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.
- e) The drawings submitted by the Contractor (or their subvendors) shall bear Employer's drawing number in addition to contractor's (their sub-vendor's)

own drawing number. Employer's drawing numbering system shall be made available to the successful bidder to enable him to assign Employer's drawing numbers to the drawings to be submitted by him during the course of execution of the Contract.

Similarly, all the drawings/ documents submitted by the Contractor during detailed engineering stage shall be marked "FOR APPROVAL" or "FOR INFORMATION" prior to submission **in line with suggestive MDL**.

Further, space shall be identified on each drawing for Approval stamp and electronic signature.

- f) The furnishing of detailed engineering data and drawings by the Contractor shall be in accordance with the time schedule for the project. The review of these documents/ data/ drawings by the Employer will cover only general conformance of the data/ drawings/ documents to the specifications and contract, interfaces with the equipments provided by others and external connections & dimensions which might affect plant layout. The review by the Employer should not be construed to be a thorough review of all dimensions, quantities and details of the equipments, materials, any devices or items indicated or the accuracy of the information submitted. The review and/ or approval by the Employer/ Project Manager shall not relieve the Contractor of any of his responsibilities and liabilities under this contract.
- g) After the approval of the drawings, further work by the Contractor shall be in strict accordance with these approved drawings and no deviation shall be permitted without the written approval of the Employer.
- h) All manufacturing, fabrication and execution of work in connection with the equipment / system, prior to the approval of the drawings, shall be at the Contractor's risk. The Contractor is expected not to make any changes in the design of the equipment /system, once they are approved by the Employer. However, if some changes are necessitated in the design of the equipment/system at a later date, the Contractor may do so, but such changes shall promptly be brought to the notice of the Employer indicating the reasons for the change and get the revised drawing approved again in strict conformance to the provisions of the Technical Specification.
- i) Drawings shall include all installations and detailed piping layout drawings. Layout drawings for all piping of 65 mm and larger diameter shall be submitted for review/ approval of Employer prior to erection. Small diameter pipes shall however be routed as per site conditions in consultation with site authority/ representative of Employer based on requirements of such piping indicated in approved/ finalised Flow Scheme/ Process & Instrumentation Diagrams and/or the requirements cropping up for draining & venting of larger diameter piping or otherwise after their erection as per actual physical condition for the entire scope of work of this package.



Assessing & anticipating the requirement and supply of all piping and equipment shall be done by the contractor well in advance so as not to hinder the progress of piping & equipment erection, subsequent system charging and its effective draining & venting arrangement as per site suitability.

j) As Built Drawings

After final acceptance of individual equipment / system by the Employer, the Contractor will update all original drawings and documents for the equipment / system to "as built" conditions and submit no. of copies as per **Annexure VI**.

k) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to Engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission. The contractor shall make a visit to site to see the existing facilities and understand the layout completely and collect all necessary data/ drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same.

l) The Contractor shall submit adequate prints of drawing / data / document for Employer's review and approval. The Employer shall review the drawings and return soft copy to the Contractor authorizing either to proceed with manufacture or fabrication or marked to show changes desired. When changes are required, drawings shall be re-submitted promptly, with revisions clearly marked, for final review. Any delays arising out of the failure of the Contractor to submit/rectify and resubmit in time shall not be accepted as a reason for delay in the contract schedule.

m) All engineering data submitted by the Contractor after final process including review and approval by the Project Manager/ Employer shall form part of the contract documents and the entire works covered under these specification shall be performed in strict conformity with technical specifications unless otherwise expressly requested by the Project Manager in writing.

8.03.05	e-Learning Package: e-learning packages shall be supplied for the equipment / system for the following Steam Turbine Generator & auxiliaries and Steam Generator & auxiliaries along with associated electrical and C&I system.
8.03.05.01	Steam Turbine Generator & Auxiliaries Steam Turbine including stop valves, control valves, overload valves and cross over piping. Steam Turbine Auxiliary Systems including Quick Closing and Ordinary NRVs, Turbine gland sealing system, Lubricating oil system and its purification system, Centralized oil storage and its purification system, Control fluid and its purification system, governing and protection system, exhaust hood spray cooling system, drainage and vent system, turbine preservation system, HP/LP Bypass system. Generator and Auxiliary System including Generator, complete hydrogen cooling, carbon dioxide and nitrogen gas systems as applicable, complete seal oil system, complete water cooling system where applicable and complete excitation system. Condensing Plant including Condenser, Condenser air evacuation system and Condenser on load tube cleaning system as applicable etc. Drip Pump along with all accessories as applicable, Condensate Extraction Pumps along with all accessories, Deaerator level Control Station, Feed Water Heating Plant including Drain Cooler, low pressure heaters, deaerator and feed storage tank, high pressure heaters and associated accessories, Boiler Feed Pumps along with all accessories, Drive Turbine for Boiler Feed Pump along with all accessories, Feed regulating station, Make up system to Condenser, Gland Steam Condenser Recirculation System, Turbine Hall EOT Cranes and EOT Crane for Boiler Feed Pump as applicable.
8.03.05.02	Steam Generator & Auxiliaries Furnace/evaporator, separator & drain collection vessel, superheater, reheater, economiser, startup recirculation & drain system, desuperheating spray system, safety valves, soot blowing system, draft plant including FD & ID fans, PA fan, air preheaters, SCAPH, coal preparation and firing system including raw coal feeder and pulverisers, coal burners, fuel oil system and oil burners, Electrostatic precipitator, NOx control system and Flue gas desulphurisation system, Aux. PRDS system.
8.03.05.03	These packages shall be installed on the Learning Management Server (LMS) of Power Management Institute (PMI), NTPC located at Noida. The Engineer- In-Charge (EIC) for the e-learning modules shall be from PMI. 1. The objective of the e-Learning package consisting of courses for erection, commissioning, operation and maintenance of equipment / system as specified

above is to facilitate the employees to have first hand information / requirement with respect to above activities for the supplied equipment / system .

2. The bidder shall submit e-learning courses each for erection, commissioning, operation and maintenance of each of the equipment / system supplied as above.
 - a. The erection course(s) should include instructions on pre-checks, prerequisites, erection strategy, erection procedure etc.
 - b. The commissioning course(s) should include instructions on pre-commissioning, commissioning, initial operation etc.
 - c. The operation course(s) should include instructions on the permissive, interlocks, physical check-ups, start-up, shutdown and protections etc.
 - d. The maintenance course(s) should include instructions on predictive, preventive, breakdown and overhauling.

Depth of coverage of above courses shall be as specified for **“Instruction Manuals”** in above clauses. A literature on caution / safety while handling equipment / system for the above modules shall follow the description of the said equipment /system.

3. The e-Learning packages on equipment / system shall be installed by the vendor and shall be successfully test run in the presence of EIC or representative before acceptance by NTPC. The vendor will also give the master copy in form of Flash Drive/CD/DVD. The respective module for erection & commissioning shall be delivered and successfully test run at least three months before the scheduled start of the corresponding activity at site.

The respective module for operation & maintenance shall be delivered and successfully test run at least three months before scheduled first synchronization of first unit.

4. e-Learning course broad requirements:

- a. The courses shall be web based and mobile based Application type. It shall run on all possible versions of web browser like Internet Explorer, Google Chrome, Firefox etc. on Laptop/Desktop and shall be Smartphone/Tablet/Mobile responsive. The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.
- b. The courses shall support liquid/fluid page layout so that the entire screen gets adjusted to PC, Laptop, Smartphone/Mobile, Tablet and any other display devices.
- c. Course content text shall be in English language and be associated with a voiceover in English language with Indian accent.

- d. Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.
- e. Each course shall have every physical and functional detail of the equipment / system supplied.
- f. Each of the e-Learning course shall be based on multiple web pages and mobile pages with multiple modules.
- g. There shall be option for self-assessment test after every course. In case the user doesn't opt for self-assessment test the user shall be able to go to the next course. There shall be no restriction in no. of times for repeating the assessments. All correct answers along with the answers marked by the users shall be displayed at the end of test/quiz.
- h. If Java and Flash, as applicable are not available in the system to run the package, then there shall be a prompt message for updation of the same.
- i. Each course shall have a self-running interactive content with navigation buttons containing forward, backward, pause, bookmark and menu options in the course window.
- j. The course shall contain chapter titled 'Introduction/overview' that explains the purpose of the course.
- k. The course content shall contain descriptive text shall be factual, specific, terse, clearly worded, and simply illustrative, so that the user can understand it.
- l. The system shall provide the user with the ability to select the information with a Cursor.
- m. The course menu should contain table of content linked to concerned pages. The user shall be given the capability to access all of the functions available on the system through a menu system. This shall consist of active buttons, which shall control a hierarchy of pull down/pop-up menus. Menu shall appear quickly and exist only while a selection is being made. The user shall be given the capability to position the cursor or pointer on the menu item and use pointer device such as mouse to activate the function.
- n. Every course shall contain the 3D design/drawing/exploded view/360° turn around view of the equipment/system, textual description of the equipment/system and its functionality with video (as applicable), animation and audio.
- o. The users shall be able to control audio sound level associated with the courses.
- p. Drawings / text in the courses shall be scalable (Zoom In/ Out).
- q. The user shall have the capability to record a **bookmark** to mark displayed information for later recall, whenever he accesses the same course next time.

