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

VOLUME – II

TECHNICAL SPECIFICATION
FOR
CONDENSATE POLISHING UNIT

SPECIFICATION NO.: PE-TS-497-155-A001 REV 00

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001 VOLUME IIB REV. NO. 00 DATE: 22-05-2023 (TYP.)

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		SECTION –	
		REV. NO. 00	DATE:

PROJECT INFORMATION

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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.

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	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.

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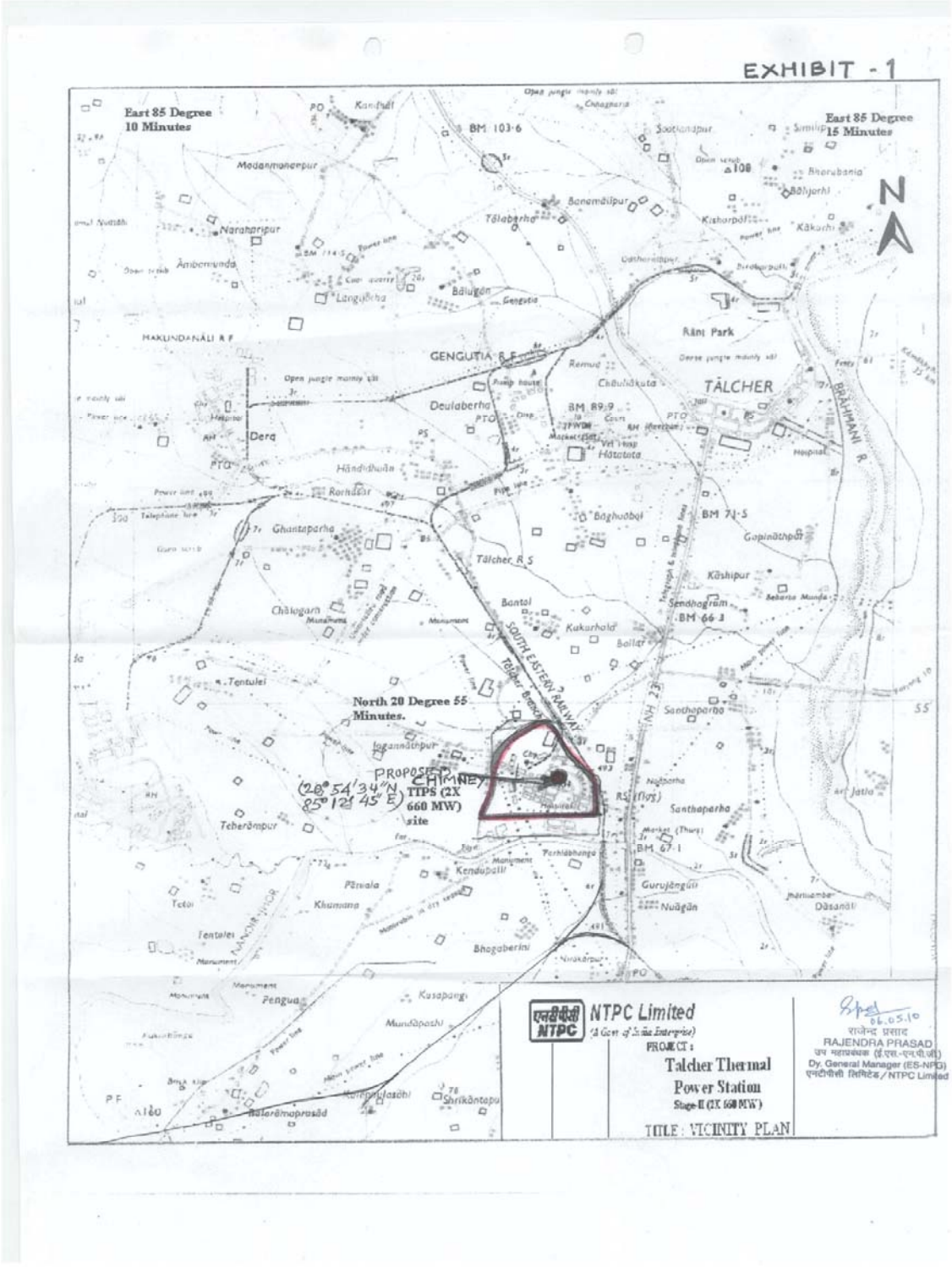
ANNEXURE-I



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ANNEXURE-II

जलवायवी सारणी

CLIMATOLOGICAL TABLE

स्टेशन : अंगुल STATION : Angul

अक्षांश LAT. 20°50' देशांतर LONG. 85°06' समुद्री स्तर से ऊंचाई HEIGHT ABOVE M.S.L. 139 मीटर METRES

BASED ON OBSERVATIONS 1971-2000

MONTH	STATION LEVEL PRESSURE hPa	AIR TEMPERATURE °C MEAN DRY BULB	MEAN WET BULB	MEAN DAILY MAX	MEAN DAILY MIN	HIGHEST WITHE MONTH	LOWEST WITHE MONTH	EXTREMES HIGHEST DATE AND YEAR	EXTREMES LOWEST DATE AND YEAR	HUMIDITY RELATIVE HUMIDITY %	HUMIDITY VAPOUR PRESSURE hPa	CLOUD AMOUNTS ALL CLOUDS Oktas of sky	CLOUD AMOUNTS LOW CLOUDS Oktas of sky	RAINFALL MONTHLY TOTAL mm	RAINFALL NO.OF RAINY DAYS	RAINFALL TOTAL IN WETTEST MONTH WITH YEAR mm	RAINFALL TOTAL IN DRIEST MONTH WITH YEAR mm	RAINFALL HEAVIEST FALL IN 24 HOURS mm	RAINFALL DATE AND YEAR	MEAN WIND SPEED Km/h
जनवरी JAN	1011.2	17.9	15.4	27.9	15.6	31.0	11.3	35.1	5.5	76	15.8	1.2	0.5	9.0	0.7	61.7	0.0	48.8	22	
	997.6	25.7	18.5					1994		47	15.6	1.1	0.5			1996			1996	
फरवरी FEB	1000.1	21.1	18.0	30.9	18.2	35.3	12.7	39.3	8.8	72	18.3	2.0	1.1	20.9	1.6	370.1	0.0	118.1	6	
	995.4	29.0	19.9					1967		41	16.0	1.6	0.9			1961			1961	
मार्च MAR	996.7	25.3	21.0	35.5	21.0	39.2	15.9	43.1	10.2	67	21.7	1.5	0.8	25.0	1.7	206.0	0.0	115.0	30	
	992.6	33.5	22.1					1999		35	17.4	1.8	1.1			1990			1990	
अप्रैल APR	993.1	29.7	24.4	38.9	24.4	42.5	20.0	45.6	14.4	70	27.3	1.7	0.7	95.9	2.3	132.4	0.0	67.2	2	
	988.4	35.6	24.4					1941		38	21.5	2.6	1.6			1997			1965	
मई MAY	989.4	30.6	25.9	39.8	25.0	44.3	21.6	47.2	15.6	68	29.7	1.9	0.9	75.6	3.6	333.1	0.0	105.0	30	
	985.7	36.6	25.7					1921		42	24.2	3.2	2.0			1995			1990	
जून JUN	985.8	29.7	26.0	36.2	25.9	42.5	21.7	47.2	17.4	74	30.7	4.3	2.8	210.1	8.5	528.2	39.4	161.2	15	
	982.5	32.8	26.3					1967		62	29.0	5.1	3.7			1990	1965		1990	
जुलाई JUL	986.1	27.9	25.4	32.1	24.4	36.2	22.4	41.1	18.3	81	30.5	5.4	3.6	258.3	12.1	552.5	102.4	243.8	25	
	983.1	29.4	25.9					1982		76	30.7	5.9	4.6			1932	1985		1932	
अगस्त AUG	986.5	27.5	25.3	31.4	23.9	34.5	21.3	37.7	14.3	83	30.6	5.5	4.0	325.3	13.4	826.0	96.5	257.3	21	
	983.9	28.8	25.8					1983		78	31.1	5.9	4.5			1931	1937		1931	
सितम्बर SEP	990.9	27.5	25.2	32.1	24.1	34.8	20.5	36.1	12.8	83	30.5	4.5	3.1	206.5	10.2	569.7	56.1	148.8	6	
	987.8	28.9	25.6					1977		76	30.3	5.3	4.0			1921	1919		1939	
अक्टूबर OCT	995.8	26.2	23.6	32.3	20.7	34.4	18.6	37.7	12.0	90	27.2	2.9	1.7	100.8	5.1	404.5	0.0	194.2	18	
	992.1	29.3	24.3					2000		66	26.5	3.3	2.3			1973			1999	
नवम्बर NOV	999.4	22.4	19.4	30.0	18.2	32.5	13.6	35.1	5.6	75	20.5	1.8	0.9	35.7	1.3	161.5	0.0	101.4	6	
	995.8	27.3	20.9					1997		54	19.7	1.9	1.0			1939			1999	
दिसम्बर DEC	1011.7	17.8	15.3	27.7	15.1	30.3	11.5	32.1	3.5	75	15.5	1.0	0.4	3.1	0.3	39.8	0.0	48.8	14	
	997.8	24.7	17.9					1995		49	15.3	1.1	0.4			1991			1997	
वार्षिक योग ANNUAL TOTAL OR MEAN	993.8	25.2	22.0	32.9	21.5	44.1	9.1	47.2	3.5	75	24.9	2.8	1.7	1300.1	60.9	2693.4	756.1	257.3	21	
	990.2	30.1	23.1					1921	12	56	23.2	3.3	2.2			1990	1957	8	1931	
वर्षों की संख्या NUMBER OF YEARS	26	18	18	17	17	17	17	89	89	18	18	26	26	30	30	94	94	100		

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TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-4540-001A-2	SUB-SECTION-IB PROJECT INFORMATION	PAGE 5 OF 15

ANNEXURE-III

RAW WATER ANALYSIS

SN	Constituent	As	mg/l (except pH & turbidity)
1	Calcium	CaCO3	80
2	Magnesium	CaCO3	35
3	Sodium	CaCO3	20
4	Potassium	CaCO3	5
5	Total Cation	CaCO3	140
6	HCO3	CaCO3	85
7	p Alkalinity	CaCO3	0
8	Chlorides	CaCO3	35
9	Sulphate	CaCO3	20
10	Total Anion	CaCO3	140
11	Reactive Silica	SiO2	25
12	Silica non-Reactive	SiO2	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	KMnO4	ppm	2
19	TOC	ppm	5

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 @ 350^0C	% vol. (min)	85
	b. Distillation volume recovery @ 370^0C	% vol. (min)	95
	c. Kinematic Viscosity @ 40 Degree C	cSt	2.0 – 5.0
	d. Density @ 15 Degree C	kg/m^3	820 – 860
	e. Pour Point		
	- Summer	Degree C (max)	15
	- Winter	Degree C (max)	03
	f. Cold Filter Plugging Point		
	- Summer	Degree C (max)	18
	- Winter	Degree C (max)	06
	g. Flash Point (Abal)	Degree C (max)	35
	h. Lubricity WSD 1.4 @ 60 Degree C	Microns (max)	460
2.	HEATING VALUE		
	a. Higher Heating Value (HHV)	Kcal/Kg	11,000
	b. Lower Heating Value (LHV)	Kcal/Kg	10,300
3.	ACIDITY		
	a. Inorganic	mg KOH/g	Nil
	b. Total	mg KOH/g	0.2 (max.)
4.	Copper Strip Corrosion 3 hours @100^0C	No.	1 (max)
5.	RCR on 10% residue	% wt.	0.3 (max)
6.	CONTAMINANTS		
	a. Ash	ppm (wt.)	100 (max)
	b. Sediments	% wt	0.05 (max)
	c. Total Sulphur	% wt	0.05 (max)
	d. Water Content	% volume	0.05 (max)
	e. Trace Metals		
	- Na + K	ppm (wt)	0.30 (max)
	- Vanadium	ppm (wt)	0.50 (max)
	- Lead	ppm (wt)	0.50 (max)
	- Calcium	ppm (wt)	2.0
	- Ni + Zn	ppm (wt)	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_2O_3) (%)	30.5	28.43
3.3	Iron Oxides(Fe_2O_3) (%)	18.2	15.2
3.4	Titania (TiO_2)	1.56	1.76
3.5	Phosphoric Anhydride(P_2O_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_2O) (%)	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 (ºC)	1100	1250
4.2	Hemispherical Temp. (ºC)	1300	1350
4.3	Flow Temp. (ºC)	1400	1400

Annexure – IV-5

LIMESTONE CHARACTERISTICS

Chemical Analysis(% by mass)			
1.	CaO	%	47-51.0*
2.	MgO	%	0.9-3.8
3.	Fe_2O_3	%	0.45-1.0
4.	Al_2O_3	%	1.19-2.1
5.	Si_2O_3	%	2.1-4.5
6.	Mn_2O_3	%	<0.12
7.	P_2O_5,	%	Traces
8.	Cl_2	%	<0.015
9.	Na_2O	%	<0.16
10.	K_2O	%	<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:

1. *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) $CaCO_3$ content of 79%.
2. For the purpose of volumetric computations of limestone handling & storage system the bulk density of limestone shall be taken as 1400 kg/m^3. However for torque, drive & structural load requirements the density of lime stone shall be taken as 1700 kg/m^3. For gypsum, the bulk density shall be taken as 900 kg/m^3 for volumetric computation and 1250 kg/m^3 for torque, drive & structural load requirements.
3. For the purpose of sizing of equipments and guarantee, $MgCO_3$ shall be considered as unreactive dolomitic form.

Annexure-IV-6

METHANOL CHARACTERSTICS

SN	Fuel Property	Unit	Methanol
1	Chemical Formula		CH3-OH
2	Fuel Carbon	Wt%	38
3	Fuel Oxygen	Wt%	12
4	Density at 20 deg C	kg/m3	792
5	LHV	Kcal/kg	4800
6	Boiling Temp	^{0}C at 1 bar	65
7	Vapour Pressure	bar at 20^{0}C	0.13
8	Kinematic viscosity	cSt at 20^{0}C	0.74
11	Auto Ignition	^{0}C	470
12	Heat of Vapourization	kcal/kg	260
15	Flammability limit	vol %	6-36
16	Flash Point	^{0}C	12

CLAUSE NO.	PROJECT INFORMATION	

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%	fines ≤ 5%
4.	Gross Calorific Value (GCVARB*)	Kcal/Kg	**Refer below**
5.	Moisture (ARB*)	Wt%	<= 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: ^{0}C

IDT	ST	HT	FT
1134	1357	1374	1422

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

Na2O	MgO	Al2O3	SiO2	P2O5	SO3	K2O	CaO	TiO2	MnO	Fe2O3
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.

SECTION - I
SPECIFIC TECHNICAL REQUIREMENTS

SPECIFIC TECHNICAL REQUIREMENTS:

1.1 This specification is intended to cover design, engineering, manufacture, fabrication, assembly, inspection & testing at vendor's & sub-vendor's works, painting, forwarding, supply and delivery at site including start up and commissioning spares, mandatory spares, properly packed for transportation, unloading / handling and storage at site, in site transportation, assembly, erection and commissioning, trail run, preparation and submission of "As Built" drawings, site testing, carrying out performance guarantee tests at site, operation & maintenance and handover of **Condensate Polishing Units along with pre filters and common one number external regeneration systems** as per the details in different sections / volumes of this specification for **2X660 MW TALCHER TPP STAGE-III.**

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 Condensate Polishing Units along with pre filters and common one number external regeneration system within quoted price.

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 Items though not specifically mentioned but needed to make the system complete as stipulated under these specifications are also to be furnished unless otherwise specifically excluded.

1.6 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.

1.7 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 Section-III of the specification as **"**PRE BID CLARIFICATION SCHEDULE". 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 and delivery 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.

1.8 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.

1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

1.10 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 as interpreted by BHEL in the relevant context. Please refer GCC/SCC for better clarity.

1.11 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.

1.12 BHEL's/Customer's representative shall be given full access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to him.

1.13 "Contractor"/ "Vendor" referred in this specification shall be read as "bidder".

SPECIFIC TECHNICAL REQUIREMENTS FOR MECHANICAL

1.0 GENERAL

The Condensate Polishing service vessels along with the pre filters with one (1) common set of external regeneration system and associated accessories shall conform to the technical specification for CONDENSATE POLISHING UNIT (CPU).

2.0 DESIGN CONDITIONS FOR CONDENSATE POLISHING UNIT

There shall be three numbers Condensate polishing service vessels (3X50% capacity) and two numbers back washable type cartridge pre filters (2x50% capacity) for each 660 MW unit. There are two 660 MW units. There shall be one complete set of external regeneration systems common for both the TG units Condensate Polishers.