Notes:

1. e-learning Package of an equipment / system shall include e-learning courses for each of erection, commissioning, operation and maintenance of that equipment / system.
2. e-learning courses on erection, commissioning, operation and maintenance of an equipment / system shall include e-learning lessons/chapters/modules (as required) for erection, commissioning, operation and maintenance respectively of that equipment / system.
3. The vendor shall get the approval of one sample course from EIC before proceeding for further courses.

8.04.00

Provision for Fail Safe operation of vital Equipments

All the Plant and equipments / Systems supplied under the contract shall be designed following "Fail Safe" concept. In case of failure of Power supply like Electric power, Hydraulic pressure, Pneumatic pressure, Vacuum etc. the system should be designed in such a way that the equipment/Valves/dampers etc. shall always move/remains (as applicable) to safest position as per system requirement to ensure safety of Man and Machinery.

8.05.00

Engineering Co-ordination Procedure

8.05.01

The following principal coordinators will be identified by respective organizations at time of award of contract:

NTPC Engineering Coordinator (NTPC EC):

Name :

Designation :

Address :

a) Postal :

b) Telegraphic / e-Mail :

c) FAX : TELEPHONE :

Contractor's/ Vendor's Engineering Coordinator (VENDOR EC):

Name :

Designation :

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	Address : a) Postal : b) Telegraphic / e-Mail : c) FAX : TELEPHONE :
8.05.02	All engineering correspondence shall be in the name of above coordinators on behalf of the respective organizations.
8.05.03	Contractor's/Vendor's Drawing Submission and Approval Procedure: a) All data/information furnished by Vendor in the form of drawings/ documents/catalogues or in any other form for NTPC's information/ interface and or review and approval are referred by the general term "drawings". b) Not used c) All drawings (including those of subvendor's) shall bear at the right hand bottom corner the 'title plate' with all relevant information duly filled in. The Contractor shall furnish this format to his sub-vendor along with his purchase order for sub-vendor's compliance. d) Not used e) The contractor shall make a visit to site to see the existing facilities and understand the layout completely and collect all necessary data / drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same. f) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper endorsement for checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission. g) The Contractor shall submit drawing / data / document for Employer's review and approval. The drawings submitted by the Contractor/vendor shall be reviewed by NTPC and their comments shall be forwarded within three (3) weeks of receipt of drawings. Upon review of each drawing, depending on



the correctness and completeness of the drawing, the same will be categorized and approval accorded in one of the following categories:

CATEGORY- I: Approved

CATEGORY- II Approved, subject to incorporation of comments/ modification as noted. Resubmit revised drawing incorporating the comments.

CATEGORY –III Not approved. Resubmit revised drawings for approval after incorporating comments/ modification as noted.

CATEGORY -IV For information and records.

- h) Contractor shall resubmit the drawings approved under Category II, III & IVR within two (2) weeks of receipt of comments on the drawings, incorporating all comments. Every revision of the drawing shall bear a revision index wherein such revisions shall be highlighted in the form of description or marked up in the drawing identifying the same with relevant revision Number enclosed in a triangle (eg. 1, 2, 3 etc). Contractor shall not make any changes in the portions of the drawing other than those commented. If changes are required to be made in the portions already approved, the Contractor shall resubmit the drawing identifying the changes for Employer's review and approval. **Drawings resubmitted shall show clearly the portions where the same are revised marking the relevant revision numbers and Employer shall review only such revised portion of documents.**
- i) In case, the Contractor/ Vendor does not agree with any specific comment, he shall furnish the explanation for the same to NTPC for consideration. In all such cases the Contractor shall necessarily enclose explanations along with the revised drawing (taking care of balance comments) to avoid any delay and/or duplication in review work.
- j) It is responsibility of the Contractor/ Vendor to get all the drawings approved in the Category I & IV (as the case may be) and complete engineering activities within the agreed schedule. Any delay arising out of submission and modification of drawings shall not alter the contract completion schedule.
- k) If Contractor/ Vendor fails to resubmit the drawings as per the schedule, construction work at site will not be held up and work will be carried out on the basis of comments furnished on previous issues of the drawing.
- l) These comments will be taken care by the contractor while submitting the revised drawing.

	The contractor shall use a single transmittal for drawings. Submission. This shall include transmittal numbers and date, number of copies being sent, names of the agencies to whom copies being sent, drawing number and titles, remarks or special notes if any etc.
8.06.00	ENGINEERING PROGRESS AND EXCEPTION REPORT
8.06.01	The Contractor shall submit every month an Engineering progress and Exception Report giving the status of each engineering information including a) A list of drawings/engineering information which remains unapproved for more than four (4) weeks after the date of first submission b) Drawings which were not submitted as per agreed schedule.
8.06.02	The draft format for this report shall be furnished to the Employer within four (4) weeks of the award of the contract, which shall then be discussed and finalised with the Employer.
9.00.00	TECHNICAL CO-ORDINATION MEETING
9.01.00	The Contractor shall be called upon to organise and attend monthly Design/ Technical Co-ordination Meetings (TCMs) with the Employer/Employer's representatives and other Contractors of the Employer during the period of contract. The Contractor shall attend such meetings at his own cost at NEW DELHI / NOIDA or at mutually agreed venue as and when required and fully co-operate with such persons and agencies involved during the discussions.
9.02.00	The Contractor should note that Time is the essence of the contract. In order to expedite the early completion of engineering activities, the comments of the Employer shall be discussed across the table during the above Technical Co-ordination Meeting (s) wherein best efforts shall be made by both sides to ensure the approval of the drawing.
9.02.01	The Contractor shall ensure availability of the concerned experts / consultants/ personnel who are empowered to take necessary decisions during these meetings. The Contractor shall be equipped with necessary tools and facilities so that the drawings/documents can be resubmitted after incorporating necessary changes and approved during the meeting itself.
9.02.02	Should any drawing remain unapproved for more than six (6) weeks after it's first submission, this shall be brought out in the monthly Engineering Progress and Exception Report with reasons thereof.

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9.03.0	Any delays arising out of failure by the Contractor to incorporate Employer's comments and resubmit the same during the TCM shall be considered as a default and in no case shall entitle the Contractor to alter the Contract completion date.
10.00.00	DESIGN IMPROVEMENTS The Employer or the Contractor may propose changes in the specification of the equipment or quality thereof and if the parties agree upon any such changes the specification shall be modified accordingly. If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any changing the price and/or schedule of completion before the Contractor proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.
11.00.00	EQUIPMENT BASES A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base, unless otherwise specifically agreed to by the Employer. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.
12.00.00	PROTECTIVE GUARDS Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards shall be designed for easy installation and removal for maintenance purpose.
13.00.00	LUBRICANTS, SERVO FLUIDS AND CHEMICALS
13.01.00	All the first fill and one year's topping requirement of consumables such as greases, oils, lubricants, servo fluids / control fluids, gases (excluding H₂, CO₂ and N₂ for Generator) etc. which will be required to put the equipment covered under the scope of specifications into successful commissioning/initial operation and to establish completion of facilities shall be supplied by the contractor. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum. Bidder scope shall include supply of H₂, CO₂ and N₂ as applicable for the Generator till successful commissioning of Generator. Bidder shall supply a quantity not less than 10% of the full charge or one (1) year topping requirement mentioned above (Whichever is higher) of each variety of lubricants, servo fluids, gases etc. (as detailed above) used which is expected to be

	utilized during the first year of operation. This additional quantity shall be supplied in separate containers.
13.02.00	As far as possible lubricants marketed by the Indian Oil Corporation shall be used. The variety of lubricants shall be kept to a minimum possible. Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals etc. required for the complete plant covered herein shall be furnished. On completion of erection, a complete list of bearings/ equipment giving their location and identification marks shall be furnished to the Employer alongwith lubrication requirements.
14.00.00	LUBRICATION
14.01.00	Equipment shall be lubricated by systems designed for continuous operation. Lubricant level indicators shall be furnished and marked to indicate proper levels under both standstill and operating conditions.
15.00.00	MATERIAL OF CONSTRUCTION
15.01.00	All materials used for the construction of the equipment shall be new and shall be in accordance with the requirements of this specification. Materials utilised for various components shall be those which have established themselves for use in such applications.
16.00.00	RATING PLATES, NAME PLATES & LABELS
16.01.00	Each main and auxiliary item of plant shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the Employer.
16.02.00	Each item of plant shall be provided with nameplate or label designating the service of the particular equipment. The inscriptions shall be approved by the Employer or as detailed in appropriate section of the technical specifications.
16.03.00	Such nameplates or labels shall be of white non-hygroscopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back.
16.04.00	Items of plant such as valves, which are subject to handling, shall be provided with an engraved chromium plated nameplate or label with engraving filled with enamel. The name plates for valves shall be marked in accordance with MSS standard SP-25 and ANSI B 16.34 as a minimum.



16.05.00	Hanger/ support numbers shall be marked on all pipe supports, anchors, hangers, snubbers and restraint assemblies. Each constant and variable spring support shall also have stamped upon it the designed hot and cold load which it is intended to support.
16.06.00	Valves, steam traps and strainers shall be identified by Employer's tag number of a metal tap permanently attached to non-pressure parts such as the yoke by a stainless steel wire. The direction of flow shall also be marked on the body.
16.07.00	Safety and relief valves shall be provided with the following: - Manufacturer's identification. - Nominal inlet and outlet sizes in mm. - Set pressure in Kg/cm² (abs). - Blowdown and accumulation as percentage of set pressure. - Certified capacity in Kg of saturated steam per hour or in case of liquid certified capacity in litres of water per minute.
16.08.00	All such plates, instruction plates, etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.
16.09.00	All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system.
17.00.00	TOOLS AND TACKLES The Contractor shall supply with the equipment one complete set of all special tools and tackles and other instruments required and other instruments for the erection, assembly, disassembly and proper maintenance of the plant and equipment and systems (including software). These special tools will also include special material handling equipment, jigs and fixtures for maintenance and calibration / readjustment, checking and measurement aids etc. A list of such tools and tackles shall be submitted by the Bidder alongwith the offer. The price of each tool / tackle shall be deemed to have been included in the total bid price. These tools and tackles shall be separately packed and sent to site. The Contractor shall also ensure that these tools and tackles are not used by him during erection, commissioning and initial operation. For this period the Contractor should bring his own tools and tackles. All the tools and tackles shall be of reputed make acceptable to the Employer.
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18.00.00	WELDING
18.01.00	If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed by others the requirements shall be submitted to the Employer in advance of commencement of erection work.
19.00.00	COLOUR CODE FOR ALL EQUIPMENTS/ PIPINGS/ PIPE SERVICES
19.01.00	All equipment/ piping/ pipe services are to be painted by the Contractor in accordance with Employer's standard colour coding scheme, which will be furnished to the Contractor during detailed engineering stage.
20.00.00	PROTECTION AND PRESERVATIVE SHOP COATING
20.01.00	PROTECTION All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either metallic or a non-metallic protection device. All ends of all valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. All primers/paints/coatings shall take into account the hot humid, corrosive & alkaline, subsoil or over ground environment as the case may be. The requirements for painting specification shall be complied with as detailed out in Part-A & B of the Technical Specification.
20.02.00	PRESERVATIVE SHOP COATING All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall be treated beforehand and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and prepared in the shop. The surfaces that are to be finish-painted after installation or require corrosion protection until installation, shall be shop painted as per the requirements covered in the relevant part of the Technical Specification. Transformers and other electrical equipments, if included shall be shop finished with one or more coats of primer and two coats of high grade resistance enamel. The finished colors shall be as per manufacturer's standards, to be selected and specified by the Employer at a later date.
20.03.00	Shop primer for all steel surfaces which will be exposed to operating temperature below 95 degrees Celsius shall be selected by the Contractor after obtaining specific approval of the Employer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperature

	higher than 95 degrees Celsius and such primer shall also be subject to the approval of the Employer.
20.04.00	All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of the Employer.
20.05.00	All piping shall be cleaned after shop assembly by shot blasting or other means approved by the Employer. Lube oil piping or carbon steel shall be pickled.
20.06.00	Painting for Civil structures and equipment/system covered under this package shall be done as specified under technical requirements on civil works in relevant part of this specifications.
21.00.00	QUALITY ASSURANCE PROGRAMME
21.01.00	To ensure that the equipment and services under the scope of contract whether manufactured or performed within the Contractor's works or at his sub-contractor's premises or at the Employer's site or at any other place of work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Employer/authorised representative after discussions before the award of the contract. The QA programme shall be generally in line with ISO-9001/IS-14001. A quality assurance programme of the contractor shall generally cover the following: a) His organisation structure for the management and implementation of the proposed quality assurance programme b) Quality System Manual c) Design Control System d) Documentation Control System e) Qualification data for Bidder's key Personnel. f) The procedure for purchase of materials, parts, components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc. g) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls. h) Control of non-conforming items and system for corrective actions. i) Inspection and test procedure both for manufacture and field activities.

- j) Control of calibration and testing of measuring testing equipments.
- k) System for Quality Audits.
- l) System for indication and appraisal of inspection status.
- m) System for authorising release of manufactured product to the Employer.
- n) System for handling storage and delivery.
- o) System for maintenance of records, and
- p) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component .Formats for the same will be shared along with QA Coordination procedure.

22.00.00 GENERAL REQUIREMENTS - QUALITY ASSURANCE

22.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive programme as it is the contractor's responsibility to draw up and implement such programme duly approved by the Employer. The detailed Quality Plans for manufacturing and field activities shall be drawn up by the Bidder and will be submitted to Employer for approval. Schedule of finalisation of such quality plans will be finalised before award on enclosed format No. QS-01-QAI-P-1/F3-R0. Monthly progress reports shall be furnished.

22.02.00 Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's/ Sub-contractor's/ sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing. The Quality Plan shall be submitted on electronic media through C-folders, a web based system of NTPC ERP, for review and approval.

22.03.00 Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's "Site Quality Control Organisation", during various stages of site activities starting from receipt of materials/equipment at site.

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22.04.00	The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality Plans and reference documents/standards etc. will be subject to Employer's approval without which manufacturer shall not proceed. These approved documents shall form a part of the contract. In these approved Quality Plans, Employer shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the Employer's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Employer in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Employer along with technical justification for approval and dispositioning.
22.05.00	The contractor shall submit to the Employer Field Welding Schedule for field welding activities in the format enclosed at Annexure-V . The field welding schedule shall be submitted to the Employer along with all supporting documents, like welding procedures, heat treatment procedures, NDT procedures etc. at least ninety days before schedule start of erection work at site.
22.06.00	The contractor shall have suitable Field Quality Organization with adequate manpower at Employer's site, to effectively implement the Field Quality Plan (FQP) and Field Quality Management System for site activities. The contractor shall submit the details of proposed FQA setup (organizational structure and manpower) for employer's approval. The FQA setup shall be in place at least one month before the start of site activities.
22.07.00	No material shall be despatched from the manufacturer's works before the same is accepted by Employer's Project Manager/Authorised representative and duly authorised for despatch by issuance of Material Dispatch Clearance Certificate (MDCC / CHP Clearance).
22.08.00	All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties; chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details
22.09.00	All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the Employer. All welding/brazing procedures shall be submitted to the Employer or its authorized representative prior to carrying out the welding/brazing.
22.10.00	All brazers, welders and welding operators employed on any part of the contract either in Contractor's/his sub-contractor's works or at site or elsewhere shall be

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	qualified as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the Employer. All welding / brazing procedures qualified / used at shop, will be made available to NTPC during audit / inspection. Procedures to be qualified at site will be submitted to NTPC for approval.
22.11.00	Not Used.
22.12.00	For all IBR pressure parts and high pressure piping welding, the latest applicable requirements of the IBR (Indian Boiler Regulations) shall also be essentially complied with. However, other piping shall be as per relevant code. Similarly, any other statutory requirements for the equipment/systems shall also be complied with. On all back-gauged welds MPI/LPI shall be carried before seal welding
22.13.00	All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.
22.14.00	No welding shall be carried out on cast iron components for repair.
22.15.00	Unless otherwise proven and specifically agreed with the Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
22.16.00	All non-destructive examination shall be performed in accordance with written procedures as per International Standards, The NDT operator shall be qualified as per SNT-TC-IA (of the American Society of non-destructive examination). NDT shall be recorded in a report, which includes details of methods and equipment used, result/evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job.
	In general all plates of thickness greater than 40mm & for pressure parts plates of thickness equal to or greater than 25mm shall be ultrasonically tested otherwise as specified in respective equipment specification. All bar stock/Forging of diameter equal to or greater than 40 mm shall be Ultrasonically tested.
22.17.00	The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the sub-vendors proposed by the Main contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment etc., list of which shall be drawn up by the Contractor and finalised with the Employer, shall be subject to Employer's approval on enclosed format as Annexure-III. List of NTPC approved sub vendors against similar Pkg/items is attached as Section-VI, Part-B ,Chapter E-60 Indicative sub-vendor list. The contractor's proposal for any new sub vendor for any of the items identified in indicative sub-vendor list shall necessarily be furnished in the sub vendor questionnaire & main Contractor Evaluation report format attached as Annexure- VII with all relevant documents and main contractor's own assessment report

assessed as per their quality management system for NTPC review and acceptance

New sub vendor proposal will only be considered for NTPC review, provided the proposal is 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.

Major checks and quality requirements as mentioned below shall necessarily be assessed by main contractor and complied with documentary support in case the same is not the part of their Quality management system.

- i. Duly Filled Main supplier Evaluation Report.
- ii. Duly Filled Sub-Supplier Questionnaire.
- iii. Factory Registration Certificate.
- iv. Overall Organization Chart with Manpower details (Design, Manufacturing, Quality etc.)
- v. Supply reference list of the Sub-Supplier indicating similar product supply order reference no., customer name, rating of product, date /year of supply, date / year of commissioning.
- vi. List of Manufacturing Equipment available with sub vendor.
- vii. List of Testing Equipment available with sub vendor.
- viii. Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any.
- ix. Details of Outsourced Manufacturing Processes, if any.
- x. Quality control exercised during receipt, in-process & final inspection.
- xi. Compliance of Statutory requirements (As applicable)

After first submission of proposal to NTPC , In absence of relevant documents/ Incompleteness of the proposal, The main contractor will be given a period of maximum 10 days to submit the compliance of the NTPC comments. In case of noncompliance it will be presumed that main contractor is not serious about pursuing the proposal & the proposal will be foreclosed.