3.0 BRIEF SYSTEM DESCRIPTION

The proposed condensate polishing units shall treat the entire condensate of the turbine generator of each unit of power station. The proposed schematic arrangement of the condensate polishing unit and its regeneration facility shall be as per the enclosed P&I Diagram. Arrangement of piping, valves and instruments shown in the P&ID are bare minimum. The bidder shall include the complete system including regeneration facility as elaborated in this specification meeting the contractual requirements.

Condensate pre filters followed by polisher unit (service vessels) shall be located in the TG hall of corresponding units. Condensate polisher service vessels alongwith the pre filters will be provided on the discharge side of the high pressure condensate extraction pumps.

The regeneration systems shall be external and common to the CPU of all the TG units. For regeneration, resin from the exhausted exchanger vessel will be transferred hydraulically/hydro-pneumatically to this facility. The exhausted resin charge will be cleaned, separated, regenerated, mixed and rinsed before being stored for the next use.

The regeneration process offered by the bidder shall be of proven design and shall essentially be the same process by virtue of which the bidder is qualified and shall give resin-separation compatible with the desired effluent quality.

4.0 SALIENT DESIGN DATA

4.1 A) NORMAL RUN (PRE FILTERS)

PARAMETERS	INFLUENT	EFFLUENT
Crud, ppb (mostly black oxide of Iron)	25	<5

Under the above operating and design flow through pre-filter, the pre-filter service run shall be not less than 30 days (720 hrs) of continuous operation while maintaining the above effluent quality. The effluent values indicated above shall be the maximum values.

B) NORMAL RUN (CONDENSATE POLISHER UNIT (SERVICE VESSEL))

The following dissolved solids concentration and conditions shall be used as a basis of design for the condensate polishing system. The ionic concentrations indicated below are as such.

PARAMETERS	INFLUENT	EFFLUENT
Ammonia, ppb	150	---
Total solids, ppb	100	20
Silica, ppb	30	5 (refer Note 1)
Iron, ppb	50	5

Sodium, ppb	10	2
Chloride, ppb	10	2
pH	8.5-9.0	--
Effluent conductivity after removal of ammonia and amines (micro mhos/cm) at 25 deg. C.	--	0.1 or less

Note 1: Silica value shall be 7 ppb as per resin supplier recommendations in case the temperature of the condensate is 50degC & above.

Under the above operating and design flow through the polisher units, the un-ammoniated resins shall not reach “ammonia break-point” in less than 30 days (720 hrs) of continuous operation while maintaining the above effluent quality. Whenever specific conductivity starts increasing from 0.1 micro mhos/cm in the effluent, it is deemed that “ammonia break point” is reached. The effluent values indicated above shall be the maximum values.

4.2 START-UP CONDITION

4.2.1 START-UP CONDITION FOR PRE FILTERS

The condensate quality during start-up operation for Pre filters design shall be as follows:

PARAMETERS INFLUENT	PARAMETERS INFLUENT	PARAMETERS EFFLUENT
Crud, ppb (mostly black oxide of Iron)	1000 maximum	Removal not less than 99.98% (At the outlet of Pre-Filter)

The pre-filter shall be designed for a crud loading of 1000 ppb. Service length of Pre Filter shall be minimum 50 hours.

4.2.2 START-UP CONDITION FOR CONDENSATE POLISHER UNIT (SERVICE VESSEL)

During start up conditions, quality of the influent may deteriorate to –

TDS, ppb	2000 maximum
Silica, ppb	150 maximum
Crud, ppb (mostly black oxide of Iron)	1000 maximum

For design purposes, average crud loading shall be considered as 500 ppb. Under such conditions, total crud content of the effluent shall not exceed 150 ppb.

Service run during start – up condition will be 50 hours.

4.3 CONDENSER LEAK CONDITION:

Under condenser tube-leakage condition, the plant shall be designed for 2000 ppb TDS in addition to the normal influent contaminants

PARAMETERS INFLUENT	PARAMETERS INFLUENT	PARAMETERS EFFLUENT
Total solids, ppb	2000 plus normal influent contaminants	Sodium <= 20ppb Silica <= 20ppb

4.4 The bed cross section shall be such that the velocity of condensate through it, shall not exceed 2 meters/min at the design flow rate. Internal diameter of the service vessels (excluding the rubber lining) of cylindrical type shall be selected meeting the above mentioned velocity criteria. For vessels of spherical shape, where the bed cross section vary, the diameter (excluding the rubber lining) of the vessel shall be selected considering velocity not exceeding 1.75 meters/minute. The effective depth of the mixed resin bed in the condensate polisher service vessels shall not be less than 1100 mm. Uniform bead size of resin shall be provided for better separation of resins and performance.

4.5 Cation resins shall be regenerated by technical grade hydrochloric acid to IS:265 (concentration 30-33% by volume) and anion resins by sodium hydroxide, rayon grade to IS:252 available as 48% lye or as flakes. In no case, the regeneration levels cannot be lower than the values indicated below:

a) Cation resin: 125 kg of 100% HCl per cubic meter of resin

b) Anion resin: 160 kg of 100% NaOH per cubic meter of resin.

4.6 Rinse water outlet header of each condensate polishing unit shall be provided with a pressure reducing station with isolating valves, suitably designed to enable the water entry to the condenser hot well which is operating under vacuum. The pressure reducing station shall consist of either a pressure reducing valve from design pressure of service vessel to condenser vacuum or a combination of orifice plates to reduce pressure from design pressure of service vessel to 2 kg/cm2 and a pressure reducing valve from 2 kg/cm2 to condenser vacuum.

4.7 While calculating pump head, 10% margin (minimum) shall be considered of the value of friction losses. Pipe friction loss shall be calculated as per Willam-Hazen formula and “C” value to be adopted shall be as described elsewhere in this specification. Pump recirculation with a regulating valve shall be provided for all the pumping system.

4.8 At the design flow rate, the pressure drop in clean condition across the Pre filters including polisher service vessels shall not exceed 2.1 Kg/sq.cm. This pressure drop shall include losses due to pre filters, service vessel, entrance and exit nozzles, distributors, under drains, resins and the effluent resin traps. Maximum pressure drop under dirty conditions across the Pre filters and service vessels including pre filters, service vessel, entrance and exit nozzles, distributors, under drains, resins and the effluent resin traps will be restricted to 3.5 kg/sq.cm including the pressure drop across effluent resin traps

5.0

All the design parameters at clause no 4.0 (4.1 to 4.8) of this chapter, i.e. the effluent quality, the design flow, design service length, Chemical consumption for regeneration and Pressure drop across the resin bed in clean and dirty condition at rated design flow shall be guaranteed by the Bidder.

6.0 SYSTEM REQUIREMENT

6.1 The regeneration process offered by the bidder, shall be of proven design and shall essentially be the same process by virtue of which the bidder is qualified and shall give resin-separation compatible with the desired effluent quality. Documentary evidence shall be submitted by the bidder to the Customer/BHEL to establish this requirement during detailed engineering stage as desired by BHEL/ Customer

6.2 Pre filters (cartridge filter) shall be provided by bidder and same may be horizontal or vertical as per system requirement. The bidder shall offer only proven design in successful operation in previous installation at previous installation under similar working condition Documentary evidence shall be submitted by the bidder during detailed engineering stage as desired by BHEL/ Customer for sub vendor acceptance with respect to pre-filter to establish this requirement.

6.3 The bidder shall include inert resin in the system if they feel that it helps in better resin separation.

6.4 In case, after separation of resins, there are undesired contaminant resins, the bidder shall provide a system either to eliminate this cross contamination of resins or to nullify the detrimental effect of entrapped resins to the effluent quality.

7.0 Exchange Resins

a. The resins shall be in the form of spherical beads. Base of the ion-exchange resins shall be a copolymer of styrene and divinyl benzene forming a macroporous or macrorecticular structure. Other details are as follows:

Cation : Strong acid, with sulfonic acid functional group .
Anion : Strong base, with quaternary ammonium (type I) functional group.
Inert : Non ionic, compatible with the above resin types.

Cation resins shall be supplied in hydrogen form and Anion resins shall be supplied in hydroxide form. Cation Resin of gel type may also be offered meeting the criteria as mentioned below in d) & c) iv.

b. Physical Properties:

i. Particle size: The resins shall be in the form of spherical beads. All resins, when wet screened with U.S. standard sieves, shall pass through a No.14 sieve no more than 2 percent shall be retained on a no. 16 sieve, and more than 2 percent shall pass through a no. 40 sieve. The particle sizes and densities shall be carefully controlled to facilitate clear separation between the resins during regeneration process.

ii. Bead Strength: The average force required to fracture individual beads of cation resins in hydrogen form, anion resins in hydroxide form, and the inert resins, shall exceed 350 grams. Not more than 5 percent of the beads tested in each batch shall get fractured by forces less than 200 grams.

c. Chemical Properties:

i. Total wet volume ion-exchange capacities in equivalents/liter shall not be less than the following:

Cation in hydrogen form: 1.7
Anion in hydroxide form: 0.8

ii. The resins shall contain a minimum of metallic and organic impurities consistent with good processing. The processing procedure will include rinsing the resins with demineralized water before packing, so that further rinsing will not be required before use. Foreign objects in the resins shall constitute a basis for its rejection.

iii. Cation-Anion resin ratio shall be 1.5 parts cation to 1.0 part anion by volume. In case the process requires any non-ionic resin the same shall represent at least 10 percent of the bed volume, but not less than 15 cm of the bed depth in the resin separation tank of the external regeneration facility.

iv. Manufacturer: The resins shall be of reputed manufacturer with adequate past record of successful service for not less than 3 years in similar application.

d. The resin shall be suitable for the condensate temperature that may be achieved in all operating regimes of TG cycle. However, the anion resin shall be suitable for a temperature of 60 deg.C.

8.0 VESSELS FREE BOARD:

The pressure vessels in the common external regeneration facility shall be provided with adequate freeboards over the top of the settled resins, to minimize resin loss during their use. Minimum freeboards to be are as follows:

(i) Mixed resin Storage vessel : 50%

(ii) Resin separation vessel : 75%

(iii) Cation regeneration vessel : 75%

(iv) Anion regeneration vessel and activated carbon filter : 75%

However, if a vessel is used for more than one service, then the vessel design shall be based on the

service which gives maximum freeboard.

9.0 SCOPE OF SUPPLY (MECHANICAL) – (Please refer P&ID also)

Broad scope of supply (mechanical) for this package is detailed below and as indicated in relevant portion of this specification and same shall be in the scope of the bidder. Please refer Electrical and C&I specifications also for respective scope of Electrical and C&I items and same shall be in the scope of the bidder.

A. SERVICE VESSEL FACILITY

Condensate Polisher plant of service vessel area shall consist of following

1) There shall be three numbers service vessels (3X50%) for each 660 MW TG unit each polishing 50 % of the condensate flow. Each Condensate polisher vessels shall be complete with condensate inlet and outlet connections, pre filter, connections for resin transfer to and from the vessels, bed support-cum-under drain system, inlet water distributors, air distribution arrangement for resin mixing, all fittings and appurtenances etc. as required.

2) There shall be two numbers (2x50%) back washable type cartridge pre filters at the upstream of condensate polishing service vessels along with all associated piping, valves, instrumentation etc. The pre-filters shall be designed for start-up period, commissioning period as first cleaning step as well as normal continuous operation.

3) Backwash Waste water from Pre-Filter: DM Water used for backwashing shall be collected in a RCC Pit in Service Vessel area having holding capacity 1.5 times the capacity of DM water required for backwashing the one Pre filter and the same shall be pumped to CPU regeneration area N-Pit by means of two (2) numbers (1Working+1Standby) (2x100%) backwash waste water pumps for each TG unit. (Pump, Piping, Valves and Instruments for this backwash waste water transfer is not in the scope of bidder).

4) External resin traps at the outlet of each of the polisher vessel, designed for in-place manual back washing.

5) Condensate inlet and outlet headers for each installation with pipe connections to each condensate polisher vessels.

6) Resin transfer headers and pipe lines connecting the external regeneration facilities to the condensate polisher vessels of each installation.

7) Rinse water outlet headers from condensate polisher vessels of each installation upto the condenser hot well.

8) Gland sealing water piping for the valves in the rinse water line.

9) Emergency bypass system as mentioned in P&ID for the total system (i.e. Pre filters and Service Vessel) shall also be provided. This emergency bypass system will open automatically in case of pressure differential exceeding 3.5 Kg/cm2.

10) Two (2) nos. (2X100%) capacity (1Working+1Standby) oil free type, air blowers to supply necessary air for mixing the resins in the service vessels for each 660 MW TG unit CPU. Each blower shall be complete with motor, V-belt drive with belt guard, inlet filter/silencer, flexible couplings discharge snubber, all mounted on a single base. Relief valve(s) shall be provided as required.

11) All necessary drains, vents and sampling points, with valves as specified and as required.

12) Complete Instrumentation and Control for automatic operation.

13) Nine (9) complete charges of resins. One charge will be defined as cation, anion & inert resin (if

applicable) requirement for one service vessel.

14) Complete instrumentation and controls for this system, including the differential pressure transmitters, panel mounted indicating type controller with provision for remote manual operation, actuator for the control valve with positioner etc. All tubing, wiring, airsets, and other fittings, required to complete the system.

15) All necessary valves, piping, instrumentation & fittings for the installations with actuators necessary for their remote operation. These shall include suitable foolproof arrangement to prevent accidental over pressurization of the resin transfer pipeline and regeneration facilities connected to it, which are designed for pressure much lower than that of the Condensate polishing plant service vessel area.

16) Operating platforms, ladders, supports and other structural works for each Condensate Polisher vessels and each pre filter to facilitate accessibility for operation and other equipment etc. shall be provided.

17) All Sodium and silica analysers shall be provided in air conditioned panel/ cabinet. Air conditioning equipment required for sodium and silica analysers panel shall be in bidder's scope

18) Multistream for Silica and Sodium Analysers shall be provided as per P&ID and Multistream analysers shall have at least one stream as spare. Hence, minimum 5 stream Silica and Sodium Analysers for each TG unit shall be provided by bidder.

19) A common drain header for the condensate polisher service vessels of each unit up to the hot well.

20) One Number Air Receiver for each 660 MW TG unit CPU as required for the backwashing of Pre-Filter.

21) Emergency bypass system:

Each condensate polisher service unit shall be provided with an automatic bypass system for the condensate polisher on the condensate inlet and outlet headers of the unit with a set of control valve with its isolation valves on the upstream and downstream sides of the control valve.

In the event of excessive pressure differential between the condensate inlet and outlet headers, this control valve will open automatically to bypass requisite quantity of condensate to prevent this pressure differential from exceeding a preset limit when all vessels/ two vessels/one vessel/no vessel is in operation.

Either 2x50% capacity valves or 1x100% control valve to achieve proper control under all operating conditions shall to be provided.

Complete instrumentation and controls required to complete the system, shall also be installed.

The isolation valves may be provided with operators for manual operation. The entire system shall be designed for an internal pressure of at least the design pressure of service vessels and for a maximum condensate flow of not less than total design flow of all the working service vessels.

The control system shall be so designed that the control valve is able to bypass 50% of rated flow (based on offered vessel configuration) when any of the service vessel is out of service, 100% (based on offered vessel configuration) of flow when two vessels are taken out of service and 100% of flow when all the service vessels are out of service.

a. Pre-Filter bypass control system as indicated in the P&ID shall be in bidder’s scope.

b. Service vessel and Pre-filter bypass control system (Emergency bypass system) as indicated in the P&ID shall be in bidder’s scope.

c. Service vessel bypass control system as indicated in the P&ID shall be in bidder’s scope

22) Vessel internals shall meet the following requirements

Inlet water and regenerant distributor: -

Hub and internals diffuser splash plate or header and perforated laterals. Material of construction shall be

SS-316 except for acid service which will be of Hastealloy-B.

Under drains: -

Same as above with screened laterals with internal perforated pipes and rubber lined flat bottom. For resin separation/regeneration/mixed resin vessels, it may have fully screened bottom (NEVA- clog type with pora septanurese screen, fully supported by subway grid or equal).

All internal fasteners shall be of SS-316 and heavy-duty locknuts shall be used throughout.

B. REGENERATION SYSTEM

Regeneration area shall be considered as low pressure area. One (1) common external regeneration systems for regeneration of the ion exchange resins from the condensate polishers for all the turbogenerator units shall be provided. One (1) common facility for regeneration of the ion-exchange resins from the condensate polishers of all the turbo-generator units shall be provided utilizing three (3) tank concepts and consisting of following:

1) One No. Resin Separation & Cation Regeneration Vessel.

2) One No. Anion resin regeneration vessel.

3) Two (2) Numbers Mixed resin storage vessels.

4) The regeneration vessels arrangement shall be as per the supplier recommendation/ process utilising three (3) tank concept as defined above. However, there shall be two numbers identical mixed resin storage vessels. If the process envisages the chemical regeneration arrangement in mixed resin storage vessel, then additional mixed resin storage should also have chemical regeneration arrangement.