The proposed Sub vendor will be assessed broadly on following criteria

- i) Quality Management System Compliance including raw material/BOI control, traceability & control over outsources process
- ii) Design Capabilities (As applicable)
- iii) Manufacturing, Testing & Storage Facility
- iv) Processing Capabilities
- v) Supply Experience
- vi) Safety Aspect

In case of major observations or non-compliance observed during sub vendor works visit (Jointly with the main contractor) with respect to the submitted documents, proposed sub vendor will not be considered for acceptance and Main contractor will be solely responsible in such cases.

Monthly progress reports on sub-vendor detail. Submission / approval shall be furnished preferably on enclosed format at Annexure-IV. Such vendor approval shall not relieve the contractor from any obligation, duty or responsibility under the contract.

22.18.00	For components/equipment procured by the contractors for the purpose of the contract, after obtaining the written approval of the Employer, the contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the sub-contractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful vendors shall be finalised with the Employer and such approved Quality Plans shall form a part of the purchase order/contract between the Contractor and sub-contractor. Within two (2) weeks of the release of the purchase orders /contracts for such bought out items /components, a copy of the same without price details but together with the detailed purchase specifications, quality plans and delivery conditions shall be furnished to the Employer on the monthly basis by the Contractor along with a report of the Purchase Order placed so far for the contract.
22.19.00	Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-contractor's quality management and control activities. The contractor shall provide all necessary assistance to enable the Employer carry out such audit and surveillance.
22.20.00	The contractor shall carry out an inspection and testing programme during manufacture in his work and that of his subcontractor's and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. Contractor shall carry out all tests/inspection required to establish that the items/equipment conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan.
22.21.00	Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Employer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.
22.22.00	For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.
22.23.00	Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Employer/ authorised representative.
22.24.00	Environmental Stress Screening Environmental stress screening test process / procedure for eliminating infant mortile components for DDCMIS / PLC based system & for other systems having

	substantial electronics components (as determined by employer) like Electronic transmitter, CCTV components, PA systems etc. shall be furnished for NTPC acceptance
22.25.00	The Contractor / Sub-contractor shall carry out routine test on 100% item at contractor / sub-contractor's works. The quantum of check / test for routine & acceptance test by employer shall be generally as per criteria / sampling plan defined in referred standards. Wherever standards have not been mentioned quantum of check / test for routine / acceptance test shall be as agreed during detailed engineering stage.
22.26.00	Software Reliability / Quality Certification Certification from OEM's authorized signatory that software offered with DDCMIS, PLC, CCTV, PA, Pyrometer, CEMS, AAQMS, EQMS, BHMS etc. declaring that the all the offered software(s) had gone through the established software quality test and offered software is not of β-version and offered software is also free from all known bugs as on date of approval of systems documents by NTPC as a part of quality documentation review and approval process during detail engineering.
23.00.00	QUALITY ASSURANCE DOCUMENTS
23.01.00	The Contractor shall be required to submit the QA Documentation in soft copies, as identified in respective quality plan with tick (✓) mark.
23.01.01	Each QA Documentation shall have a project specific Cover Sheet bearing name & identification number of equipment and including an index of its contents with page control on each document. The QA Documentation file shall be progressively completed by the Supplier's sub-supplier to allow regular reviews by all parties during the manufacturing. The final quality document will be compiled and issued at the final assembly place of equipment before despatch. However, soft copies will be furnished not later than two (2) weeks.
23.02.00	Typical contents of QA Documentation is as below:- (a.) Quality Plan (b.) Material mill test reports on components as specified by the specification and approved Quality Plans. (c.) Manufacturer / works test reports/results for testing required as per applicable codes and standard referred in the specification and approved Quality Plans. (d.) Non-destructive examination results /reports including radiography interpretation reports. Sketches/drawings used for indicating the method of traceability of the radiographs to the location on the equipment.

	(e.) Heat Treatment Certificate/Record (Time- temperature Chart) (f.) All the accepted Non-conformance Reports (Major/Minor)/deviation, including complete technical details / repair procedure). (g.) CHP / Inspection reports duly signed by the Inspector of the Employer and Contractor for the agreed Customer Hold Points. (h.) Certificate of Conformance (COC) wherever applicable. (i.) MDCC
23.03.00	Similarly, the contractor shall be required to submit soft copies containing QA Documentation pertaining to field activities as per Approved Field Quality Plans and other agreed manuals/ procedures, prior to commissioning of individual system.
23.04.00	Before despatch / commissioning of any equipment, the Supplier shall make sure that the corresponding quality document or in the case of protracted phased deliveries, the applicable section of the quality document file is completed. The supplier will then notify the Inspector regarding the readiness of the quality document (or applicable section) for review. (a.) If the result of the review carried out by the Inspector is satisfactory, the Inspector shall stamp the quality document (or applicable section) for release. (b.) If the quality document is unsatisfactory, the Supplier shall endeavor to correct the incompleteness, thus allowing to finalize the quality document (or applicable section) by time compatible with the requirements as per contract documents. When it is done, the quality document (or applicable section) is stamped by the Inspector. (c.) If a decision is made for despatch, whereas all outstanding actions cannot be readily cleared for the release of the quality document by that time, the supplier shall immediately, upon shipment of the equipment, send a copy of the quality document Review Status signed by the Supplier Representative to the Inspector and notify of the committed date for the completion of all outstanding actions & submission. The Inspector shall stamp the quality document for applicable section when it is effectively completed. The submission of QA documentation package shall not be later than two (2) weeks after the despatch of equipment.
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23.05.00	TRANSMISSION OF QA DOCUMENTATION On release of QA Documentation by Inspector, one set of quality document shall be forwarded to Corporate Quality Assurance Department and other set to respective Project Site of Employer. For the particular case of phased deliveries, the complete quality document to the Employer shall be issued not later than two (2) weeks after the date of the last delivery of equipment.
24.00.00	PROJECT MANAGER'S SUPERVISION
24.01.00	To eliminate delays and avoid disputes and litigation, it is agreed between the parties to the Contract that all matters and questions shall be referred to the Project Manager and without prejudice to the provisions of 'Arbitration' clause in Section GCC, the Contractor shall proceed to comply with the Project Manager's decision.
24.02.00	The work shall be performed under the supervision of the Project Manager. The scope of the duties of the Project Manager pursuant to the Contract, will include but not be limited to the following: (a.) Interpretation of all the terms and conditions of these documents and specifications (b.) Review and interpretation of all the Contractor's drawing, engineering data, etc. (c.) Witness or his authorised representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract (d.) Inspect, accept or reject any equipment, material and work under the contract (e.) Issue certificate of acceptance and/or progressive payment and final payment certificates (f.) Review and suggest modifications and improvement in completion schedules from time to time, and (g.) Supervise Quality Assurance Programme implementation at all stages of the works.

25.00.00	INSPECTION, TESTING AND INSPECTION CERTIFICATES
25.01.00	The word 'Inspector' shall mean the Project Manager and/or his authorised representative and/or an outside inspection agency acting on behalf of the Employer to inspect and examine the materials and workmanship of the works during its manufacture or erection.
25.02.00	The Project Manager or his duly authorised representative and/or an outside inspection agency acting on behalf of the Employer shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Project Manager and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.
25.03.00	The Contractor shall give the Project Manager/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within fifteen (15) days of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.
25.04.00	The Project Manager or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall inform in writing to the Project Manager/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.
25.05.00	When the factory tests have been completed at the Contractor's or subcontractor's works, the Project Manager /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector. Failure on the part of Project Manager /Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests or the issue of the certificates shall not bind the Employer to accept the equipment should it, on further tests after erection be found not to comply with the contract.
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25.06.00	In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, material, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Project Manager /Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the Project Manager/Inspector or to his authorised representative to accomplish testing.
25.07.00	The inspection by Project Manager / Inspector and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the contract.
25.08.00	To facilitate advance planning of inspection in addition to giving inspection notice as specified at clause no. 25.03.00 - of this chapter, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at Customer Hold Point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.
25.09.00	All inspection, measuring and test equipment used by contractor shall be calibrated periodically depending on its use and criticality of the test/measurement to be done. The Contractor shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by NTPC. Wherever asked specifically, the contractor shall re-calibrate the measuring/test equipment in the presence of Project Manager / Inspector.
25.10.00	ASSOCIATED DOCUMENT FOR QUALITY ASSURANCE PROGRAMME
25.10.01	List of items requiring quality plan and sub supplier approval. Format No.: QS-01-QAI-P-01/F3-R0 (Annexure-III).
25.10.02	Status of items requiring Quality Plan and sub supplier approval. Format enclosed at Annexure-IV .
25.10.03	Field Welding Schedule Format enclosed at Annexure-V .
25.11.00	TESTING OF MAJOR DESIGN FEATURES: The major design features of the system shall be demonstrated by the Contractor at the Contractor's works or any other place mutually agreed within Six months from the date of LOA. These are the system function tests, which have a major impact on the detailed system design & finalization of important engineering documents like configuration, functional grouping, BOM etc., but do not require a fully engineered system for conductance. Bidder shall identify these features & include detailed test procedures in the bid, which shall be finalized during discussions with the bidder

before award. The developments and any augmentation of standard features undertaken by the Bidder to fulfill the various specification requirements, shall be also be tested during these major design tests. This shall include but not be limited to the following.

- a) System accuracy tests of DDCMIS for the various type of inputs identified in Part-B.
- b) Loop reaction time for sample loops/ logics.
- c) SOE functionality tests.
- d) Server changeover.
- e) Various response times, having serious implication on operation & maintenance philosophy.
- f) Duty cycle of controller/ HMIPIS with simulated load, representative of the final engineered load.
- g) Connectivity of Switchgear DDCMIS with Switchgear Relay Network.

The results of the above tests, after its acceptance by the Employer, shall be properly documented and submitted to Employer.

If any of the envisaged tests have been carried out by Bidder in a previous NTPC project, then the same need not be specifically conducted by the Bidder for this project, provided it is clearly established by the Bidder & accepted by the Employer that there is no difference between the system offered for this project & the previous NTPC project with respect to the test. However, even in such a case, test report of the previous project shall be submitted by the Bidder as a part of MDFT (Major Design Feature Test) test report.

25.12.00

DEMONSTRATION OF APPLICATION ENGINEERING

25.12.01

Contractor shall prepare and submit typical implemented scheme in their system (Control system & HMI) on sample basis. The typical cases to be covered shall include but not be limited to the following.

- (i) Logics/Loops:
 - a) Drive logics implementation for each type of binary drive along with its display in HMI.
 - b) Sequence implementation along with its display in HMI.

	c) Single non-cascade controller implementation. d) Cascade loop implementation. e) Master slave implementation with different slave combination. f) Temperature & pressure compensation for flow signals & pressure compensation for level signals as applicable. (ii) HMI Functions: a) LVS Annunciation. b) Graphics. c) HSR d) Logs/Reports. e) Calculations (Basic & Performance Calculations).
25.12.02	The above typical cases shall be finalized with the Employer through Technical Co-ordination meetings. After review and finalization of the typical cases, the implementation of each logic & control loop shall be carried out by the Contractor. After implementation of these logics & loops, the Contractor shall test each logic /loop and record the observations and demonstrate to Employer at Employer premises during engineering finalization. Any modifications as a result of the demonstration shall be done and documented as part of the test report along with the final scheme. Similarly, HMI functions shall also be demonstrated by the Contractor at Employer premises & the results shall be documented as part of test report.
25.12.03	During the integrated testing at the Contractor's works, only sample checks shall be done by the Employer for the items covered in above application engineering demonstration.
26.00.00	PRE-COMMISSIONING AND COMMISSIONING FACILITIES
26.01.00	(a) As soon as the facilities or part thereof has been completed operationally and structurally and before start-up, each item of the equipment and systems forming part of facilities shall be thoroughly cleaned and then inspected jointly by the Employer and the Contractor for correctness of and completeness of facility or part thereof and acceptability for initial pre-commissioning tests, commissioning and start-up at Site. The list of pre-commissioning tests to be performed shall be as mutually agreed and

	included in the Contractor's quality assurance programme as well as those included in Part-D, Section-VI and elsewhere in the Technical Specifications. (b) The Contractor's pre-commissioning/ commissioning/start-up engineers, specially identified as far as possible, shall be responsible for carrying out all the pre-commissioning tests at Site. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the commissioning of the complete facilities shall be commenced during which period the complete facilities, equipments shall be operated integral with sub-systems and supporting equipment as a complete plant. (c) All piping system shall be flushed, steam blown, air blown as required and cleanliness demonstrated using acceptable industry standards. Procedures to accomplish this work shall be submitted for approval to the Employer six months prior to the respective implementations. The Employer will approve final verification of cleanliness. (d) The time consumed in the inspection and checking of the units shall be considered as a part of the erection and installation period. (e) The check outs during the pre-commissioning period should be programmed to follow the construction completion schedule. Each equipment/system, as it is completed in construction and turned over to Employer's commissioning (start-up) Engineer(s), should be checked out and cleaned. The checking and inspection of individual systems should then follow a prescribed schedule to be agreed by Employer. (f) The Contractor during initial operation and performance testing shall conduct vibration testing to determine the 'base line' of performance of all plant rotating equipment. These tests shall be conducted when the equipment is running at the base load, peak load as well as lowest sustained operating condition as far as practicable.
26.01.00	Contractor shall furnish the commissioning organization chart for review & acceptance of employer at least eighteen months prior to the schedule date of synchronization of 1st unit. The chart should contain: (1.) Biodata including experience of the Commissioning Engineers. (2.) Role and responsibilities of the Commissioning Organisation members. (3.) Expected duration of posting of the above Commissioning Engineers at site.
26.02.00	Initial Operation (a) On completion of all pre-commissioning activities/ tests and as a part of commissioning the complete facilities shall be put on 'Initial Operation' during which period all necessary adjustments shall be made while operating over the full load range enabling the facilities to be made ready for the Guarantee Tests.

- (b) The 'Initial Operation' of the complete facility as an integral unit shall be conducted for 720 continuous hours. During the period of initial operation of 720 hours, the unit shall operate continuously at full rated load for a period not less than 72 hours.

The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.

The Contractor shall intimate the Employer about the commencement of initial operation and shall furnish adequate notice to the Employer in this respect.

- (c) Any loss of generation due to constraints attributable to the Employer shall be construed as Deemed Generation.
- (d) An Initial Operation report comprising of observations and recordings of various parameters to be measured in respect of the above Initial Operation shall be prepared by the Contractor. This report, besides recording the details of the various observations during initial operation shall also include the dates of start and finish of the Initial Operation and shall be signed by the representatives of both the parties. The report shall have sheets, recording all the details of interruptions occurred, adjustments made and any minor repairs done during the Initial Operation. Based on the observations, necessary modifications/repairs to the plant shall be carried out by the Contractor to the full satisfaction of the Employer to enable the latter to accord permission to carry out the Guarantee tests on the facilities. However, minor defects which do not endanger the safe operation of the equipment, shall not be considered as reasons for with- holding the aforesaid permission.

26.03.00

Guarantee Tests

- a) The final test as to prove the Functional Guarantees shall be conducted at Site by the Contractor in presence of the Employer. The contractor's Commissioning, start-up **Engineer** shall make the unit ready to conduct such test **before start of initial operation**. Such test **shall be conducted along with the** Initial Operations.
- b) These tests shall be binding on both the parties of the Contract to determine compliance of the equipment with the functional guarantee.
- c) For performance/ demonstration tests instrumentations, of accuracy class shall be as per specified test codes. The numbers and location of the instruments shall be as per the specified test codes. In addition the values of parameters shall be logged from the information system provided under Employer's Distributed Digital Control Monitoring and Information system. Test will be conducted at specified load points.

	d) Any special equipment, tools and tackles required for the successful completion of the Guarantee Tests shall be provided by the Contractor, free of cost. e) The Guarantee tests and specific tests to be conducted on equipments have been brought out in detail elsewhere in the specifications.
26.04.00	Before start of commissioning of critical equipment, Commissioning Clearance Certificate (CCC) to be submitted by Main contractor. List of the critical equipments and CCC format will be provided along with QA Coordination procedure.
27.00.00	TAKING OVER Upon successful completion of Initial Operations and all the tests conducted to the Employer's satisfaction, the Employer shall issue to the Contractor a Taking over Certificate as a proof of the final acceptance of the equipment. Such certificate shall not unreasonably be withheld nor will the Employer delay the issuance thereof, on account of minor omissions or defects which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of the Contract after issuance of such certificate.
28.00.00	TRAINING OF EMPLOYER'S PERSONNEL
28.01.00	The scope of service under training of Employer's engineers shall include a training module covering the areas of Operation & Maintenance. Such training should cover the following areas as a minimum in order to enable these personnel to individually take the responsibility of operating and maintaining the power station in a manner acceptable to the Employer: (a) Training for Steam Generator & ESP Equipment, TG & Auxiliaries and related equipments. (b) Training for Electric Systems including VFD and Electric power supply system. (c) Training for other SG/TG related C&I systems/equipments including training on Flame Monitoring System, Furnace and Flame Viewing System, Turbine Supervisory System (TSS) including vibration analyzer, vibration monitoring system axial shift, eccentricity measurements etc. for Main Turbine, BFP Turbine etc. Burner management study, control loop study, misc. system for SG C&I, EHTC, Turbine stress control system, Turbine protection system, ATRS, instrumentation etc. c1: Training on Engineering, Model building, pre-testing, Post -test fine tuning of Advance process control systems with faculty having experience of atleast 5 years in Model Process Control. (d) Training for special packages specified elsewhere in Technical Specification, Section-VI.
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- (e) Training for various C&I systems/equipment supplied includes the following:
- i) DDCMIS - Human Machine Interface – Hardware & Operating System
 - ii) DDCMIS-Human Machine Interface System Engineering & Application Software.
 - iii) DDCMIS – Control System Hardware and Control system Application Software.
 - iv) DDCMIS – Operator Training : Use of the system at Works + at site.
 - v) DDCMIS – Specialized Network security.
- (f) Training for power cycle piping/critical piping.
- (g) Training for UPS systems Annunciation system, SWAS, PA system, flue gas analyzers, CCTV and 24 VDC system.
- (h) Training on following aspects of fieldbus (i) Hardware & Software features (ii) System design, diagnostic and testing (iii) maintenance, troubleshooting and fault analysis.
- (i) Training on Non-Intrusive hardwired Electric Actuator and Fieldbus based Electric Actuator along with detail training on Foundation Fieldbus/ Profibus interface used in actuator
- (k) Training for numerical relays & networking systems supplied under MV & LT switchgear system.
- (l) Training courses on offered PLC system in the following areas:
- (a.) Operator training
 - (b.) Hardware Maintenance training
 - (c.) Software training
 - (d.) Any other specialized training as required for system operation and maintenance.
- (m) Training for Ash Handling System & Coal Handling Plant Equipment and Auxiliaries