5) All internals, fittings and appurtenances for these vessels.

6) Common waste effluent header with one (1) number resin trap, total one (1) number for station designed for in place manual backwashing.

7) One (1) number Resin injection hopper to handle upto 150 litre of as received new resins.

8) Two (2) nos. (2X100%) (1Working+1Standby) oil free type air blowers with electric motor drives, for supplying all the process air required for cleaning of the resins and their regeneration processes. Each blower shall be complete with motor, V-belt drive with belt guard, inlet filter/silencer, flexible couplings discharge snubber, all mounted on a single base. Relief valve(s) shall be provided as required

9) Two (2) nos. (2X100%) (1Working+1Standby) DM water pumps with electric motor drives for water supply for chemical preparation, dilution water supply during dosing & regeneration etc. These DM water pumps will take suction from DM water storage tanks provided for CPU Package.

10) Two (2) nos. (2X100%) (1Working+1Standby) DM water pumps with electric motor drives for water supply and transfer of resin from service vessel to regeneration vessels and vice – versa. These DM water pumps will take suction from DM water storage tanks provided for CPU Package.

Waste water generated during regeneration: The DM water used for resin transfer operations shall be collected in a RCC pit in regeneration area having holding capacity 1.5 times the capacity of DM water required for transferring the resins or 50 m^3 (min) and the same shall be pumped to CW channel for recycle/re-use by means of two (2) numbers (1W+1S) (2x100%) of waste water recycle pumps. The material of construction of pumps shall be SS-316 (casing, impeller and shaft).

11) One (1) number alkali preparation tank complete with electrically driven stirrer, dissolving basket, carbon dioxide absorber, overflow seal, integral pipe works, valves, instruments, ladders, platforms, lifting lugs etc. and all other required accessories.

12) One (1) number alkali day tank complete with electrically driven stirrer, dissolving basket, carbon dioxide

absorber, overflow seal, integral pipe works, valves, instruments, ladders, platforms, lifting lugs etc. and all other required accessories.

13) Two (2) numbers acid measuring tank, complete with fume absorber, overflow seal, integral pipe works, valves, instruments, ladders, platforms, lifting lugs etc. and all other required accessories.

14) One (1) number lime tank, complete with electrically driven stirrer, dissolving basket, carbon dioxide absorber, overflow seal, integral pipe works, valves, instruments, ladders, platforms, lifting lugs etc. and all other required accessories.

15) One (1) no. Activated carbon filter for alkali complete with internals, integral pipe works, valves, instruments, ladders, platforms, lifting lugs, carbon trap etc. and all other accessories as required.

16) One (1) no. hot water tank complete with heaters (2X50%), internals, integral pipe works, valves, instruments, ladders, platforms, lifting lugs etc. and all other accessories as required.

17) Two (2) nos. (2x100%) (1Working+1Standby) alkali solution transfer-cum-recirculation pumps of suitable capacity and head to meet the system requirements. These pumps shall be provided with a pulsation dampener at the outlet header of each pump along with necessary valves & instrumentation & accessories.

18) Two (2) nos. (2x100%) (1Working+1Standby) Acid dosing pumps for dosing hydrochloric acid (30% conc.) along with electric motor drive, pulsation dampener & safety relief valve at the outlet header of each pump all other required accessories etc.

19) Two (2) nos. (2x100%) (1Working+1Standby) Alkali dosing pumps for dosing NaOH (48% conc.) along with electric motor drive, pulsation dampener & safety relief valve at the outlet header of each pump all other required accessories etc.

20) All integral pipe works, valves, internals, fittings, hangers, supports and appurtenances etc for these vessels.

21) There shall be Bulk Acid storage tanks (two numbers) and Bulk Alkali storage tanks (two numbers) along with acid unloading pumps (two numbers (2X100%)) and alkali unloading pumps (two numbers (2X100%)) for CPU Regeneration system.

22) There shall be two numbers DM water storage tanks. These Two (2) numbers of DM Tanks shall be of vertical cylindrical type in Mild steel construction internally painted with epoxy. The design features of the tanks & accessories shall be as per IS: 803. However, minimum thickness of shell plate, bottom plate and roof plate shall be 8 mm, 10 mm and 6 mm receptively. The tanks shall be provided with CO2 absorber and over flow seal pit. capacity of each tank shall be equivalent to 1.5 times the DM water required for one (1) regeneration operation of working vessels of one (1) TG unit including resin transfer operations from Condensate Polishing Plant to regeneration plant and regeneration plant to Condensate Polishing Plant and for preparation of chemicals for one (1) regeneration of working vessels of one (1) TG unit and also for back washing of Pre-Filters of one TG unit. However, the capacity of each DM water storage tank shall be 600 m3 minimum. Water inlet pipe shall led up to the bottom of DM tanks (preferably through perforated pipe) to avoid turbulence/agitation

23) Total two (2) numbers mixing tee for Acid and alkali dosing facility.

24) Neutralising pit of RCC construction with acid/alkali resistant tiles shall be provided to receive drains from the regeneration in two (2) sections and each section shall have a holding capacity of 1.5 times the waste effluent from each regeneration of one vessel & 1.5 times the capacity of DM water required for backwashing the one Pre filter. For disposal of neutralized effluent pumping, pumps shall be provided. Proven agitation system like air agitation/ venturi mixing shall be provided, in addition to recirculation from pumps.

25) Total three (3) numbers (1W+1S+1Maint. standby) the waste recirculation/disposal pumps for Neutralising pit.

26) Design pressure of the condensate Polisher Service Vessels is indicated elsewhere. For all other

Pressure vessels, the design pressure shall be at least 8 kg/cm² (g) minimum.

27) All the atmospheric vessels shall be at least 6 mm thickness.

28) To facilitate erection at site chemical dosing preparation equipment shall be mounted on structural steel skids and assembled (including piping) at the manufacturer's shop, to the maximum extent possible, prior to shipping. The number of mechanical connections shall be minimized using pipe headers wherever possible. The chemical dosing equipment's may also be supplied and installed independently instead of assembling the skids.

29) Grouting material required for equipment grouting.

30) Safety equipment as indicated elsewhere in the specification.

31) All equipment for dosing of acid and alkali solutions shall be rated to provide a maximum dosing rate at least 20% in excess of that required from process calculation except Acid and alkali measuring Tank for which excess margin is defined under Datasheet –A.

32) Adequate number of safety shower units and Eye-fountains to protect against any chemical hazard or at least 2 nos. shall be provided by bidder. The same shall be in bidder's scope of Supply.

33) Platform/ operating platform, Ladder, supporting structure for service vessel area and regeneration area vessels and tanks and necessary cross over for piping shall be in bidder's scope.

34) Four (4) sets of safety equipment [(Personal Protection Equipment (PPE)] comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided

C. 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, counter flanges, Hangers and supports, embedment plates with lugs etc required for the below given piping shall also be provided by the bidder.

1) Service vessel inlet header shall be seamless carbon steel ASTM A-106 Gr B (OD 406.4 X 12.7 mm thick).

2) Service vessel outlet header shall be seamless carbon steel ASTM A-106 Gr B (OD 406.4 X 12.7 mm thick).

3) Rinse water outlet piping to Condenser Hotwell shall be seamless carbon steel ASTM A 106 Gr -B (OD 168.3 x 7.11 mm). The distance between CPU service vessel to condenser Hotwell shall be considered as 110 meters for each unit and this piping shall also be in bidder's scope.

4) Resin transfer piping shall be minimum 80 NB and of SS 304 Sch 40 (minimum) seamless. One way piping distance for resin Transfer Piping between farthest service vessel and regeneration area shall be 375 meters. Complete resin transfer piping shall be in bidder's scope. Other details have been attached elsewhere in the tender technical specification. Further all the resin transfer piping inside service vessel area and regeneration area shall be in bidder's scope.

5) Piping handling DM water shall be Stainless steel SS 304 Schedule 40 (minimum). One way piping distance for DM water piping between farthest service vessel and regeneration area shall be 375 meters. Complete DM water piping shall be in bidder's scope. Other details have been attached elsewhere in the tender technical specification. Further all the DM water piping inside service vessel area and regeneration area shall be in bidder's scope.

6) The material of piping handling DM waste water generated during regeneration shall be of stainless steel type 304 Sch.40 (Min). The piping distance from CPU regeneration area to CW channel is 600 meters. Complete DM waste water piping shall be in bidder's scope. Other details have been attached elsewhere in the tender technical specification.

7) Pipeline handling Alkali shall be of stainless steel type 316 Sch.10 (minimum).

8) Piping for Acid service (HCl) shall be carbon steel Poly propylene lined/CPVC as per ASTM F441(Sch.80).

9) Piping for service air shall be shall be of hot dip galvanized (heavy grade) steel.

10) Piping for instrument air shall be hot dip galvanized (heavy grade) steel.

11) All piping within each of the above skids/equipment shall also be in bidder's scope.

12) There shall be a Neutralisation Pit (N pit) for CPU regeneration and the Neutralisation pit Civil work shall be under BHEL scope. The regeneration waste from CPU regeneration area shall be led to this N-pit via drain.

13) Service water piping in CPU service vessel area (used for cooling of condensate sample), Service water piping in each CPU regeneration area, instrument air piping for each CPU service vessel area & regeneration area and service air piping for each CPU service vessel area & regeneration area, potable water piping for each CPU regeneration area etc. shall also be in bidder's scope.

14) Similarly, all piping between each external regeneration facility and the skids for chemical dosing and acid/alkali preparation shall also be designed, supplied, erected and tested by the bidder. These shall include demineralized water piping to the chemical dosing, acid /alkali piping from external bulk storage tanks to respective preparation skids, the alkali preparation skids from the external regeneration facility, alkali solution from its preparation facility to the alkali dosing skid, dilute chemical solution piping for acid and alkali from the dosing skids to the external regeneration facility, piping to the preparation/dosing facilities, instrument air piping and power supply for immersion heaters of the diluent water tank from the regeneration facility, and all instrumentation and control wiring between these skids, etc.

15) Bidder shall design, supply and erect the piping between the service units and the common external regeneration facility, for transferring the exhausted and regenerated resins as required.

16) All piping shall be laid above ground and generally laid in pipe trestles including crossing of road/pipe/cable trenches if any. Piping of between chemical tanks area and regeneration area etc. may be laid on pedestals if layout permits.

17) The resin transfer pipeline arrangement shall avoid any sharp bends which cause segregation of the mixed resins, and pockets where the resins can get trapped. Suitable observation ports shall be provided in all critical areas to enable the operator to monitor completeness of the resin transfer operations. All necessary arrangements for venting and draining of the pipeline shall be provided.

18) The resin transfer pipeline shall be sized for a flow velocity of between 2.3 and 3.0 meters/sec. For other services, design criteria shall be generally in line with design philosophy described elsewhere in technical specification.

19) Remotely operated valves suitably interlocked with the plant operation, shall ensure that the resins get transferred to and from only the particular service vessel which has been selected by the operator.

20) All lined vessel connections and connections in unlined vessels (25 NB and larger) shall be flanged to ANSI 125 lb class minimum except the polisher service vessels which shall be ANSI 300 lb class minimum, Flat face flanges shall be used throughout. Nozzle material shall be ASTM-106 Gr. B. Sch.80 pipe for all vessels. All flanged connections shall be supplied complete with matching counter flanges, nuts, bolts and full face gaskets. All the pipeline in service vessels area where pressure may attain same as service vessel shall be designed for 300 lb class minimum.

21) Complete supporting system for the pipeline shall be designed, fabricated and supplied by the Bidder. Inside the building, the overhead portion of the pipeline may be supported from the building structures. In outdoors, the pipeline may run on steel posts. Crossing of the roads shall be on a pipe bridge with a clear height of at least 6.1 meters over the road surface. All the steel structures of the pipe bridge and the supporting posts along with all necessary hanger, clamps, connecting steel, fixing bolts, nuts, etc. shall be supplied and erected by the bidder.

22) Piping distance from Neutralisation Pit (N pit) of CPU regeneration area to Bottom Ash Slurry Sump shall be of MSRL construction and piping distance shall be 475 meters. Complete N-Pit waste transfer piping shall be in bidder's scope. Other details have been attached elsewhere in the tender technical specification.

23) Routing of this pipe line shall be developed by the bidder and shall be finalized in coordination with the BHEL/Customer, based on the space available and the final layout.

24) Complete Piping of stainless steel type 304 Sch.40 (Min) of 100NB for filling the DM water storage tank from the TP (by BHEL) at 10meter distance shall be in bidder's scope. Complete piping of DM water suction, discharge and recirculation of both the DM water storage tank shall be in bidder's scope.

25) The condensate pipeline shall be sized for a flow velocity between 3 and 5 m/sec.

D. VALVES

All the valves in service vessel area and regeneration area as indicated in P&ID and to meet the system requirement as mentioned elsewhere in the specification shall be in the bidder's scope of supply.

1) All valves shall be designed as per applicable AWWA/BID/BS or equivalent international standard /codes.

2) The isolation valves on the resin transfer line shall be of eccentric plug type/ball valve (full bore type) of stainless steel construction (SS 316).

3) Emergency bypass control valve shall be of double flanged/ lugged wafer butterfly type. Isolation valves of wafer (lugged) type butterfly valves (resilient material seated, to ensure bubble-tight shut off) shall be provided on the upstream and downstream sides of the control valve. Other Butterfly valves in Service Vessel Area shall be 300lb class (minimum) and end connection shall be lugged wafer (min.)

4) The material of construction of valves handling condensate in service vessel area shall be SS-316 (for body, disc and shaft). Seat/seat rings should be of Teflon/titanium back up rings. Seal shall be of Teflon or equivalent.

5) Isolation Valves handling Acid(HCL), Alkali, Ammonia etc shall be diaphragm type in MSRL (Mild Steel Rubber lined) construction.

6) Isolation Valves handling DM water shall be Butterfly or gate or globe type and shall be of SS -304 construction.

7) Non-return valves shall be constructed of SS-304 for DM Water & SS316 for alkali. For Hydrochloric acid, non-return valve shall be dual plate/ swing check/ lift ball check type of suitable material or as per manufacturer's standard practice.

8) All valves in service vessels area where pressure may attain same as service vessel shall be designed for 300 lb class minimum. However, Bidder to select the class/ pressure rating of the valves of service vessel area to meet the system design requirement. In case it has been found that the class/ pressure rating as required is higher than 300lb class then the same shall be considered by bidder in their scope.

E. PRESSURE VESSELS, ATMOSPHERIC TANKS & MISCELLANEOUS ITEMS

1) Design of all vertical cylindrical atmospheric storage tanks containing water, acid, alkali and other chemicals shall conform to IS: 803

2) Unless otherwise mentioned design temperature of all pressure vessels and storage tanks shall be 10 deg.C higher than the maximum temperature that any part of the vessel/tank is likely to attain during operation.

3) All vessels/tanks without inside rubber lining shall have a corrosion allowance of minimum 2 mm and mill allowance (minimum 0.3 mm) for shell and dished ends. Thinning allowance of 2 mm (minimum) shall be considered for dished end of torospherical type.

4) All the atmospheric tanks shall have sufficient free board above the ''Level High /Normal Level'' as the case may be. The overflow level shall be kept at least 20 cm or 10% of vessel height above the ''Level High /Normal Level'' for all the tank except for the DM tanks for which a minimum height of 300 mm shall be provided over the ''High Level''. Further, a minimum 100 mm free board shall be provided above the top of overflow level to the top of tank.

5) All pressure vessels shall be designed and constructed in strict accordance with the ASME code Section VIII or acceptable equivalent international standard. Suitable mill tolerances shall be considered for determining the

thickness of the shells and dished ends. A minimum thinning allowance of 2 mm shall be considered for the dished ends of torospherical type.

6) Pressure vessel ends shall be of dished design and constructed by forging, pressing or spinning process. Spherical vessels for CPU service vessels are acceptable. Conical or flat ends shall not be accepted. All the atmospheric vessels shall be atleast 6 mm thickness.

7) All pressure vessels shall be fabricated from carbon steel plates to SA-515 / 516 Gr. 70 and lined internally. The lining shall be of rubber having a hardness of 65 plus/minus 5 shore -A meeting the requirements of IS:4682, Part-I. The lining shall be applied in three layers, resulting in a total thickness of not less than 4.5 mm anywhere on the internal surfaces of the vessels. The lining shall extend over the full face of all flanged connections and shall have a minimum thickness of 3 mm in all such external areas.

8) Vessel internals shall meet the following requirements:

Inlet water and regenerant distributor: - Hub and internals diffuser splash plate or header and perforated laterals. Material of construction shall be SS-316 except for acid service which will be of Hastealloy-B.
Under drains: Same as above with screened laterals with internal perforated pipes and rubber lined flat bottom.
For resin separation/ regeneration/ mixed resin vessels, it may have fully screened bottom (NEVA - clog type with pora septanurese screen, fully supported by subway grid or equal).
All internal fasteners shall be of SS-316 and heavy duty locknuts shall be used throughout.

9) Resin Traps: Outlet of each condensate polisher vessel, activated carbon filter and waste effluent header of the common regeneration shall be provided with a resin trap. Pressure drop at design flow through a clean resin trap shall not exceed 0.35 kg/sq.cm. Resin trap shall be of rubber lined steel construction and internals (cord & screen) shall be of JOHNSON SCREENS IRELAND or equivalent (SS-316) construction. Resin traps of process effluent line shall have screen opening not exceeding 120 percent of associated process vessel under drain screen opening. Other resin traps shall have screen opening of 60 mesh. In place manual back flushing shall be provided for all resin traps.

10) Carbon Trap (for ACF): Outlet of each Activated Carbon filler on Carbon trap (media trap) shall be provided by bidder as per manufacturer standard.

F. ADDITIONAL REQUIREMENT

1) Operating platforms, permanent ladders (not rugs), supports and other structural works for each vessel, tanks, valves etc. to facilitate accessibility for operation and maintenance for all the condensate polisher mixed beds, regeneration vessels, storage tanks, alkali and acid measuring tanks & preparation tanks and other equipment's etc. is also in bidder's scope.

2) Initial charge of all lubricants & grease.

3) All special tools necessary for proper maintenance or adjustment of the equipment packaged in permanent box. Finish paints for touch-up painting of equipment after erection at site in sealed container.

4) Painting requirement as indicated in Section- II are bare minimum. However, any variation in the painting schedule as finally approved by BHEL / Customer shall be taken care by the bidder without any commercial and delivery implication to BHEL / Customer. Colour coding scheme shall be intimated to vendor during detail engineering.

5) Start-up and commissioning spares as required.

6) Mandatory spares as indicated in Annexure – V.

7) 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. Coating, wrapping and protection required for buries pipes shall also be in bidder's scope of work.

8) For calculating the required pump head for pump selection, at least 10% margin shall be taken over the pipe friction losses and static head shall be calculated from the minimum water level of the tank/ sump/ reservoir from which the pumps draw water. However, the static head to be consider shall be 15 meters (minimum).

9) All the first fill and one Year's topping requirements of consumable such as reagent (as required for all analysers etc.), 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 in the scope of the bidder. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.

10) The Condensate Polisher Service vessels, blowers etc. will be located indoor near corresponding units. Regeneration system equipment shall be kept under shed and one-meter height parapet wall shall be provided around this shed. Effluent re-circulation/disposal pumps, Bulk chemical storage tanks, unloading transfer pumps and DM water storage tanks for regeneration system etc. shall be kept in open area.

11) MCC shall be located in CPU regeneration area.

12) Space available for CPU service Vessels area & CPU Regeneration area (Vide ref. Dwg. No. PE-DG- 497-100-M003 & Plot Plan Dwg. No. PE-DG-497-100-M001) are attached in this specification. Bidder to accommodate their equipment within the space provided. Further the location of other facilities has also been indicated in Dwg. No. PE-DG-497-155-A003 attached in this specification. The location of DM waste water pit shall be in CPU regeneration area.

13) Any statutory requirement / clearance required for the packages from government / local body shall be in bidder's scope.

14) 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 shall be taken from BHEL. 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.

15) 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.

16) KKS numbering as per BHEL/ Customer requirement shall be provided by the Bidder during detailed engineering stage without any commercial/ delivery implication to BHEL.

17) 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.

18) 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.

19) 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".

20) For Skid Mounted dosing equipment. all the equipment, piping etc. shall be assembled on two (2) structural steel skids one (1) for acid and one (1) for alkali dosing equipment. The bidder shall supply all anchor bolts, foundation plates, sleeves, nuts, inserts etc. to be embedded in concrete for these equipment skids. Each equipment skid shall be provided with suitable lifting lugs, eye bolts etc. to facilitate erection and maintenance.

21) Wherever any design standard mentioned in this specification, bidder to consider latest standard for designing of all the items.

22) In order to facilitate erection at site chemical dosing preparation equipment shall be mounted on structural steel skids and assembled (including piping) at the manufacturer's shop, to the maximum extent possible, prior to

shipping. The number of mechanical connections shall be minimised by the use of pipe headers wherever possible. Alkali solution preparation, alkali dosing and acid dosing system are a recommended listing of the main equipment skids to be furnished under this package. The bidder may also supply and install this equipment independently instead of assembling the skids.

23) Chain Pulley block/ Electric Hoist shall be in bidder's scope in line with selection criteria mentioned in section IIA.

10.0 CONTROL & OPERATION

10.1. General

a) It is not the intent to specify here the complete details of the control system. Basic type of controls required has been specified below. The bidder shall submit the complete detail of the system offered by him like the extent of automation offered, operation of the complete system, logic/flow diagrams, type and details of the presentation of information, the type of mimic, hardware details etc. along with detailed circuit descriptions

b) It shall be possible to operate in Auto/Semi-Auto /Manual mode. In 'Auto' mode, once the sequence has been initiated, it shall proceed from step to step automatically. In 'Semi-Auto' mode each step shall be performed only after initiation by the operator. In 'Manual' mode complete operation shall be by the operator by operation of the Control switches on the panel.

c) 'Close-Auto-Open' control facility shall be provided from OWS/control panel for solenoid valves. In 'Auto' position, the valves shall receive close / open command from the Control system.

d) 'Stop-Auto-Start' Control facility shall be provided from OWS / control panel for the various drives. In 'Auto' position, the drives shall receive stop/start command from the Control system.

e) On control system failure, it shall be possible to operate the valves by means of manual operator of solenoid valves too.

f) The control system shall link the various steps such as closing/opening of different valves, starting/stopping of various pumps etc. which form a sequence. The logic system shall adhere to the correct sequence of operation and predetermined time intervals. The system shall have interlocks so that, criteria necessary for each step are complete prior to proceeding to the next step.

g) It shall be possible to switch mode of operation from one to the other at any moment and the operation shall proceed on the newly selected mode from that time.

h) For steps, which require frequent time adjustment, it shall be possible to change the time setting from the front of the panel. For all other steps it shall be possible to adjust the time setting from inside the panel.

i) For all sequences, the current step number, set time of the step, elapsed time of the step and the total elapsed time of the sequence shall be indicated in the OWS/control panel.

j) A mimic shall be provided for the CPP scheme and Regeneration system scheme shall be provided. Status of various vessels, drives, valves etc shall be indicated by on the mimic.

k) The system shall incorporate the necessary safety features. During automatic sequential operation, if any pre-requisite criterion is not fulfilled or missing for a pre-determined time interval, the steps should not proceed further, and Alarm shall be provided. Missing criteria, sequence, which is under hold up etc., shall be displayed.

l) The safety system for any sequence/step shall check the opening of the required valves and closure of the remaining valves of the plant to avoid mal-operation.

m) Wherever standby equipments are provided, it shall be possible to select each of the drive on 'standby' duty.

n) The detailed logic for the sequence and for each of the drive shall be subject to the BHEL/Customer's approval.

o) Start, progress and stop of each of the sequence shall be annunciated.

p) The status of vessels of Condensate Polishing Plants shall be available in all the CPP panels of all TG units and as well as in the regeneration plant control panel. Similarly, the status of regeneration plant status shall be available in the panels of Condensate Polishing Plants of all TG units.

10.2. Control & Operation of the Condensate Polishing Unit

a) It shall be possible to select each of the CPU vessel for any of the following operations or mode:

(1) Standby (Applicable for where spare service vessel (s) are provided)

(2) Service

(3) Isolation from service.

(4) Exhausted Resin Transfer from CPU vessel to Regeneration plant.

(5) Regenerated Resin Transfer from Regeneration plant to CPU vessel

(6) Rinse mode.

Each mode or operation is described as below:

Standby Mode:

(1) Among the vessels, any one of the vessels may be selected in this mode.

(2) Under this mode, the vessel, which was regenerated in previous cycle and filled with regenerated resin, shall be kept ready for next Service cycle.

(3) The selection of any vessel for Standby mode shall be initiated by operator and there shall be indication about the details such as "Condition of the resin; Whether it is filled with regenerated resin or exhausted resin, whether the standby vessel has undergone rinse cycle or not, date and time of receipt of regenerated resin and completion of rinse cycle etc

Service mode:

(1) Service flow rate for each polishing vessel shall be monitored. During periods of low condensate flow the operator may select to remove one of the vessels from service by a manually initiated automatic sequence.

(2) High differential pressure across the influent and effluent headers will cause an alarm and bypass system shall be initiated as described elsewhere in this section.

(3) By observing the individual vessel flow indicators, or conductivity at vessel outlet the operator can determine which vessel is contributing most to the pressure drop and is in need of resin cleaning.

(4) Cation conductivity indicators shall monitor the polishing system influent and effluent streams as

well as the discharge of each service vessel. A high influent conductivity alarm will alert the plant operator that a problem condition such as air or condenser cooling water leakage has occurred. This conductivity analyzer shall also provide contacts for an alarm at the power station main control room. A high effluent header or service vessel conductivity alarm will alert the operator to the need for regeneration of a polishing vessel.

(5) When the vessel under Service mode is ready for regeneration, the operator shall change the same into “Isolation mode” in the panel. Subsequently the “Standby vessel” shall be selected for “Service mode” from the OWS/control panel. The selection shall follow, required sequences such as pressurization of the vessel, checking of the effluent quality and putting the vessel in service on satisfactory effluent quality.

(6) The differential pressure (DP) across the inlet and outlet headers of CPU services vessels shall be measured and the bypass control valve will also modulate as per the DP. The bypass system shall also be actuated upon high condensate temperature.

Isolation from Service:

Normally “Service Vessel” once exhausted shall be isolated from service till the “Resin Transfer” operation is initiated. In addition, provision to be kept for isolation of one or all the vessels from service if required by operator from the panel.

Resin Transfer from CPU vessel to Regeneration plant:

(1) When a vessel in a service mode needs regeneration as stated above, the resin transfer from the particular vessel to the regeneration plant shall be initiated from the panel of the condensate polishing plant.

(2) The transfer of resin from the service vessel shall include operations such as isolation of the service vessel, hydraulic transfer of the resin to the external regeneration system (resin separation vessel) and the complete drain down of the service vessel.

(3) The sequence of “Resin Transfer” operation shall be initiated from the Control system in panel of CPP and shall be controlled in the regeneration Panel.

(4) The completion of the operation shall be exhibited in the panel.

Resin Transfer from Regeneration Plant to CPU Vessel:

(1) When the regeneration is completed in the regeneration plant, the resin shall be transferred to the empty vessel of Condensate Polishing plant.

(2) This shall be initiated by the operator from the control panel of condensate polishing plant of the unit from which resin was transferred to the regeneration plant in previous service. Provision shall also be kept to transfer the regenerated resin to any of the empty vessel of the CPP of any of the TG unit if required.

(3) The transfer of resin from the regeneration plant shall include operations such as hydraulic transfer of the resin and the complete drain down of the water.

(4) The sequence shall be initiated from the panel of CPP and shall be controlled in the regeneration Control Panel.

(5) The completion of resin transfer operation shall be exhibited in both the Control panels.

Rinse mode:

(1) After transfer of regenerated resin from the regeneration plant to the empty condensate polisher vessel, this rinse cycle shall be initiated from the Control system of the respective unit so that the vessel may be rinsed and kept ready for next service cycle.

(2) The rinse mode shall be a manually initiated full automatic sequence. This sequence shall include the rinse down step using condensate at a suitable rate until the unit effluent quality is acceptable for boiler feed water. Prior to rinsing, the resin shall be given air scrub by means of air blowers provided near the CPP.

(3) The effluent quality shall be determined by conductivity monitoring of the rinse water outlet, which is returned to the condenser hotwell for recycle.

(4) Cation conductivity values shall be monitored and interlocked to prevent advancing of the automatic sequence until the rinse down is complete.

(5) The completion of rinse operation shall be annunciated in the panel so that the rinsed vessel may be selected for “Standby mode” or “Service mode” as per requirement.

10.3. External Regeneration Control System

a) A manually initiated automatic sequence for physical cleaning and chemical regeneration of the resin shall be provided. Control for chemical dosing system and alkali preparation facility shall also be provided in it.

b) Physical cleaning of the resin shall consist of three steps, drain to level, air scrub and rinse. The air scrub and rinse steps are of short duration, approximately 1 and 2 to 3 minutes respective time. However, the program will allow the operator to increase or decrease the number of times the sequence is repeated to meet the requirements existing at that time.

c) The chemical regeneration is a many step sequence. This will include hydraulic reclassification of the resins and the transfer of the resins to the respective regeneration vessels. The layer of inert, intermediate density resin may be inserted to achieve a better separation of the cation and anion resins, improve resin regeneration, and reduce leakage. The separated resins are then back washed, regenerated with hydrochloric acid and sodium hydroxide solutions respectively and then rinsed. Following the rinse step the resins shall be given an air scrub followed by a good backwash. The resin is then transferred back to the resin separation vessel and the resins are air mixed. The mixed resins after regeneration are given a final rinse with the discharge conductivity being monitored. The quality of this discharge will determine if the regeneration has been effective. If the quality is not satisfactory the regeneration sequence must be repeated. If satisfactory, the mixed resin is transferred to the resin storage vessel.

d) A resin mixing and final rinse may occur in the resin storage vessel provided that the system design will permit direct return of the resins to the resin separation vessel in the event of an unsatisfactory regeneration.

e) Upon satisfactory completion of regeneration, the status shall be annunciated audio-visually in the regeneration system OWS/control panel and as well as in the Balance of Plant Control System. This repeat annunciation in the CPP OWS/panel shall facilitate the operator to initiate resin transfer operation from the regeneration plant to the desired vessel of the Unit in which the service vessel is empty.

f) Upon resin transfer operation from regeneration plant as described by the operator from the I Control System, the regeneration plant shall be ready to receive next batch of exhausted resin from any of the

CPP. The status of regeneration plant (Whether ready to receive resin for regeneration or under regeneration etc) shall be available in the Control System of CPP.

g) Demineralized water shall be used throughout the regeneration process for backwashing, diluting the regenerant, rinsing and resin transfer.

h) A conical bottom hopper having a water ejector will be used for resin make-up.

i) At any time only one of the sequence shall be in progress.

10.4 Interlocks

- All interlocks for safe operation of the plant shall be provided. They shall specifically include the following as minimum requirement.
- Service vessels can be back in service, only after they have been pressurized.
- Service vessels can be taken up for resin transfer only after they have been completely isolated from the condensate system and depressurized.
- Resin can be transferred to and from only one service vessel at a time.
- Resin transfer between the service and the regeneration skids shall be permitted only when the receiving vessel is initially empty.
- Regeneration sequence can commence, only when the level in the waste neutralization pit is low enough to receive the entire waste quantity of waste water from the regeneration operation.
- Wherever possible, completion of all timed steps in the regeneration and resin transfer process shall be physically verified by effluent conductivity etc, as applicable. The automatic sequence shall be prevented from advancing to next step, till these required physical conditions are achieved, and at the same time this delay shall be annunciated in the control panel, to draw the attention of the operator. The automatic sequence of operations shall be interruptive at any time by the operator and he shall be able to take over the control to manual from that step onwards. Further operator should be able to override sequence, if required. It shall be possible for the operator to extend the timing of a particular step by isolating the timer for the duration. The timer will restart once the operator puts back the system on 'auto' and the other steps will then follow as programmed.
- The regeneration sequence shall be prevented from advancing further in the event of tripping of a running motor or other fault condition, which do not permit the various desired parameter of this step to be achieved. A manual override for this shall also be provided.
- Annunciation logic shall be carefully designed so that the alarms are activated only under abnormal conditions. As for example, low flow of diluent water is only relevant when the chemical dosing is in progress. All other times, when no diluent water flow is required, this annunciation should be blocked. In general, Normal and trouble free operation of the plant shall not activate any of these alarms.
- Adequate diluent water flow shall be established before starting of the ejectors/ dosing pumps for acid and alkali.
- The immersion heater in the hot water tank can be put on only when there is adequate water level in the tank.
- CPU service vessel inlet & isolate valves will close automatically in the event of tripping of condensate extraction pump.

11.0 SCOPE OF SUPPLY (ELECTRICAL)

Complete electrical as per specification / details indicated in Section IB.

12.0 SCOPE OF SUPPLY (C&I)

Complete C&I as per specification / details indicated in Section IC.

13.0 SCOPE OF SUPPLY (CIVIL)

Total Civil work is in BHEL Scope of work; however Civil Input drawing shall be provided by bidder.