Area	Topics	Mandays
Ash Handling Plant	Product design - Basic design features - Theory & principle of operation - Latest technological trends in Ash handling plant and design Plant Visit - Operational feedback	300

GENERAL TECHNICAL REQUIREMENTS



	- O&M history/problems related to Ash handling plant - Visit to Manufacturer's Work - Manufacturing process of Ash handling equipments - Testing facilities - Operation & Maintenance of Plant - Trouble shooting and fault analysis - Familiarization of special maintenance techniques - Special tool and tackles familiarization	
Coal Handling Plant	- Product design - Basic design features - Theory & principle of operation - Latest technological trends in Coal handling plant and design - Plant Visit - Operational feedback - O&M history/problems related to Coal handling plant - Visit to Manufacturer's Work - Manufacturing process of Coal handling equipments - Testing facilities - Operation & Maintenance of Plant - Trouble shooting and fault analysis - Familiarization of special maintenance techniques - Special tool and tackles familiarization	150

- n) Training for UF Membranes, RO membranes, Zero Liquid Discharge (ZLD) Chlorine Di-Oxide (ClO₂) generation & dosing system, Condensate Polishing Plant (CPU) and CW Treatment System.

Area	Topics	MANDAYS
UF Membranes	Product design -Basic design features -Theory & principle of operation -Latest technological trends in Ultrafiltration membranes and design -CIP & CEB of UF system Plant Visit	7

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GENERAL TECHNICAL REQUIREMENTS



- Operational feedback
- O&M history/problems related to UF membranes
- Visit to Manufacturer's Work**
- Manufacturing process of UF membranes and equipment
- Testing facilities
- Operation & Maintenance of Plant**
- Trouble shooting and fault analysis
- Familiarization of special maintenance techniques
- Special tool and tackles familiarization

Area	Topics	MANDAYS
RO membranes	Product design -Basic design features -Theory & principle of operation -Latest technological trends in RO membranes and design -Failure analysis, types of failures, causes & its evaluation, remedies -CIP of RO system Plant Visit -Operational feedback -O&M history/problems related to RO membranes Visit to Manufacturer's Work -Manufacturing process of RO membranes and equipment -Testing facilities Operation & Maintenance of Plant -Trouble shooting and fault analysis -Familiarization of special maintenance techniques -Special tool and tackles familiarization	7

Zero Liquid Discharge (ZLD)	System Design - Plant water optimization and Scheme to achieve the ZLD - Basic design features - Latest technological trends for ZLD in Thermal Power Plant Plant Visit - Operational feedback - O&M history/problems related to plant	5
Chlorine Di-Oxide (ClO₂) generation & dosing system	System/Product Design - Basic design features - Theory & principle of operation - Latest technological trends in Chlorine Di-Oxide (ClO₂) generation & dosing system and design aspects & Selection criteria. Plant Visit - Operational feedback - O&M history/ problems related to ClO₂ plant Performance Test of generator - Generator capacity performance testing. Operation & Maintenance of Plant -Trouble shooting and fault analysis -Familiarization of special maintenance techniques -Special tool and tackles familiarization	5
Condensate Polishing Plant (CPU)	System/Product Design - Basic design features including Pre-filters - Theory & principle of operation - Latest technological trends in CPU & Pre-filters and design aspects & Selection criteria. Plant Visit - Operational feedback - O&M history / problems related to CPU plant Visit to Manufacturer's Work -Manufacturing process of pre-filters and major equipment	3

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GENERAL TECHNICAL REQUIREMENTS



	-Testing facilities Operation & Maintenance of Plant -Trouble shooting and fault analysis -Familiarization of special maintenance techniques -Special tool and tackles familiarization	
CW Treatment System	System/Product Design - Basic design features - Theory & principle of operation - Latest technological trends and design aspects & Selection criteria. Operation & Maintenance of Plant - Operational feedback - O&M history / problems related to plant - Trouble shooting and fault analysis - Familiarization of special maintenance techniques - Special tool and tackles familiarization	3
Note: One week shall constitute of five (5) man days.		

(o) Training for **Substation Automation System****PRODUCT****AREAS OF TRAINING REQUIREMENT****PRODUCT/SYSTEM DESIGN****Substation Automation System**

The contractor shall provide training for NTPC personnel comprehensively covering following courses.

- 1 Computer System Hardware
- 2 Computer System Software
- 3 Application Software

MANDAYS: 60 (Total) inclusive of visit to Manufacturer's site)

- (p) Training on Erection methodologies for all the Sub-packages, System and Equipments associated with the EPC Package, including a visit to power plant construction site.

The exact details, extent and schedule for training shall be as finalized during detailed engineering and shall be subject to Employer's approval.

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GENERAL TECHNICAL REQUIREMENTS



28.03.00	The scope of services under training shall also necessarily include training of Employer's Engineering personnel covering entire scope for the package. This shall cover all disciplines viz, Mechanical, Electrical, C&I , QA etc. and shall include all the related areas like Design familiarization, training on product design features and product design software of major equipment and systems, engineering, manufacturing, erection, commissioning, training on operating features of equipment, quality assurance and testing, plant visits and visits to manufacturer's works, exposure to various kinds of problems which may be encountered in fabrication, manufacturing erection, welding etc.
28.04.00	Contractor shall also arrange for training of Employer's personnel in respect of fire detection and protection systems and other Balance of Plant equipments.
28.05.00	Contractor shall provide training on application of PAUT (Phased array ultrasonic testing) and TOFD (Time of flight diffraction) techniques for two weeks (at least 80 Hours). The training shall be arranged at least six months prior to the start of erection works of SG & TG works.
28.06.00	Exact details, extent of training and the training schedule shall be finalized based on the Bidder's proposal within two (2) months from placement of award.
28.07.00	In all the above cases, the lodging and boarding of the Employer's personnel shall be at the cost of Bidder. The Bidder shall make all necessary arrangements towards the same.
28.08.00	Take off prices (product wise) should be indicated by the Bidder in the Bid Proposal Sheets. Employer reserves the right to include or exclude these item(s) during placement of Award. Note: 1. For training purposes, one (1) man month implies 30 working days (excluding all intervening holidays) per person. 2. The total man months in each area shall be divided into suitable number of modules which shall be discussed and finalized during post award stage. 3. Duration of each module shall not be less than 10 (ten) working days out of which 20 % shall be for plant/manufacturers' works visits and 80% shall be classroom training. 4. A) Location of classroom training for engineering shall be at Design/Engineering office. B) Classroom training for erection/O&M shall be at location of Manufacturers' works.

28.09.00

TRAINING REQUIRED IN MAN MONTH

Area	Engineering (Man months)	Erection (Man months)	O&M (Man months)
Steam Turbine Generator and its Auxiliaries including electricals	6.5	9.0	23
Steam Generator and its Auxiliaries including electricals	6.5	9.0	23
Station C&I (Control and Instrumentation)	3.5	5.5	10
Ash Handling Plant	2.0	3.0	5.0
Coal Handling Plant	1.0	1.5	2.5
UF Membranes, RO Membranes, ZLD, Chlorine Di Oxide (ClO ₂) generation & dosing system, Condensate Polishing Plant (CPU), CW Treatment System	0.2	0.3	0.5
Substation Automation System	0.3	0.7	1
Total	20	29	65

29.00.00

SAFETY ASPECTS DURING CONSTRUCTION AND ERECTION

In addition to the requirements given in Erection Conditions of Contract (ECC) the following shall also cover:

- i) Working platforms should be fenced and shall have means of access.
- ii) Ladders in accordance with Employer's safety rules for construction and erection shall be used. Rungs shall not be welded on columns. All the stairs shall be provided with handrails immediately after its erection.

30.00.00

NOISE LEVEL

The equivalent 'A' weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) meter horizontally from the nearest surface of any equipment/machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for

- i) Safety valves and associated vent pipes for which it shall not exceed 105 dBA-115 dBA.
- ii) Regulating drain valves in which case it shall be limited to 90 dBA-115 dBA.
- iii) Mill noise which will be limited to 85-90 dBA.
- iv) TG unit in which case it shall not exceed 90 dBA.
- v) For HP-LP bypass valves and other intermittently operating control valves, the noise level shall be within the limit of 90 dBA.
- vi) For BFP Motor Noise level shall be within the limit of 90 dBA.