14.0 SCOPE OF SERVICES

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

- Unloading, Storage, handling and transportation at site.
- Chipping of foundation, grouting below base plate for all structures, equipment, grouting of anchor bolts wherever these are not placed in the foundation during casting of foundation itself, excavation & filling of earth for buried MS pipes if and as required. To the extent possible, vendor shall ensure to supply all foundation bolts timely so as to facilitate placement of these bolts while casting the foundation. Wrapping, coating and protection of all the buried pipe shall be as per IS 10221 or AWWA C 203.
- Pre- Commissioning work such as flushing, hydraulic testing etc. Necessary consumables and instrumentation as required for inspection and testing at works as well as at site including precommissioning activities shall be arranged by the successful bidder at their own cost.
- Erection and Commissioning of entire Condensate polishing plant.
- Arrangement of all lubricants, instruments, reagents for carrying out trial run, commissioning and PG test.
- Monitoring gadgets, instruments and equipment's required for maintenance (till PG test & Plant Hand
- over).
- During FAT of DCS, bidder will depute his concerned representative for technical support as and when required by customer / BHEL.
- All personnel required during maintenance and PG test.
- Trial run for requisite period.
- Performance testing.
- Painting of all equipment within scope of supply as per Surface preparation & painting specification.
- Bidder shall also provide one final coat additionally of same DFT as specified in tender specification at site after completion of erection of each equipment / item.
- Preparation of civil assignment drawings i.e. pedestals details; insert plates / embedment's plates required for supporting pipes and equipment etc. and review of civil drawing prepared by BHEL based on civil assignment drawing of bidder. In case any modification is required in the civil work already done based on civil inputs given by vendor, rework shall be done at the cost and risk of the vendor.
- Preparation & submission of all drawings & documents as per drawing/documents requirement & distribution schedule enclosed as Annexure-IV.
- Training of plant Owner's personnel, O&M operators' personnel on plant operation and maintenance.
- All other facilities/ services as described in section on site services in specification and related to Condensate polishing system scope of work.
- Relevant requirements as per GTR, GCC, ECC & SCC.
- AMC requirement for analyser instruments is in bidder's scope and shall be governed as per Section IC..
- Any other service required for making the installation complete in all respect within battery limits and for satisfactory erection & commissioning of the system as well as to meet any statutory requirement relevant to the package, unless specifically EXCLUDED from scope of services.

15.0 TERMINAL POINTS

A. CONDENSATE POLISHING PLANT - SERVICE VESSEL AREA

- Service vessel inlet – (OD 355.6 X 9.53 mm thick, ASTM A-106 Gr- C) - Single piping connection as per drg. no. PE-DG-497-100-M032.
- Service vessel outlet – (OD 355.6 X 9.53 mm thick, ASTM A-106 Gr-C) - Single piping connection as per drg. no. PE-DG-497-100-M032.
- Rinse water outlet- Rinse water outlet piping (OD 168.3 x 7.11 mm, ASTM A-106 Gr-B) till condenser hotwell nozzle for each unit is in the scope of bidder.
- 25 NB connection of Instrument air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from service vessel area.
- 50 NB connection of Service air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from service vessel area.

- Gland sealing water supply & analyser rack cooling water supply piping - Service water connection (50 NB) at 5-meter distance from service vessel area.

B. EXTERNAL REGENERATION AREA

- 25 NB Instrument air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from the regeneration building at 0.5 meters above FGL at end closer to pipe rack/ pedestal.
- 25 NB Service air supply at 5 to 7 kg/cm2 (g) - At 5 meter distance from the regeneration building at 0.5 meters above FGL at end closer to pipe rack/ pedestal.
- Service water (50 NB) - At 5 meter distance from the regeneration building at 0.5 meters above FGL at end closer to pipe rack/ pedestal.
- Potable water (25 NB) - At 5 meter distance from the regeneration building at 0.5 meters above FGL at end closer to pipe rack/ pedestal.
- DM water (100NB) for DM Tank filling – At 5 meter distance from the regeneration building at 0.5meters above FGL at end closer to pipe rack/ pedestal.

16.0 EXCLUSIONS

- All civil works including foundation of equipment. However complete grouting for equipment, fixing and any concreting inside vessels and lining shall be in the scope of the bidder.
- Pipe Trestle from CPU Service Vessel area to Regeneration area, pipe trestle from CPU Regeneration area for Resin Transfer waste water sump up to CW Channel, pipe trestle for N-Pit waste water sump up to Ash slurry sump are not in bidder's scope. However, auxiliary structure, hanger/support components for all the piping (CPU regeneration area, in acid/alkali handling area, interconnecting acid/alkali storage area, CPU service vessels, DM water piping, DM waste water piping, resin transfer piping, instrument air piping, service air piping, service water piping, potable water piping etc.) are in bidder's scope.
- Instrument air & service air up to terminal points.
- All chemicals except lubricants, reagents, monitoring gadgets required for pre- commissioning, commissioning, trial run and PG test.
- Air conditioning, ventilation & firefighting facilities.
- Other exclusions are mentioned in the electrical & C&I parts of this specification.
- Service water & DM water up to terminal points.

17.0 QUALITY PLAN(QP) REQUIREMENTS

Minimum QP requirements are specified as ANNEXURE -I. However, any additional comments as given by BHEL/Customer shall be adhered by the bidder without any commercial & delivery implication to BHEL. BHEL & customer reserves the right for inspection of imported items by BHEL/customer officials (if felt necessary). The same shall be decided during detail engineering during approval of QP's. The cost of third party inspection for all components shall also be in bidder's scope.

18.0 SUB-VENDOR ITEMS

The sub vendor list (Annexure- II) enclosed is indicative only and is subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

Bidder to propose sub vendor list with following back up documents within 4 weeks of placement of LOI/LOA. Thereafter no request for additional sub-vendor shall be entertained. The sub vendor list shall subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.
a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
b) End user performance certificate that the equipment/system has been operating satisfactorily for minimum one year as on the scheduled date of bid opening.

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

For approval of Sub vendor list proposed by bidder, meetings shall be arranged by BHEL in Customer office for which bidder representative along with sub supplier as desired by BHEL/Customer will attend the meetings.

19.0 DESIGN/ CONSTRUCTION

In addition to the requirements of Section I & II the following shall also be complied under scope of this specification.
The P&I diagram is enclosed herein in this section for bidder's compliance.
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

20.0 SPARES

The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares as indicated in the relevant sections of specifications.
The general requirements pertaining to the supply of these spares is given below: -

A. MANDATORY SPARES

- The list of mandatory spares considered essential by the BHEL & Customer is indicated in Annexure V.
- The bidder shall indicate the prices for each and every item (except for items not applicable to the bidder's design) in the 'Schedule of mandatory Spares' whether or not he considers it necessary for the BHEL & Customer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.
- BHEL reserves the right to buy any or all the mandatory spares parts.
- The prices of mandatory spares indicated by the Bidder in the price schedule shall be used for bid evaluation purposes.
- 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.
- Inspection of mandatory spares shall be in line with the approved quality plans for the respective items/equipments. The inspection categorisation of mandatory spares shall also be in line with the approved Categorisation plan for the respective items/equipments.

B. START-UP & COMMISSIONING SPARES

Start-up and commissioning spares are those spares which are required during the start-up and commissioning of the equipment/system. All spares used till the plant is handed over to the BHEL/Customer shall come under this category. The Bidder shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipments are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Bidder

C. The Bidder shall indicate the service expectancy period for the spares parts (both mandatory and recommended) under normal operating conditions before replacement is necessary.
D. All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.
E. All the spares (both recommended and mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.

F. The Bidder will provide cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable BHEL to identify and finalise order for recommended spares.

G. Each spares part shall be clearly marked or labelled on the outside of the packing with its description. When more than one spares part is packed in a single case, a general description of the content 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 purposes of identification.

H. All cases, containers or other packages are to be opened for such examination as may be considered necessary by BHEL / Customer.

I. The Bidder will provide the BHEL/Customer with all the addresses and particulars of his sub suppliers while placing the order on vendors for items/components/equipments covered under the contract and will further ensure with his vendors that the BHEL/Customer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.

J. The Bidder shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.

K. In addition to the recommended spares listed by the Bidder, if the BHEL/Customer further identifies certain particular items of spares, the Bidder shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the BHEL/Customer and placement of order for additional spares if the BHEL/Customer so desires.

L. The Bidder shall guarantee the long term availability of spares to the BHEL/Customer for the full life of the equipment covered under the contract. The Bidder shall guarantee that before going out of production of spares parts of the equipment covered under the Contract, he shall give the BHEL/Customer at least 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-Bidders. Further, in case of discontinuance of manufacture of any spares by the Bidder and/or his sub Bidders, Bidder will provide the BHEL/Customers, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the BHEL/Customer for the purpose of manufacture/procurement of such items.

M. The bidder to provide datasheets/assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which the mandatory spares to be supplied can be uniquely identified.

ANNEXURE-I

QAP FOR CONDENSATE POLISHING UNIT (CPU)

Condensate Polishing Plant

Items / Components \ Test/Check	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks
COMMON ITEMS:											
1. Horizontal Centrifugal Pumps				Y	Y			Y^1	Y		
1.1. Casing	Y^a		Y^b		Y		Y				
1.2. Impeller	Y^a		Y^b		Y					Y^d	
1.3. Shaft	Y^a		Y		Y					Y^c	
2. Vertical Pumps				Y	Y			Y^1	Y		
2.1. Casing	Y^a		Y^b		Y		Y				
2.2. Impeller	Y^a		Y^b		Y					Y^d	
2.3. Shaft	Y^a		Y		Y					Y^c	
2.4. Fabricated Parts	Y^a	Y	Y^b		Y	Y^2	Y				
3. Dosing/ Metering Pumps	Y^a				Y		Y	Y^1	Y		
4. Gate/ Globe/ Check Valves	Y^a		Y^b		Y		Y	Y	Y	Y^3, Y^6	
5. Dual Plate Check Valves	Y^a		Y^b		Y		Y	Y	Y	Y^6, Y^{12}	
6. Diaphragm Valves	Y^a				Y		Y		Y	Y^4, Y^3	
7. Butterfly Valves				Y	Y		Y	Y	Y	Y^3	
7.1 Body & Disc (Cast	Y^a		Y^b		Y						
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	Y^a		Y^b	Y	Y		Y	Y	Y	Y^3	
9. Blowers/ Compressors	Y^a		Y^b	Y	Y			Y	Y	Y^c, Y^d	
10. Tanks/ Pressure Vessels	Y^a	Y	Y^b	Y	Y	Y^8	Y		Y	Y^7	
11. Rubber Lining	Y^a				Y				Y	Y^9	
12. Strainers	Y^a	Y	Y^b	Y	Y		Y		Y		

LEGENDS: Applicable tests are identified by 'Y'.

Y^a : One per Heat / Heat Treatment batch / Lot.

Y^b : On machined surfaces only. Also 100% on Butt Welds & 10% on Fillet Welds.

Y^c : UT shall be done for shafts with Dia 50 mm or above & Plates of Thickness 25 mm or above.

Y^d :Dynamic Balancing per IS: 21940, Grade 6.3 minimum shall be conducted for rotating assy.

Y^1 : As per Pump governing standard. Tolerences as per HIS, USA.

Y^2 : Random 10% RT to be conducted on butt welds for Thk ≥10 mm.

Y^3 : Seat Leakage Test for actuator operated valves shall be done by operating the valve with job actuator.

Y^4 : Tests on Rubber Diaphragms shall be conducted per batch of Rubber mix for Tensile, Elongation, Hardness, Thickness, Bleed Resistance. In addition, Type Test for 50,000 cycles for each type of diaphragm shall also be conducted.

Y^6 : Blue Matching, Wear Travel for Gate Valves and reduced pressure test for check valves shall be conducted as per relevant standards.

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.

Y^8 : RT as per fabrication code requirements. However, dished ends welds, if

Condensate Polishing Plant

Items / Components \ Test/Check	Material Test	WPS/PQR/Welder	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic test / Pneumatic test / Vacuum test	Performance Test	Test as per relevant Std / Appd. Data Sheets	Other Tests	Remarks
13. Pipe & Pipe Fittings	Y[a]	Y	Y		Y	Y[8]	Y		Y		manufactured by using welded plates shall be subjected to 100% RT.
14. Agitators /Flash Mixer/ Flocculator	Y[a]	Y	Y[b]	Y	Y			Y		Y[10]	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.
15. Ventilation/Exhaust Fan	Y[a]		Y[b]	Y	Y			Y[11]	Y	Y[c], Y[d]	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.
16. Hoists & Cranes	Y[a]	Y	Y[b]	Y	Y	Y[8]		Y	Y		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.
17. Package/ Split AC	Y							Y	Y	Y[13]	Y[12] :Dry cycle test on valve spring for 1, 00,000 cycles shall be carried out as type test, if not carried out earlier, for the similar MOC, size and type of spring.
18. Resins / Activated Carbon									Y		Y[13] : Electronic leak test for condenser & evaporator unit.

Note:
1.The complete Piping system along with valves & fittings shall be hydraulically tested at 1.5 times design pressure or 2 times working pressure whichever is higher after erection at site.
2. In case of items other than those identified above, the quality requirements shall be decided based on system design requirements.

LOW PRESSURE PIPING

CLAUSE NO.

LOW PRESSURE PIPING

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

	Tests/Check / Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y[a]	Y[b]			Y1			Y			Y	
2	Diaphragm Valves	Y[a]				Y[5]			Y		Y[6]		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y[7]		
	Body	Y[a]	Y[b]										
	Disc	Y[a]	Y[b]										
	Shaft	Y[a]	Y	Y[c]									
3B	Fabricated Butterfly Valves	**REFER NOTE 14**											
4	Gate/ Globe/Swing Check / Ball Valves	Y[a]	Y[b]	Y[c]		Y[5]	Y	Y	Y	Y	Y[8]		
5	Dual Plate Check Valves	Y[a]	Y[b]	Y[c]		Y	Y	Y	Y	Y	Y[4]		
6	Rolled & Welded Pipes and Mitre Bends	Y[a]	Y[3]		Y	Y[3]			Y		Y[3&15]	Y	
7	Coating & Wrapping of Pipes	Y[2]									Y[2]		
8	Tanks & Vessels	Y[a]	Y[b]		Y	Y			Y		Y[16]		
9	Strainers	Y[a]	Y[b]		Y #	Y					Y[11]		#For Fabricated Strainer
10	Rubber Expansion Joints	Y[a]				Y[12]		Y	Y		Y[13]		
11	Internal Lining of Pipes	Y[a]							Y		Y[9]		
12	Site Welding		Y[10]		Y	Y							

NOTES (MEANING OF SUPERSCRIPTS)

a	One per heat/heat treatment batch/lot.
b	On machined surfaces only for castings and on butt welds.
c	For shaft/spindles > or = 40 mm
1	100% Hydraulic test shall be carried out. Weld joints not subjected to hydraulic test due to some unavoidable reasons, shall be subjected to 100% RT/PAUT.
2	Spark Test, Adhesion Test and Material Test for primer and enameled & Coal Tar Tapes as per AWWA-C-203-91/ IS-10221 & IS 15337 as applicable.
3	Followings are the testing requirements for fabrication of pipes at site

TESTS	**QUANTUM OF CHECKS**
WPS, PQR, Welder Qualification Test	100% Welders and WPS shall be qualified as per ASME- section IX
DPT on root run	100% for pipes up to 1200 mm diameter
DPT after back gauging	100% for pipes above 1200 mm diameter
RT / UT by (TOFD/PAUT) Technique	5% (100% of T Joints)
DPT on finished butt weld joints	10%

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

POWER CYCLE PIPING

CLAUSE NO.	QUALITY ASSURANCE

POWER CYCLE PIPING

1.00.00 **H.P.PIPING FOR STEAM GENERATOR AND TURBINE GENERATOR & AUX.**

1.01.00 **Piping:**

(a) All raw materials used shall have co-related mill test certificate meeting material specification.

All tests, as given in respective material code (other than supplementary requirements), shall be carried out as minimum. This includes the tests wherein it is specified in the ASTM code that “the test is to be carried out when specified by the purchaser” or any such indication, in the code

(b) All pipe lengths under this package, including piping where alloy steel is used shall be subjected to 100 % ultrasonic examination as per material specification standard with acceptable notch depth of 5% of the selected wall thickness (1.5mm maximum) except for the following piping system:

DOWN STREAM OF AUX. PRDS (where carbon steel is used) and aux. steam piping system (station HDR, unit HDR, interconnection) where notch depth of 12.5% of the selected wall thickness (1.5mm maximum) will be adhered to.

(c) The edge preparation for shop and site welds in stainless steel /alloy steel shall be subjected to a dye penetrate check.

(d) Pipe bend shall be checked for ovality and thinning by ultrasonic or other acceptable methods on first off lot & on random samples for subsequent pieces for high pressure applications. Outer surface of bends shall be subjected to magnetic particle examination/LPI.

(e) Non-destructive examination of welds shall be carried out after post weld heat treatment, if any.

(f) All butt welds in alloy steel piping of P-91, X -20, X-22 & material P15E group & above shall be checked for RT/ UT/PAUT+TOFD & MPI after SR.