31.00.00

PACKAGING, TRANSPORTATION AND STORAGE

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage at site due to improper packing and preservation. The Contractor shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting despatch of equipment. Before despatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & preassembly to bare minimum. The Employer's Inspector shall have right to insist for completion of works in shops before despatch of materials for transportation.

In addition to above, the contractor shall take all necessary measures for storage of all electronic equipment / systems at site in a dust free Air conditioned space ensuring proper temperature & humidity.

32.00.00	ELECTRICAL EQUIPMENTS/ENCLOSURES																		
32.01.00	All electrical equipments and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specifications.																		
33.00.00	INSTRUMENTATION AND CONTROL																		
	All instrumentation and control systems/ equipment/ devices/ components, furnished under this contract shall be in accordance with the requirements stated herein, unless otherwise specified in the detailed specifications.																		
33.01.00	All instrument scales and charts shall be calibrated and printed in metric units and shall have linear graduation. The ranges shall be selected to have the normal reading at 75% of full scale. All scales and charts shall be calibrated and printed in Metric Units as follows: <table> <tr> <td>1. Temperature</td><td>- Degree centigrade (deg C)</td></tr> <tr> <td>2. Pressure</td><td>- Kilograms per square centimetre (Kg/cm²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.</td></tr> <tr> <td>3. Draught</td><td>- Millimetres of water column (mm wc).</td></tr> <tr> <td>4. Vacuum</td><td>- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).</td></tr> <tr> <td>5. Flow (Gas)</td><td>- Tonnes/ hour</td></tr> <tr> <td>6. Flow (Steam)</td><td>- Tonnes/ hour</td></tr> <tr> <td>7. Flow (Liquid)</td><td>- Tonnes / hour</td></tr> <tr> <td>8. Flow base</td><td>- 760 mm Hg. 15 deg.C</td></tr> <tr> <td>9. Density</td><td>- Grams per cubic centimetre.</td></tr> </table>	1. Temperature	- Degree centigrade (deg C)	2. Pressure	- Kilograms per square centimetre (Kg/cm ²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.	3. Draught	- Millimetres of water column (mm wc).	4. Vacuum	- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).	5. Flow (Gas)	- Tonnes/ hour	6. Flow (Steam)	- Tonnes/ hour	7. Flow (Liquid)	- Tonnes / hour	8. Flow base	- 760 mm Hg. 15 deg.C	9. Density	- Grams per cubic centimetre.
1. Temperature	- Degree centigrade (deg C)																		
2. Pressure	- Kilograms per square centimetre (Kg/cm ²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.																		
3. Draught	- Millimetres of water column (mm wc).																		
4. Vacuum	- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).																		
5. Flow (Gas)	- Tonnes/ hour																		
6. Flow (Steam)	- Tonnes/ hour																		
7. Flow (Liquid)	- Tonnes / hour																		
8. Flow base	- 760 mm Hg. 15 deg.C																		
9. Density	- Grams per cubic centimetre.																		
33.02.00	All instruments and control devices provided on panels shall be of miniaturized design, suitable for modular flush mounting on panels with front draw out facility and flexible plan-in connection at rear.																		

34.00.00	ELECTRICAL NOISE CONTROL The equipment furnished by the Contractor shall incorporate necessary techniques to eliminate measurement and control problems caused by electrical noise. Areas in Contractor's equipment which are vulnerable to electrical noise shall be hardened to eliminate possible problems. Any additional equipment, services required for effectively eliminating the noise problems shall be included in the proposal. The equipment shall be protected against ESD as per IEC-61000-2. Radio Frequency interference (RFI) and Electro Magnetic Interference (EMI) protection against hardware damage and control system mal-operations/errors shall be provided for all systems as per EN-50082-2 (1995).
35.00.00	SURGE PROTECTION FOR SOLID STATE EQUIPMENT All solid state systems /equipment shall be able to withstand the electrical noise and surge as encountered in actual service conditions and inherent in a power plant and shall meet the requirements of surge protection as defined in ANSI C37.90.1-1989 on its suitable equivalent class of IEC 254-4. Details of the features incorporated and relevant tests carried out. The test certificates. etc. shall be submitted by the Bidder.
36.00.00	INSTRUMENT AIR SYSTEM The instrument air supply system as supplied by the Bidder for various pneumatic control & instrumentation devices like pneumatic actuators, power cylinders, E/P converters, piping / tubing etc. Each pneumatic instrument shall have an individual air shut - off valve. The pressure regulating valve shall be equipped with an internal filter, a 50 mm pressure gauge and a built-in filter housing blow down valve.
37.00.00	TAPPING POINTS FOR MEASUREMENTS Tapping points shall include probes, wherever applicable, for analytical measurements and sampling. For direct temperature measurement of all working media, one stub with internal threading of approved pattern shall be provided along with suitable plug and washer. The Contractor will be intimated about thread standard to be adopted. The following shall be provided on equipment by the Bidder. The standard which is to be adopted, will be intimated to the Contractor. i) Temperature test pockets with stub and thermowell ii) Pressure test pockets

38.00.00	SYSTEM DOCUMENTATION The Bidder shall provide drawings, system overview & description, hardware/software details, technical literature, functional & hardware schemes, bill of material, parts list, interconnection diagrams, data sheets, erection/ installation/ commissioning procedures, instruction/ operating manuals, etc. for each of the C& I system / sub-systems/ equipment supplied under this package. The documentation shall include complete details of the C&I systems/ sub-systems/ equipment to enable review by Employer during detailed engineering stage and to provide information to plant personnel for operation & Maintenance (including quick diagnostics & trouble shooting) of these C&I systems/ sub-systems/ equipment at site. The minimum documentation requirements for C&I systems shall be as stipulated under C&I "Technical Data Sheets" Part of specifications. In addition to this, system documentation for DDCMIS shall include as a minimum to that specified elsewhere in the Technical Specification. The exact format, submission schedule and contents of various documents shall be as finalised during detailed engineering stage.
38.01.00	Bill of material (instrument list) for all C&I equipment/ devices shall be furnished by the bidder in standard formats as approved by the Employer.
39.00.00	MAINTENANCE MANUALS OF ELECTRONIC MODULES The Contractor shall have to furnish two (2) sets of all maintenance manual of each and every electronic card/module as employed on the various systems and equipment including peripherals etc., offered by him. The Contractor will also have to furnish the data regarding the expected failure rate of various modules and other system components. Further, the contractor shall furnish a set of operating manuals which should include block diagrams, make, model/type, details wiring and external connection drawings etc. as required to do the testing and maintenance of the electronic modules. Backup & Restoration Procedures of DDCMIS, Station LAN & Advance Process Control shall be provided.
40.00.00	MAKE IN INDIA REQUIREMENTS a) The bidder shall follow Indian laws, regulations and standards. There shall not be any restriction in terms of compliance to codes & standards of foreign origin only. The compliance to equivalent/better Indian as well as other codes & standards, wherever available, shall also be acceptable. b) The technologies/ products offered shall be environmentally friendly, consuming less energy, and safe, energy efficient, durable and long lasting under the prescribed operational conditions.



- c) The bidder/its sub vendor/supplier shall ensure supply of spares, materials and technological support for the entire life of the project.
 - d) The bidder shall list out the products and components producing Toxic E-waste and other waste as specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled/ disposed of by the contractor and for this, the bidder has to establish recycling/disposal unit as specified.
 - e) The equipment/ material sourced from foreign companies will be tested in accredited labs in India before acceptance wherever such facilities are available. The testing shall be carried out in accordance with MOP extant order/guidelines.
 - f) The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.
 - g) All applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.
 - h) Wherever required, the foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of Employer.
 - i) To protect the security, integrity and reliability of equipment in this package, it is essential to remove vulnerabilities arising out of the possibility of cyber-attack through malware/ Trojans etc. embedded in imported equipments. This requirement shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in this package. Contractor shall comply all the requirements of Order No 25-11/6/2018-PG, dated 02/07/2020 (attached as **Appendix-I**), issued by Ministry of Power, Government of India and its subsequent amendments/revisions. Contractor shall furnish declaration of compliance of MOP order dated 02/07/2020 requirements with dispatch of equipment/ item. Further, Contractor shall furnish back up testing certificates, whenever Employer asks the same.
 - j) All equipment/materials/parts/items required in this package which are domestically manufactured with sufficient domestic capacity as identified in Annexure-I of MOP order dated 16/11/2021 including its subsequent revisions (copy attached as **Appendix-II**) shall necessarily be sourced from the class-I local suppliers only as per the extant provisions of the Public Procurement (Preference to Make in India) Orders issued by DPIIT and MoP.
- Any violation w.r.t Make in India and minimum local content (MLC) requirements as specified shall be sole responsibility of the Bidder.

Appendix-I

No.25-11/6/2018-PG
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
Tele Fax: 011-23730264

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our **national defence, vital emergency services** including health, disaster response, **critical national infrastructure** including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the **entire economy** and the **day-to-day life** of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a **strategic and critical sector**.