(g) For welds in P91, X20 & X22 and material P15E group & above Materials requiring heat treatment, induction type of heating shall be deployed for post weld heat treatment, or heat treatment can be carried out in furnace.

(h) Non-destructive examination of welds shall be carried out in accordance with the relevant design/manufacturing codes. However, as a minimum, the following requirements shall be met. Further statutory requirement, wherever applicable shall also be complied with.

(1) Temperature > 400 Deg, C or pressure exceeding 71 bar.

(i) 100% RT/UT on butt welds and full penetration branch welds.

(ii) 100% MPE.

CLAUSE NO.	QUALITY ASSURANCE
	(2) Temperature > 175 Deg, C upto 400 Deg. C or pressure exceeding 17 bar and upto 71 bar. (i) 100% RT/UT on butt welds and full penetration branch welds for pipe dia. more than 100 NB. (ii) 10% RT/UT on butt welds and full penetration branch for pipe dia up to 100NB. (iii) 100% MPE. (3) For all other pipes not covered above, shall be subjected 100% MPE/ DPT in case of underground pipes and 10% MPE/DPT in case of piping above the ground. Further, 10% of butt welds of underground piping shall be subjected to RT. (i) Wherever SR/PWHT is envisaged for alloy steel, above NDTs shall be after SR/PWHT. (j) Hardness survey of welds shall be carried out on alloy steel/stainless steel piping (100% Hardness survey of welds on P91, X20 & X22 & above material grade of P15E above piping) and 3% hardness survey on welds of other alloy steel.
1.02.00	**Fittings:** (a) Raw material of all forged/formed fitting shall be ultrasonically tested. All mother pipes used for fitting shall be ultrasonically tested or hydraulic tested. Forged fitting shall be ultrasonically tested and formed fittings shall be MPI tested. All tests, as given in respective material code (other than supplementary requirements), shall be carried out as minimum. This includes the tests wherein it is specified in the ASTM code that "the test is to be carried out when specified by the purchaser" or any such indication, in the code (b) Fittings shall be subjected to suitable NDT as per applicable standards. However following minimum. NDE requirement shall be applicable / met. (i) For fittings X20, P-91 & P-92 and material group P15E & above - 100% MPI & - 10% hardness check. - Also 100% UT/RT, for fittings of 200 NB & above (ii) 100% UT/RT for fittings of 200 NB & above for boiler feed discharge, recirculation and spray piping of boiler feed system. (iii) 100% UT/RT for fittings of all other piping of size OD 508 mm & above.
1.03.00	**Hangers & Supports:** (a) All raw materials used shall have co-related mill test certificate meeting mandatory checks of material specification.

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

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

TABLE-1

Valve size NB in mm	ANSI Class up to 300	ANSI Class above 300 up to 600	ANSI Class above 600 below 900	ANSI Class 900 & above & below 4500
Less than 50	Visual	Visual	Visual	MPI
50 & above but below100	Visual	Visual	MPI	MPI & RT (on 10%of valves on 100% area)
100 & above but less than 300	Visual	MPI	MPI & RT (on 10% of valves on change of section & weld ends)	MPI & RT (on 100% area)
300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT on100% area)

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

For austenitic steel MPI may be replaced by LPI.

1.06.00 **CHEMICAL DOSING SYSTEM (HP/LP/OXYGENATED)**

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

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

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

(d) Oxygen cylinders shall be as per relevant standard meeting statutory requirements.

1.07.00 **MEATLLIC EXPANSION JOINT FOR PIPING (IF APPLICABLE)**

(a.) Hydraulic pressure test shall be carried out on each pipe and expansion bellow.

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(b.) Longitudinal butt weld on bellow shall be subjected to suitable NDT examination before forming, and after forming MPE / DP test shall be carried out.

(c.) All welds shall be subjected to 100% magnetic particle/dye penetrant check and butt welds shall be subjected to 100% radiographic testing.

(d.) All the bellows subjected to vacuum service shall be subjected to vacuum test.

(e.) The bellows shall be subjected to movement test to establish suitability to perform satisfactorily in site conditions. During this test spring rate shall also be measured.

(i.) The testing of MEJ shall be as per Expansion joint Manufacturer Association (EJMA) standard.

ANNEXURE-II

SUB-VENDOR LIST

INDICATIVE VENDOR LIST

Disclaimer for Indicative Vendor List

1.1 Reasonable efforts have been made to collate the sub-vendors proposed by the various main contractors from time to time against different Projects/Packages and accepted by NTPC for various items. However, in case of error/omission, if any, and represented by the successful bidder this will be addressed during the execution of the contract based on the material evidence available with NTPC / Main Contractor.

1.2 The approved sub-vendor list drawn is not based on NTPC driven enlistment process but based on the sub- vendors proposed by various Main Contractors. As such, it is possible that some of the Suppliers/Manufacturers who may be involved in similar work/process may not be appearing in the list as such sub-vendors may not have been proposed by Main Contractors against NTPC Contracts.

1.3 In case the successful bidder chooses to propose additional sub-vendors with relevant experience after the award of the contract such sub-vendors will be considered in terms of Clause no: 19.1 of GCC, provided the proposals are received sufficiently in time: 90 days prior to ordering date of a Bought Out Items/Start of Manufacturing so as not to impede the progress of the contract.

1.4 Sub-vendors have been grouped under different categories of items. It is possible that an item characterized by certain specific features such as range and type required as per Main Contractor’s design requirements may not be in the range of the listed sub-vendor’s manufacturing process/capability. As such the main contractor to ascertain the vendor’s capability to meet his specific requirements before considering a sub-vendor.

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 MANNESAMANN 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		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		

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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 T0 GR-91		
		$			ILSENBURGER GROBBLECH	GERMANY	A		CS-SA 299, SA515, BS EN 10025, AS UP TO GRADE 91		
		$			DILLINGER-GTSVENTES	GERMANY	A		CS-SA 299, SA515, BS EN 10025, A36, AS UP TO GRADE 91		
		$			SIJ ACRONI D.O.O., SLOVENIA	SLOVENIA	A		CS- SA515, BS EN 10025, A36, AS UP TO GRADE 91		
		$			THYSSENKRUPP	GERMANY	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22		

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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 EXPANLLOW 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 ENGGINERING INC.	JAPAN	A		CONVENTIONAL VALVES (1) GATE VALVES UPTO SIZE 16", CLASS 4500 UPTO C12A/F91 (2) GATE VALVES UPTO SIZE 26" CLASS 2500 UPTO C12A (3) CHECK VALVES UPTO SIZE 14" CLASS 2500 UPTO C12A (4) GLOBE VALVES UPTO SIZE 3" CLASS 4500 UPTO C12A (5) GLOBE VALVES UPTO SIZE 10" CLASS 1500 & 4" CLASS 2500 UPTO F91		

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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, COLMNS ETC. - BOILER STURCTURES- FABRICATION, TRIAL ASSEMBLY, BLASTING(AWB, COLUMNS, CEILING GIRDER ETC.)		
		I			SALEM AUTOMECH UNIT-I & UNIT-II	SALEM	A		CEILING GIRDERS		
		I			QUALITY ENGG.WORKS	TRICHY	A		CEILING GIRDERS		

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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 FORGINGS/MATCHING PIECES WITH 508MM DIA X 75MM THICKNESS STUBS WITH OD 245MM.		
		I			DEE DEVELOPMENT	PALWAL	A		GRADE 91 WITH SIZE/TYPE LIMITATIONS		
		I			CHW FORGE	GHAZIABAD			GRADE 92 WITH SIZE/TYPE LIMITATIONS		
		I			FORGIATURA MORANDINI SRL	ITALY	A		GRADE 92 FORGED FITTINGS(REDUCERS, TEES & Y-PIECES)		
		I			BHARAT FORGE, PUNE	PUNE	A		GRADE 92 FORGED FITTINGS(REDUCERS, TEES & Y-PIECES)		
		I			BOKYOUNG METAL CO.LTD	SOUTH KOREA	A		GRADE 92 FORGED FITTINGS(REDUCERS, 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	VISAKHAPATNAM	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	VISAKHAPATNAM	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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	BLADES	I			a) M/s Masta Machinery stores Pvt Ltd, b) b) M/s HAL, Bangalore c) M/s Vedanta Meta Cast Pvt Ltd, Pune, M/s d) d) TLT, e) Howden Solyvent India	Ahmedabad Bangalore Pune, Germany, Chennai	A A A A A				
	Hydraulic Actuating Device	I			M/s TLT	Germany	A				
		I			HAROLD BECK & SONS, INC.	USA	A				
		I			Rotork	Banglore	A				

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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			FLSmidth	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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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 Thampson (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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	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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	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 एनटी 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 " 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 एनटीप 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 do 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 अनुमो 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 Conf (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 सप्लाइर का स्थान.									

एनटीपीसी NTPC	Project/ परियोजना : Talcher - III	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची	Doc. No./ दस्तावेज सं.:	
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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	

		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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1	**HP/IP Outer Casing Casting (1.25Cr & 2.25Cr)**	I			Voestalpine	Austria	A				
					JCFC	Japan	A				
					JSW	Japan	A				
					GE	Poland	A				
					Kobe Steel	Japan	A				
					Starwire	Faridabad	A				
					Sande Stahlguss GmBH	Germany	A				
					ISGEC	Muzaffarnagar	A		Weight upto 38 T, 1.25 Cr Grade		
					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	Ballabhgarh	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				
					Sande Groditz	Germany	A		Weight Upto 20T		
3	**HP/IP Inner & Outer Casing Machining**	I			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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	Package/ पैकेज : EPC PACKAGE		REVISION NO : 00	
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	Contract No./ अनुबंध सं.:	SUB-SYSTEM उप-प्रणाली: TG-Mech		

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 प्रस्तुती करण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)	Applicable Note
					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				

एनटीपीसी NTPC	Project/ परियोजना : Talcher - III	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची	Doc. No./ दस्तावेज सं.:	
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					FUZI ELECTRIC	Japan	A				
6	**HP/IP/LP Stationary & Moving Blades Bar stock**	I			Böhler	Austria	A				
					Bohler Schmiedetechnik	Germany	A				
					WELZEWERKE REVENE	Germany	A				
					DIODO	Japan	A				
					Hitachi	Japan	A				
					Starwire	Ballabhgarh	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				
					Nichia Tanko Co Ltd	Japan	A		LP Blades		
7	**HP/IP/LP Stationary & Moving Blades Machining(From Bar)**	I			SET	Hungary	A				
					MHPS	Japan	A				
					Leistritz-Numberg	Germany	A				
					Energietechnik Einsal	Germany	A				
					Prawest	Germany	A		FOR LP STATIONARY BLADES		
					ZEMA	Italy	A		FOR LP STATIONARY BLADES		
					LMTG	Hazira	A				
					GE	Switzerland/Germany/Sanand	A				

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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					
					Leistritz Turbinenkomponenten	Germany	A					
					SMB SA	Switzerland	A		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					
					Leistritz 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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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 प्रस्तुती करण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)		Applicable Note
					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	Ballabhgarh	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			
					SEMPELL	Germany	A					
19	**HP/IP/LP Shaft Seals**	II			TPT	S Korea	A					
					Starwire	Ballabhgarh	A		For INGOTS			
					Kolhapur Steel	Kolhapur	A					
					Silbitz Guss	Germany	A					
					StahlgussSaar	Germany	A					
					GE	Sanand	A					

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					PMT	Pune	A				
					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 SPRIING	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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					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				

	Project/ परियोजना : Talcher - III	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची	Doc. No./ दस्तावेज सं.:		
	Package/ पैकेज : EPC PACKAGE		REVISION NO : 00		
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	Contract No./ अनुबंध सं.:	SUB-SYSTEM उप-प्रणाली: TG-Mech			

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	Provenness Clause (Refer Note-1)	Applicable Note
					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				

एनटीपीसी NTPC	Project/ परियोजना : Talcher - III	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची	Doc. No./ दस्तावेज सं.:	
	Package/ पैकेज : EPC PACKAGE		REVISION NO : 00	
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	Contract No./ अनुबंध सं.:	SUB-SYSTEM उप-प्रणाली: TG-Mech		

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 प्रस्तुती करण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)	Applicable Note
					Intervalve	Pune	A				
54	**Valves (gate/ globe/check) for LP application**	I			L&T	Chennai/Coimbatore	A				
					Velan	Canada/Coimbatore	A				
					KSB	Germany/Coimabtore	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		

एनटीपीसी NTPC		Project/ परियोजना : Talcher - III			LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची				Doc. No./ दस्तावेज सं.:			
		Package/ पैकेज : EPC PACKAGE							REVISION NO : 00			
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		Contract No./ अनुबंध सं.:			SUB-SYSTEM उप-प्रणाली: TG-Mech							
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 प्रस्तुती करण की सूची	Remarks/ टिप्पणी	Provenness Clause (Refer Note-1)	Applicable Note	
					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	Jallandhar	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					

एनटीपीसी NTPC	Project/ परियोजना : Talcher - III	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची	Doc. No./ दस्तावेज सं.:	
	Package/ पैकेज : EPC PACKAGE		REVISION NO : 00	
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	Contract No./ अनुबंध सं.:	SUB-SYSTEM उप-प्रणाली: TG-Mech		

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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						

एनटीपीसी NTPC		Project/ परियोजना : Talcher - III				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क़्वालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची			Doc. No./ दस्तावेज सं.:		
		Package/ पैकेज : EPC PACKAGE							REVISION NO : 00		
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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.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 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

एनटीपीसी NTPC	**Project/** परियोजना **: Talcher III** **Package/** पैकेज **:** EPC **Package** **Supplier/** आपूर्तिकता**:** **Contract No./** अनुबंध सं**.:**	**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**: 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	GHAZIABAD	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.

एनटीपीसी NTPC	**Project/** परियोजना **: Talcher III** **Package/** पैकेज **:** EPC **Package** **Supplier/** आपूर्तिकर्ता**:** **Contract No./** अनुबंध सं**.:**	**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**: 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 सप्लाइर का स्थान.

S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी	Applicable Systems
1	AIR BLOWERS -LOBE TYPE > = 5KW	I			SWAM PNEUMATIC	NOIDA	A			WTP,CPU,AHP
					EVEREST BLOWERS PVT LTD	BAHADURGARH	A		UP TO 40 HP (APPROX 1600 CUM/HR)	
					KAY INTERNATIONAL	SONEPAT	A		UP TO 4800 CUM/HR	
					KULKARNI POWER TOOLS	SHIROL	A		UP TO 2500CUM/HR	
					USHA COMPRESSORS	AHMEDABAD	A		UP TO 60 HP (APPROX 2000CUM/HR)	
2.A	EOT CRANE & ELECTRIC HOIST >5 MT	I (> 10T) / III (>5T UP TO 10T)			REVA INDUSTRIES	FARIDABAD	A		UP TO 60 MT	WTP,CT.AC&VENTILATION,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&VENTILATION,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	

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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 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 POLYMERTECH PVT LTD	TALOJA	A		DIA 2800MM, THICNKESS 25MM DESIGN PRESSURE UP TO 47.5 KSC	

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 :

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					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			
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		HOIZONTAL CENTRIFUGAL PUMP UP TO 75 KW ONLY	
					SU MOTOR	MUMBAI	A		HORIZONATL UPTO 500M3/HR ONLY RUBBERLINED PUMPS AND VERTICAL CENTRIFUGAL PUMPS UP TO 100CMH ONLY	
					BHARAT PUMPS AND COMPRESSORS	NAINI	A		FLOW UP TO 2200 M3/HR AND HEAD UP TO 60 MWC	
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			
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		UP TO 1025 KW	
					SINTECH PRECISION	GHAZIABAD	A			
					WILO MATHER & PLATT	PUNE	A			

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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	
					PRECISSION ENGG CO VALVES PVT LTD	NASIK	A		FCS UP TO 50NB CLASS 800, CCS UP TO 400NB CLASS 150.	
					BELGAUM AQUA VALVE PVT LTD	BELGAON	A		FCS UP TO 50NB CLASS 800, CCS UP TO 200NB CLASS 150.	
					G M ENGINEERING PRIVATE LTD	RAJKOT	A		UP T0 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	
					ADVANCE VALVES PVT LTD	GREATER NOIDA	A		METAL SEATED, TRIPLE ECCENTRIC, SS BFV OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300.	
					BRAY CONTROLS INDIA PVT. LTD	KANCHIPURAM	A		UPTO 450 MM AND CLASS#600	
					INSTRUMENTATION LTD.	PALAKKAD	A		UPTO 2200NB CLASS # 75	
					HAWA ENGINEERS	AHMEDABAD	A		CI/ CS & FABRICATED UPTO 1200MM, CLASS #150, SS UPTO 250MM, CLASS#150	
					CRANE PROCESS FLOW	SATARA	A		UP TO 900MM PN10	