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, **to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network** in the country, the following directions are hereby issued :-

(1) All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.

(2) All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MoP).

(3) Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India

(4) Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MoP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).


(Goutam Ghosh)
Director
Tel: 011-23716674

To:

1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. Vice Chairman, NITI Aayog
4. Comptroller and Auditor General of India
5. Chairperson, CEA
6. CMDs of CPSEs/Chairman of DVC & BBMB/MD, EESL/DG, NPT/DG, CPRI/DG, BEE/
7. All ASs/JSs/EA, MoP

Copy:

1. PS to Hon'ble PM, Prime Minister's Office
2. PS to Hon'ble MOS(IC) for Power and NRE
3. Sr. PPS to Secretary(Power)

Appendix-II

No. A-1/2021-FSC-Part(5)

Government of India

Ministry of Power

Shram Shakti Bhawan, New Delhi

Dated: 16th November, 2021ORDER

Subject: Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector.

Reference: Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

The Government of India, Department for Promotion of Industry and Internal Trade (DPIIT) issued Public Procurement (Preference to Make in India), Order 2017, for encouraging 'Make in India' and promoting manufacturing and production of goods and services in India with a view to enhancing income and employment. Subsequently, DPIIT vide order No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020 and further vide order dated 16th September, 2020 have issued the revised Public Procurement (Preference to Make in India) Order 2017.

2. In light of the Public Procurement (Preference to Make in India) Order 2017, this Ministry had notified purchase preference (linked with local content) for Hydro and Transmission sectors vide Order No. 11/05/2018-Coord dated 20.12.2018, for Thermal sector vide Order dated 28.12.2018 and for Distribution sector vide Order dated 17.03.2020. Further, a combined order dated 04.04.2020 was also issued in supersession of all previous orders to indicate equipment/material/components for which there was sufficient local capacity and competition and also to indicate conditions for including suitably in the tenders to be issued by the procurers. In furtherance of Para 19 of the DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 04.06.2020, Ministry of Power (MoP) issued a revised comprehensive Order dated 28.07.2020 (Annexure-I amended by order dated 17.09.2020).

3. DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 16.09.2020 has further revised its order dated 04.06.2020. Therefore, in supersession of all the aforementioned orders including order No.10/1/2019-St.Th. (Part-II) dated 20.03.2020 issued by this Ministry, the following has been decided:

- i. For the purpose of this order, the definitions of various terms used in the order, and provisions relating to (i) Eligibility of 'Class-I local supplier'/'Class-II local supplier'/'Non-local suppliers' for different types of procurement, (ii) purchase preference (iii) exemption to small purchases and (iv) margin of purchase preference shall be the same as in DPIIT order dated 16.09.2020, referred to above and extracts of the same is given at **Appendix**.
- ii. In procurement of all goods and services or works in respect of which there is sufficient local capacity and local competition as in **Annexure-I**, only "Class-I local supplier" shall be eligible to bid irrespective of purchase value. "Class-I local supplier" is a supplier or service provider whose goods, services or works offered for procurement meets the Minimum Local Content (MLC) as prescribed in Annexure-I of this order. "Class-II local supplier" means a



supplier, as defined by DPIIT in its Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020.

- iii. In the procurement of all goods and services or works other than those listed in Annexure-I, only "Class-I local supplier" and "Class-II local supplier" as defined in the order of this Ministry herewith shall be eligible to bid in procurement undertaken by procuring entities, except when Global Tender Enquiry has been issued. In Global tender enquiries, "Non-local suppliers" shall also be eligible to bid along with "Class-I local suppliers" and "Class-II local suppliers". In procurement of all goods, services or works not covered by sub-para 3(ii) above, and with estimated value of purchases less than Rs. 200 crores, in accordance with Rule 161(iv) of GFR, 2017, Global Tender Enquiry(GTE) shall not be issued except with the approval of the competent authority as designated by Department of Expenditure.
- iv. For the purpose of this order, 'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works', Engineering, Procurement and Construction (EPC) contracts and service contracts including System Integrator (SI) contracts.
4. The list of items, in respect of which, local capacity with sufficient competition exists as per **Annexure-I**, will be reviewed at regular intervals with a view to increase number of items in this list and also to increase the MLC for each item, wherever it is less than 100%.
5. Purchase preference shall be given to local suppliers in accordance with **para 3A** of DPIIT Order dated 16.09.2020, and extracts of the same are given at **Appendix**.
6. Further, it has been decided to constitute a committee for independent verification of self-declarations and auditor's / accountant's certificates on random basis and in the case of complaints. The composition of the committee is given below:

Member (Planning), Central Electricity Authority (CEA)	Chairperson
Chief Engineer (PSETD), CEA	Member
Chief Engineer (HETD), CEA	Member
Chief Engineer (TETD), CEA	Member
Chief Engineer (DP&R), CEA	Member
As may be co-opted by CEA	External Expert
Chief Engineer (R&D), CEA	Convener

7. Further, it has also been decided to constitute a committee to examine the grievances in consultation with stakeholders and recommend appropriate actions to the Competent Authority in MoP. The composition of the Committee is given below:

Chairperson, CEA	Chairperson
Member (Hydro), CEA	Member

GENERAL TECHNICAL REQUIREMENTS



Member (Power System), CEA	Member
Member (Thermal), CEA	Convener

8. The complaint fee of Rs. 2 Lakhs or 1% of the value of the local item being procured (subject to maximum of Rs. 5 Lakhs), whichever is higher, shall be paid in the form of Demand Draft, drawn in favour of **PAO, CEA, New Delhi**. In case the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, the deposited fee of the complainant would be refunded without any interest.

9. All other conditions, not stipulated in this order, shall be as laid down in the DPIIT's order No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

10. This order shall be applicable in respect of the procurement made by all attached or subordinate offices or autonomous bodies under the Government of India including Government Companies as defined in the Companies Act, and/or the States and Local Bodies making procurement under all Central Schemes/ Central Sector Schemes where the Scheme is fully or partially funded by the Government of India. The aforesaid orders shall also be applicable in respect of projects wherein funding of goods, services or works is by Power Finance Corporation (PFC) /Rural Electrification Corporation (REC) and any Financial Institution in which Government of India/ State Government share exists. This order shall be applicable to Tariff Based Competitive Bidding (TBCB) projects also. Procuring entities as defined in the DPIIT's Order dated 16.09.2020 are advised to revise their tender documents to fully comply with the said DPIIT's Order and the subsequent Orders that would be issued in this regard by DPIIT/ this Ministry from time to time.

11. All tenders for procurement by Central Government Agencies or the States and Local Bodies, as the case may be, have to be certified for compliance of the Public Procurement (Preference to Make in India) 'PPP-MII' Order by the concerned procurement officer of the Government Organization before uploading the same on the portal.

12. Exemption from meeting the stipulated local content is allowed as per clause 13 and 13A of PPP-MII Order dated 16.09.2020, if the manufacturer declares that the item is manufactured in India under a License from a foreign Manufacturer who holds Intellectual Property Rights (IPRs) and there is Transfer of Technology (ToT) with phasing to increase Minimum Local Content. For such items, if any CPSE under the administration of Ministry of Power requests exemption for any item, it shall be considered by Ministry of Power, on case to case basis.

13. In order to further encourage Make in India initiatives and promote manufacturing and production of goods and services in India, general guidelines as enclosed at **Annexure-II** may be adopted in an appropriate manner according to the circumstances by the procuring entities in their tendering process.

14. The procurers may specify the higher values of MLC than those specified in this Order in respect of goods, services or works covered in their tenders and award the weightage to the product of higher MLC for which they have to specify the criteria beforehand in their tender. The values given in Annexure-I are the minimum prescribed values for becoming a class-I local supplier for the products indicated therein.

15. This issues with the approval of Hon'ble Minister for Power and New & Renewable Energy.



(S. Majumdar)

Under Secretary to the Government of India
Tele No. 011- 23356938

To:

1. Secretary to Government of India (All Ministries/ Departments of Government of India) (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. CEO, NITI Aayog
4. Chief Secretaries of all States/ UTs
5. Comptroller and Auditor General of India
6. Secretary, DPIIT, Chairman of Standing Committee for implementation of Public Procurement Order, 2017
7. Director General, Bureau of Indian Standards (BIS)
8. Joint Secretary, DPIIT, Member-Convener of Standing Committee for implementation of Public Procurement Order, 2017
9. Chairperson, CEA
10. CMDs of CPSEs, CMD NLC, Chairman of DVC/ BBMB/ EESL, DGs of BEE/ CPRI/ NPTI
11. All Additional Secretaries/ JSs/ EA/ CE, Ministry of Power

Copy to:

Director (Technical), NIC with a request to publish the Order on the website of Ministry of Power

APPENDIX**Extracts of important provisions contained in DPIIT Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020****1. Definitions (Para 2 of DPIIT order):**

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for "Class-I Local supplier" under this Order.

'Non-Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a 'Class-I local supplier' may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'.

2. Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement (Para 3 of DPIIT order)

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by 3(a) above, and with estimated value of purchases less than Rs 200 crores, in accordance with Rule 161(iv) of GFR, 2017 Global tender enquiry shall not