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					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	II			LEADER VALVES	JALANDHAR	A		CS GATE 600MM CLASS#600, SS GLOBE 600MM CLASS#600, CS CHECK 600MM AND CLASS#600	WTP, CW,CT,CPU,FDPS,CAS, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					HAWA ENGINEERS	AHMEDABAD	A		FCS / FSS 50 NB CLASS 800.	
					FOURES ENGINEERINGS	THANE	A		400NB CLASS 600 AND 50NB CLASS 800.	
					BHEL IVP	GOINDWAL	A		GATE UP TO 300 NB CLASS 600. GLOBE 250 NB CLASS 400, CHECK 150NB CLASS 600.	
					HITECH ENGG PVT LTD	AHEMDABAD	A		50 NB CLASS 800.	
					KSB PUMPS LTD	COIMBATORE	A		300NB CLASS 2500.	
					NITON VALVES INDIA PVT LTD	NAVI MUMBAI / AURANGABAD	A		CS GATE 900 NB CLASS 600, CHECK 300 NB CLASS 600.	
					L&T VALVES LIMITED	COIMBATORE			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	I			CRANE PROCESS FLOW	SATARA	A		UP TO 300NB PN10	WTP,CPU
					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)	I			TRILLIUM FLOW	HUBLI	A		SOFT SEATED 400MM AND CLASS #150, 300NB CLASS#300	WTP,CPU,CHP, LHP&GHP, FOH,AHP
					XOMOX SANMAR	TRICHY	A		UP TO 600MM AND CLASS#300	
					FLOWSERVE INDIA CONTROLS	CHENNAI	A		METALLIC SEATED 400NB CLASS#150, 300NB CLASS #300, 50NB CLASS #800	
10	PUMP -SUBMERSIBLE>= 30KW	I			KSB	NASHIK	A		130 KW	WTP,CT, CPU,CHP, LHP&GHP, FOH,AHP.LP PIPING,FDPS
					KIRLOSKAR BROTHERS LTD	KIRLOSKARWADI	A			
					AQUA MACHINERY	AHMEDABAD	A		UP TO 235 KW	
					WPIL	GHAZIABAD	A			
11	RUBBER EXPANSION JOINT>=1600NB (RUBBER EXPANSION JOINT < 1600NB: CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			CORI ENGINEERS PVT LTD	CHENNAI	A		UPTO 2800 MM	ACW, ECW, CW,CT
					SRM EXOFLEX PVT LTD	KOLKATA	A		UPTO 2800 MM	
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	

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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	
					FLOWSERVE 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	MUZAFER 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 FOUNDARY LTD	UK	A		FINISHED CASTING UP TO 3.6 MT APPROX	

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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 (≥ 5KW) 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	

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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					CUMMINS	PUNE	A		Up to 2000 KVA	DG SET,FDPS
					PERKINS	AURANGABAD	A		UP to 313 HP	
	DIESEL ENGINE	I			GREAVESS COTTON	AURANGABAD	A		Up to 1750 KVA	
28					SAIL	ROURKELA	A			MUW
	3 LPE COATED PIPE	I			RATNAMANI	KUTCH	A		UP TO 1100 NB	
					PSL LTD	KUTCH/ VIZAC	A		UP TO 1100 NB	
29					TRANTER INDIA	PUNE	A		HT PLATES & GASKETS FROM TRANTER SWIDEN/USA.HT PLATES FROM HISKA JAPAN	ECW
					KELVION INDIA PVT LTD	PUNE	A			
	PLATE HEAT EXCHANGER	I			ALPHA LAVAL	SATARA	A		HT PLATES & GASKETS FROM ALPHA LAVAL SWIDEN	
					IDMC	ANAND	A		HT PLATES & GASKETS FROM SONDEX DENMARK	
					SONDEX INDIA	VADODARA	A		HT PLATES FROM SONDEX DENMARK/INDIA (MODEL S188)	
30					JINDAL SAW(J161)	KUTCH	A		UP T0 DN 900 CLASS K7 & K9	MUW
	DI(Ductile Iron) PIPE & FITTINGS	I			JAI BALAJI(J156)	BARDWAN	A		UP T0 DN 900 CLASS K7 & K9	
					ELETRO STEEL	KOLKATA	A			
31	AIR COPMRESSOR: OIL FREE CENTRIFUGAL COMPRESSOR	I			NGERSOLL RAND INDIA	AHEMDABAD	A		Capacity Upto 60 NM3/Minute @ Pr 8 bar	CAS
					KIRLOSKAR PNEUMATIC COMPANY LTD	PUNE	A		Capacity up to 45.3 Nm3/min and pressure rating up to 9.3 kg/cm2	
32		I			ATLAS COPCO	Pune (Dapodi)	A			
		I			INGERSOL RAND INDIA	AHMEDABAD	A		UPTO MODELSH 300 (36 NM3/MIN) . AIR ENDS FROM GHH RAND - GERMANY & OTHER	
	SCREW TYPE AIR COMPRESSORS	I			ELGI	COIMBATORE	A		UPTO 2830 CFM, AIR ENDS FROM HITACHI-JAPAN. ASSEMBLY AND TESTING AT ELGI	CAS, CHP, LHP, GHP, MRHS, AHP
		I			KIRLOSKER PNEUMATIC COMP LTD	PUNE	A		FLOW CAPACITY 45.3 NM3/MIN , AND PRESSURE RATING 9.3 KG/CM2	
33					SUMMITS HYGRONICS	COIMBATORE	A		FOR REFRIGERANT DRYER, 11893 M3/HR , REGENERATIVE DRYERS BLOWER	
					MELLCON ENGRS PVT LTD	GR NOIDA	A		Refrigerant type 60 m3/hr & REGENERATIVE DRYERS HOC TYPE 2548 M3/HR	
	AIR DRYER	I			DELAIR INDIA LTD	GURGAON	A		Refrigerant type 7500 m3/hr & REGENERATIVE DRYERS HOC TYPE 3000	CAS
					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					KIRLOSKAR CHILLER	PUNE	A		UP TO 350TR	
	SCREW CHILLER	II			DAIKIN	NEEMRANA	A		UP TO 185 TR	AC& VENTILATION

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					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			

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		II			ORIENT FANS (ACCO)	KOLKATA	A			AHP,MRHS
					THERMAX	PUNE	A			
					RIECO	PUNE	A			
					MELCO	FARIDABAD	A			
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	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 INDUSTRIAL PUMPS	COIMBATORE	A			AHP

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		I			WEIR MINERALS	AUSTRALIA	A		MANUFACTURING AT WEIR MINERALS BANGALORE	AHP
47	AIR LOCK FEEDER VESSEL / BOTTOM ASH OVERFLOW TANK/MIXING TANK/COARSE ASH TANK/ AIR OIL CONVERTOR TANK, AIR INTAKE VALVE	II			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A		AIR OIL TANK- ASANSOLE , AIR INTAKE VALVE - KUMARDUBHI	
					MACAWBER BEEKAY	KESHWANA	A			
48	BOTTOM ASH HOPPER / BUFFER HOPPER/DUST COLLECTOR	I			MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			AHP
					MELCO	FARIDABAD	A		ONLY FOR BUFFER HOPPER AND DUST COLLECTOR	
					MACAWBER BEEKAY	KESHWANA	A			
49	CLINKER GRINDER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
50	FLY ASH HOPPERVALVE/ASH INTAKE VALVE/FLY ASH DIFFUSER / DRIVE ARRANGEMENT FOR CLINKER GRINDER	II			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
51	FLUIDIZING PAD / FLUSHING APPARATUS	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
52	FLY ASH STORAGE SILO/HCSD SILO	I			MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			AHP
					MACAWBER BEEKAY	KESHWANA	A			
53	FEED SUMP / VACUUM BREAKER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
54	FLY ASH HEADER VALVE/BRANCH HEADER VALVE / AIR INTAKE VALVE /EQUALISING VALVE /PLUG GATE FOR SUMP ISOLATION	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	KUMARDHUBI	A			
					L&T	KANSBAHAL	A			
					MACAWBER BEEKAY	KESHWANA	A			
55	HYDROMIX DUST CONDITIONER/ROTARY FEEDER	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	A			
					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/KUMARDHUBI	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/KUMARDHUBI	A			
					MACAWBER BEEKAY	KESHWANA	A			
58	PLATE VALVE AT DYKE END	I			MELCO	FARIDABAD	A			AHP
					MCNALLY SAYAJI	ASANSOL/KUMARDHUBI	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	VV NAGAR	A		UPTO 2200 TPH	

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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					PENNSYLVANIA CRUSHERCORPORATION	USA	A		UP TO 1760 TPH	
					AMERICAN PULVERISER	USA	A		UPTO 1875 TPH	
					THYSSENKRUPP	PUNE	A		UP TO 2035 TPH	
	RING GRANULATOR	I			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					TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH	
	VIBRATING SCREEN FEEDER	I			THYSSENKRUPP	PUNE	A		UP TO 2035 TPH	CHP
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual Warranty	
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1210 TPH	
64.B					TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH	
					ELECON	V V NAGAR	A		UP TO 1320 TPH	
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH	
					THYSSENKRUPP	PUNE	A			
	VIBRATING FEEDER	I			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					BENGAL TOOLS	KOLKATA	A			
					THYSSENKRUPP	PUNE / HYDERABAD	A			
					ELECON	V V NAGAR	A			
					MBE	KUMARDHUBI	A			
	TRAVELLING TRIPPER	I			TRF	JAMSHEDPUR	A			CHP
					HMTC	KOLKATA	A			
					L & T - MACNIL	CHENNAI	A			
					L & T	KANSBAHAL	A			
					L & T - EWL	KANCHEEPURAM	A			
66					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	
	FABRIC BELTING(FR GRADE) / STEEL CORD BELTING(FR GRADE)	I			RAVASCO TRANSMISSION LTD.	VAPI	A		FABRIC BELT UPTO 2200 MM WIDTH	CHP, LHP/GHP
					ORIENTAL RUBBER	PUNE	A		FABRIC BELT UPTO 2200 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2000 MM WIDTH)	
					FORECH	CHENNAI	A		FABRIC BELT UPTO 2000 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2000 MM WIDTH)	

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					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			
					TRF	JAMSHEDPUR	A			
69	HELICAL GEARBOX	I			SHANTI GEARS	COIMBATORE	A		Upto size 560	CHP, LHP/GHP
					ELECON	V V NAGAR	A			
					SIEMENS (FLENDER)	KHARAGPUR	A			
					PREMIUM TRANMISSION 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)	
					SEW EURODRIVE GMBH & CO.	GERMANY	A			
71	FLUID COUPLING (SCOOP AND TRACTION TYPE)	I			FLUIDOMAT	DEWAS	A		Scoop type upto SC-1330	CHP,LHP/GHP
					PTL	AURANGABAD	A		SCOOP TYPE UPTO PST 1150	
					ELECON	V V NAGAR	A		Scoop type upto model ESC 760. 1. As part of Type test M/s Elecon will demonstrate Scoop tube in & Scoop tube out 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	
72	SLEW RING	III			TITANUS	SOUTH AFRICA	A			CHP, LHP/GHP
					IMO	GERMANY	A			
					SKF	FRANCE	A			
					ROTHE ERDE	GERMANY	A			
					LIEBHERR	GERMANY	A			
73.A	COAL SAMPLER SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	CHP
					ERIEZ MAG EUROPE LTD	UK	A			
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTLLE COLLECTOR AT MULTOTEC SA	
					THERMO RAMSAY INC	USA	A			
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER	

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73.B	LIMESTONE SAMPLING SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER	LHP/GHP
					ERIEZ MAG EUROPE LTD	UK	A			
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTLLE COLLECTOR AT MULTOTEC SA	
					THERMO RAMSAY INC	USA	A			
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER	
74	HYDRAULIC POWER PACK	I			EATON POWER	PUNE	A			CHP, LHP/GHP
					BOSCH-REXROTH	AHMEDABAD	A			
					MAHA HYDRAULICS	CHENNAI	A			
					L & T HYDRAULICS	BANGALORE	A		EXCEPT FOR STACKER RECLAIMER	
					Hydac	COIMBATORE	A			
75	HYDRAULIC CYLINDER	I			VELJAN	HYDERABAD	A			CHP, LHP/GHP
					WIPRO	BANGALORE	A			
					EATON POWER	PUNE	A			
					L & T HYDRAULICS	BANGALORE	A			
					BOSCH-REXROTH	AHMEDABAD	A			
					Hydac	COIMBATORE	A			
76	HYDRAULIC MOTOR	I			POCLAIN HYDRAULICS	FRANCE	A			CHP , LHP/GHP
					BOSCH-REXROTH AB (FORMERLY HAGGLUNDS)	SWEDEN	A			
					PARKER CALZONI	ITALY	A			
					MAHA HYDRAULICS	CHENNAI	A		UP TO 100 LITRE CAPACITY	
					KAWASAKI	UK	A			
77	HAMMER MILL CRUSHER FOR LIME STONE HANDLING SYSTEM	I			INTERNATIONAL COMBUSTION	NAGPUR	A			LHP/GHP
					MCNALLY SAYAJI	BARODA	A			
					MCNALLY SAYAJI	KUMARDHUBI	A			
					ELECON	V V NAGAR	A			
					THYSSENKRUPP INDUSTRIES INDIA	PUNE	A			
					ECOMAN	BARODA	A		UPTO 150TPH	
78	SHOP FABRICATED STRUCTURE	I			INDIANA GRATINGS PVT. LTD.	PUNE	A			CHP/LHP/GHP
					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	HYDERABAD	A			

ITEM WITH MAIN CONTRACTOR / BIS APPROVED SOURCES.

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 :				

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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,AC&VENTILATION,CHP,LHP&GHP,AHP
5	FIRE HOSE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
6	HYDRANT VALVE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					
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	ClO2 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 enviisaged, vendors are accepted subject to Sub-QR clearance from NTPC Engg.

A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, , यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए ।

DR – For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत ब्यौरे की आवश्यकता" होगी। सूची में "DR" पत्र में इंगित किया जाना चाहिए।

QP / INSPECTION CATEGORY:

CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह

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

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

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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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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/3.3KV Switchgear- (MV Switchgear Panel)**	**CAT I**							
					BHEL	Bhopal	A		Upto 33KV
					Megawin	Salem	A		Upto 33KV
					Schneider Electric India (Formerly L&T)	Ahmednagar	A		Upto 33KV
					Siemens	Mumbai	A		Upto 33KV
					ABB	Nasik	A		Upto 33KV
					Schneider (Salt lake works)	Kolkata	A		Upto 11KV

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8.1	Fast Bus Transfer panel along with relay	CAT I							
					Aartech	Parwanoo	A		conditions apply
					ABB	Vadodara	A		conditions apply
					SEL	Delhi	A		conditions apply
9	HT Motor								
9.1	HT Motors (CW PUMP MOTOR)	CAT I							
					WEG	BRAZIL	A		UPTO 3405KW,11KV
					HYOSUNG	S.KOREA	A		UPTO 2800KW,6.6KV
					BHEL	BHOPAL	A		
9.2	HT MOTORS (BFP Motor)	CAT I							
					HYOSUNG	SOUTH KOREA	A		UPTO 11KV 13.5 MW
					BHEL	BHOPAL	A		RQP
					HYUNDAI	SOUTH KOREA	A		UPTO 11KV 17 MW
9.3	HT MOTORS (ID Fan Motors)	CAT I							
					HYOSUNG	SOUTH KOREA	A		UPTO 11KV 13.5 MW
					WEG	HOSUR	A		UPTO 11KV 14 MW
					BHEL	BHOPAL	A		RQP
					HYUNDAI	SOUTH KOREA	A		UPTO 11KV 17 MW
					TMEIC	BENGALURU	A		UPTO 11 KV 5000 KW
9.4	HT MOTOR FOR OTHER EQUIPMENTS	CAT - I							
					HYOSUNG	KOREA	A		UPTO 11KV 13.5 MW
					WEG	BRAZIL	A		UPTO 11KV 2150 KW
					WEG	HOSUR	A		UPTO 11KV 14 MW
					BHEL	BHOPAL	A		RQP
					HYUNDAI	KOREA	A		UPTO 11KV 17 MW
					TECO	TAIWAN	A		UPTO 11KV 12 MW
					TMEIC	JAPAN	A		UPTO 11KV 14 MW
					CONVERTEAM	FRANCE	A		UPTO 11KV 18 MW (*DOCUMENTS FOR NAME CHANGE TO GE CONVERTEAM SHALL BE SUBMITTED FOR APPROVAL)
					ABB	VADODARA	A		UPTO 6.6KV 2500 KW 11KV 2000 KW FOR PUMP/ FAN/ COMPRESSOR UPTO 6.6KV 750KW FOR MILL, UPTO 6.6 KV 1300KW FOR CRUSHER WITH SCOOP COUPLING
					IJLIN	KOREA	A		UPTO 11KV 2900 KW, 6.6KV 2500 KW
					JYOTI	VADODARA	A		UPTO 6.6 KV 2250 KW EXCEPT CRUSHER & MILL APPLICATION
					MARATHON	KOLKATA	A		RQP, UPTO 6.6 KV 1300 KW FOR CRUSHER WITH SCOOP COUPLING & 11 KV 1600 KW FOR OTHER APPLICATION EXCEPT CRUSHER & MILL

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					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		
					Gemscabs Industries	Bhiwadi	A		
					Gupta Power Cables	Khurda	A		
					Havells India Ltd.	Alwar	A		
					KEC International	Silvassa , Mysore	A		
					KEI Industries	Bhiwadi	A		
					Paramount Cable	Khushkhera	A		
					Polycab Wires Pvt. Ltd	Daman	A		
					Ravin Cables	Pune	A		
					Special Cables	Rudrapur	A		
					Suyog Cables	Vadodara	A		
					Thermocables	Hyderabad	A		
					Tirupati Plastomatics	Jaipur	A		
					Torrent Cable Ltd	Nadiad	A		
					Universal Cable Ltd.	Satna	A		
12	LT Control Cable 1.1 KV, Type - PVC (incl FRLS)	CAT II							For cable total quantity above 10 km per size/type- Cat-III
					Advance Cable	Bengaluru	A		
					Apar Industries Ltd	Umbergaon	A		
					Cords Cables	Bhiwadi	A		
					CMI	Faridabad	A		
					CMI	Baddi	A		
					Delton Cable Ltd	Faridabad	A		
					Elkay Telelink	Faridabad	A		
					Gemscabs Industries	Bhiwadi	A		
					Goyoline Fibres (I) Ltd	Daman	A		
					Gupta Power Cables	Khurda	A		
					Havells India Ltd.	Alwar	A		
					KEC International	Silvassa , Mysore	A		
					KEI Industries	Bhiwadi	A		
					Paramount Cable	Khushkhera	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							
					Iljin Electric	South Korea	A		For 132KV & 220 KV only
					KEC International	Vadodara	A		Upto 220KV
					KEI Industries	Bhiwadi	A		Upto 132KV , 220KV
					Phelps Dodge	Bangkok	A		For 132 KV only
					LS CABLE & SYSTEM LTD	South Korea	A		Up to 400 KV
					LS CABLE & SYSTEM LTD	BHIWADI	A		Up to 132 KV
					Universal Cable Ltd.	Satna	A		Upto 132KV only
14	DG SET(ASSMEBLER & TESTING)	CAT I							
					Kohler	Singapore	A		Up to 1500 KVA ,11KV
					CLLS	Singapore	A		Up to 1250 KVA, 415 V,
					Powerica	Silvasa	A		Up to 2000 KVA, 415 V & 1500 KVA, 11 KV
					Jakson Unit-II	Kathua	A		Up to 11KV, 1500KVA
					Jakson	Kathua	A		Up to 415 V, 2000 KVA
					Sterling Generators Pvt Ltd	Silvasa	A		Up to 415 V 2000 KVA
					Supernova	Rajpur	A		Up to 415 V 2000 KVA
14.1	ALTERNATOR	CAT I							
					Kirloskar Electric	Bangalore	A		415 V alternators
					Cummins Generator Technology (Stamford)	U.K	A		415 V & 11 KV alternators
					Leroy Somer	France	A		Up to 11KV alternator 3500 kW
					Marathan	USA	A		Alternators for up to 415 V, 1500 KVA DG SET
					Cummins Generator Technology (Stamford)	Ahmednagar	A		415 V Alternators up to 1600 KVA
					Toyo Denki Power System	Bangalore	A		11 KV, 1500 KVA
14.2	DG Set Control panel / Synchronising panel	CAT I							
					L&T	Mumbai / Coimbatore/ Ahmednagar	A		
					GE	Bangalore	A		
					Siemens	Mumbai	A		
					C&S Electric	Noida / HARIDWAR	A		
					Schneider	Nasik	A		
					Unilec	Gurgaon	A		
					Nitya Electrocontrols	Noida	A		
					Switching Circuits	Kolkata	A		
					Tricolite	Sahibabad / Manesar	A		
		I			Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur

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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
					Saft India	Bangalore	A		8Ah to 990Ah- KPH type
							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		
					Chhabi electrical	Jalgaon	A		
					Chloride Power	Kolkatta	A		
					Statcon	Hapur	A		Up to 220 V, 850 A
					Dubas	Bangalore	A		Up to 220 V, 800 A
17	Dry Type Transformer	CAT I							
					ABB	Savli	A		Up to 8 MVA, 24 KV Class
					Raychem	Pune	A		Up to 3.5 MVA, 33 KV Class
					Toshiba	Hyderabad	A		Up to 2.0 MVA, 33 KV Class
					BHEL	Jhansi	A		Up to 6.3 MVA, 33 KV Class
					Kirloskar Electric Company Limited	Pune	A		Up to 4.0 MVA, 33 KV Class
					Voltamp	Savli	A		Up to 3.25 MVA, 33 KV Class
					Sudhir Power Ltd	Silvassa	A		Up to 1 MVA, 11 KV Class
					Hammond Power Solutions	Hyderabad	A		Up to 95 KVA, 33KV Class
18	OIP/RIP BUSHING	CAT I							
18.1	OIP/CONDENSER BUSHING	I			BHEL	Bhopal	A		Up to 400 KV class
		II			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		
					ABB Switzerland Ltd. MICAFIL Bushings	Switzerland	A		Up to 400 KV class
					TELK	Angamaly	A		Up to 400 KV class
					GE T&D India Limited	Hosur	A		Up to 400 KV class
					Alstom-Passion Villa	Italy	A		Up to 400 KV class
					ABB Power Tech.Products	Sweden	A		Up to 400 KV class
					Trench	France	A		Up to 400 KV class
18.2	RIP Bushing	CAT I							
					ABB AB Components	Sweden	A		Up to 420 KV Class
					ABB Micafil	SwitzerLand	A		Up to 420 KV Class
					Izolytor	Rusia	A		Up to 420 KV Class
					HSP	Germany	A		Up to 420 KV Class
					Yash High Voltage	Vadodara	A		Up to 145 KV Class

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19	INSULATING OIL	CAT I							
					Apar Industries	Rabale/Silvassa	A		
					Power Oil Petrolium Products	Silvassa	A		
					NYNAS NAPTHENICS AB	SWEEDEN / USA	A		
					Kanden Engg Corp Ltd	Japan	A		
					Nynas Ltd	Hongkong	A		
					Raj Petro Specialities	Chennai/Silvasa	A		
					Savita Oil Technologies	Mumbai/ Silvasa	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 Scehaffer	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	Pilkhuwa	A		Conditions apply
					Weidmuller	Spain	A		Conditions apply
31	**SPV module**	**CAT I**							
					BHEL	Bangalore	A		
					Warree	Surat	A		
					Emmvee	Bangalore	A		
					Vikram Solar	Parganas	A		
					Lanco Solar	Chattisgarh	A		
					Tata Power Solar	Bangalore	A		
					Alpex	Solan	A		
					Synergy	Durgapur	A		
					Photonix	Satara	A		
					HHV Solar	Bangalore	A		
32	**Lighting mast with raise & lower type lantern carriage/ Lighting poles polygonal type**	**CAT I**							
					Bajaj	Pune	A		
					BP Projects	Hoogly	A		
					Skipper	Howrah	A		
					Transrail	Silvasa	A		

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33	132 KV cable termination & straight through jointing kits	CAT I							
					Iljin	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	Sandwitched 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		
		Refer Note 7			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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					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	A		Upto 55 KW with following conditions: i) VFD from Schneider- France, upto 415V, 50KW. ii) Enclosure & bought out items shall be from NTPC acceptable makes & iii) Engineering support for integration will be provided by Schneider/ Authorized integrator of Schneider
					DANFOSS	Oragadam	A		(upto 690V, 1200kW), VFD drives with VFD sourced from Danfoss-Denmark/USA and Panel sourced from Rittal
					YASAKAWA	Japan	A		VFD from Yasakawa- Japan, Upto 415V, 132KW
					ROCKWELL AUTOMATION	SAHIBABAD	A		VFD from Rockwell(Allen Bradley)- USA, (Upto 415 V, 600 KW)
					ABB	BANGALURU	A		VFD from ABB-Finland, Upto 690V, 750 KW
					SIEMENS	NASIK	A		VFD from SIEMENS- Germany, Upto 690V,900KW
					VACON	BANGALORE	A		VFD(NXP model) from VACON Finland, upto 400KW,415V and upto 900KW, 690V

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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 B0LT 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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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**							
					SAARSCHMIEDE	GERMANY	A		
					Buderus Edelstahl	GERMANY	A		
					JSW	JAPAN	A		
					SDF	ITALY	A		
					CRUIST FORCE	FRANCE	A		
					OMZ	RUSSIA	A		
					FORGE MASTER	UK	A		
					JCFC	JAPAN	A		
94	**GENERATOR ROTOR MACHINING**	**CAT I**							
		II			MITSUBISHI ELECTRIC	JAPAN	A		
		II			NUGO ROMANO	ITALY	A		
		I			LMTG	HAZIRA	A		
95	**ETS MATERIAL (Core material)**	**CAT I**							
		I			THYSSON KRUPP	NASIK	A		
		II			NIPPON	JAPAN	A		
		II			JFE	JAPAN	A		
		I			POSCO	RAIGARH	A		
		I			JSW	BELLARY	A		
		II			MITSUBISHI	JAPAN	A		
96	**RETAINING RING FORGING(MAT-CrMn 1818)**	**CAT II**							
					SAARCSHMIEDE	GERMANY	A		
					JSW	JAPAN	A		
					KOBE STEEL	JAPAN	A		
					FORTEH	FRANCE	A		
97	**RETAINING RING MACHINING**	**CAT I**							

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

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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			MITSUBISHI ELECTRIC	JAPAN	A		
		I			GOODLUCK ENGG	GHAZIABAD	A		
126	SEAL OIL VALVE RACK	CAT II							
					JIMC	KOREA	A		
127	SEAL OIL STORAGE TANK (LOOP SEAL TANK)	CAT I							
					JIMC	KOREA	A		
					Gujarat infra	Vadodara	A		
					Shree sarjan	Vadodara	A		
128	HYDROGEN COOLER (Gas cooler)	CAT I							
					KITASHIBA ELECTRIC	JAPAN	A		
					ENERGEN	KOREA	A		
					GEA	GERMANY	A		
					LAXMI	BHOPAL	A		
129	CARBON BRUSH	CAT II							
					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**							
		II			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 (Aluminnium key profile)	CAT II							
					Sapa Profiles Kft.	Hungary	A		
					ALSTOM Power Sp. z o.o,	Poland	A		
					Somet	Poland	A		
148	End Presure Plate (Laminated Press plate)	CAT II							
					ALSTOM Power Sp. z o.o,	Poland	A		
					Generpro	Sweden	A		
149	Stator Core Punching	CAT II							
					ALSTOM	France	A		
					ALSTOM Power Sp. z o.o,	Poland	A		
					Donako	Poland	A		
					Pitti Laminations	Hyderabad	A		
					BHEL	Jagdishpur	A		
150	Core Tension Bolt for Stator								
		I			Starwire	Ballabhgarh	A		
		II			Boehler Ybbstal Profil	Austria	A		
		II			Energietechnik Essen	Germany	A		
		II			Empaz	Poland	A		
		I			Kalyani carpenter	Pune	A		
151	Insulation of Core Tension Bolt for Stator	CAT II							
					Empaz	Poland	A		
					ALSTOM Power Sp. z o.o,	Poland	A		
152	Solid Copper Coductor for Stator Bar	CAT I							
					VonRoll	Switzerland	A		
					Pearl	Bangalore	A		
					Cosmos	Bangalore	A		
					Mahindra	Bangalore	A		
					Geaber & Greuller	Austria	A		
153	Hollow Stainless Steel Conductor for Stator Bar	CAT II							
					Fine Tubes	UK	A		
					Fischer	Austria	A		
154	Stator Bars	CAT I							
					ALSTOM Power Sp. z o.o,	Poland	A		
155	Tubes for Connection Bus Bar	CAT II							
					KME	Germany	A		
					Luvata Pori	Finland	A		
					Multimetal	Jamnagar	A		

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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 Permali	Germany	A		
					Kompozyty	Poland	A		
					PCT	USA	A		
					Siemens	Germany	A		
					Texplas	Haridwar	A		
159	Spring for Winding Head Assembly (Console)								
		CAT II			Wolfensberger	Switzerland	A		
		CAT I			R V Engg	Ballabgarh	A		
160	Generator Shaft Forging	**CAT II**							
					Saarschmiede	Germany	A		
					Buderus	Germany	A		
					JSW	Japan	A		
					JCFC	Japan	A		
					SdF Terni	Italy	A		
					SUMITOMO	JAPAN	A		
					FORGEMASTER	UK	A		
					OMZ	RUSSIA	A		
161	Generator Shaft Machining	**CAT I**							
					Alstom (Switzerland) Ltd.	Switzerland	A		
					Alstom Bharat Forge Power Limited	Sanand	A		
162	Centering Ring Forging	**CAT II**							
					Bharat Forge	Pune	A		
					Schmiedewerk Stoss	Switzerland	A		
					FORGITAL SPA VELO D ASTICO LOCALITA	Italy	A		
					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,	Poland	A		
					ISGEC	Yamunanagr	A		
					Shape Engg	Haridwar	A		
174.1	Terminal Box Machining	**CAT II**							
					ALSTOM Power Sp. z o.o,	Poland	A		
					Energy machines	Ahmedabad	A		
175	End Shield Fabrication	**CAT I**							
					ALSTOM Power Sp. z o.o,	Poland	A		
					Shape Engg	Haridwar	A		
					ISGEC	Yamunanagr	A		
175.1	End Shield Machining	**CAT I**							
					ALSTOM Power Sp. z o.o,	Poland	A		
					ISGEC	Yamunanagr	A		
					Energy Machines	Ahmedabad	A		
176	Seal Assembly (Ring & Housing)	**CAT II**							
					ALSTOM Power Sp. z o.o,	Poland	A		
177	Stator water cooler	**CAT I**							
					Alpha Laval	Sweden	A		
					GEA	Germany	A		
					TRANTER	Pune	A		
					IDMC Ltd	Anand	A		
178	Stator water cooling unit	**CAT II**							
					Rockfin	Poland	A		
179	Stator water cooling pump	**CAT II**							
					ALWELLER	GERMANY	A		
					KSB	Pune	A		
					Ebera	Japan	A		
					SULZER	Navi Mumbai	A		
180	Slip Ring Shaft Forging	**CAT II**							
					See Generator Forging Suppliers				
					Bharat forge	Pune	A		
					BAY FORGE	Chennai	A		
180.1	Slip Ring Shaft Machining	**CAT II**							
					Alstom (Switzerland) Ltd.	Switzerland	A		
					Euroflex Transmission(india) pvt. Ltd.	Hydrabad	A		

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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
					Schmelzmetall AG	Switzerland	A		
191	Connection Rod for main Rotor	**CAT II**							
					Weiland werke	Germany	A		
					Swiss Metal	Switzerland	A		
192	Excitation System	**CAT I**							
					Alstom Power Sp. z o.o	Poland	A		
					GE power	NOIDA	A		
193	GHM(Generator health monitoring system)	**CAT I**							
					GE Power	Noida	A		
194	Excitation AC-DC Bus duct	**CAT I**							
					Etacom	Belgium	A		for Cast Resin
					REEP	Chennai	A		
					C&S	NOIDA	A		
NOTE	**1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN.), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs.** **2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.**								
	D- MAJOR COMPONENTS FOR TOSHIBA MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):								
195	**STATOR FRAME WITH MAN HOLE COVER FABRICATION & MACHINING**	**CAT I**							
					TOSHIBA	JAPAN	A		
					TJPS	CHENNAI	A		
196	**KEY BAR FABRICATION AND MACHINING**	**CAT I**							
					TOSHIBA	CHENNAI	A		
					Kalyani Carpenter (Material)	Pune	A		
					Punj Lloyd (Machining)	Gwalior	A		
197	**KEY BAR ASSEMBLY**	**CAT I**							
					TOSHIBA	JAPAN	A		
					TJPS	CHENNAI	A		
198	**DOVETAIL FOR STATOR**	**CAT I**							
					TOSHIBA	JAPAN	A		
					TJPS	CHENNAI	A		
199	**END PRESSURE PLATE - Fabrication**								
		II			TOSHIBA	JAPAN	A		
		I			TJPS	CHENNAI	A		
199.1	**End Pressure Plate - Machining**	**CAT II**							
					TJPS	CHENNAI	A		
					Sharp Engineering	Pune	A		
					N.S Engg	Hyderabad	A		

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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	GENARATOR SHAFT FORGING	CAT II							
					SAARSCHMIEDE	GERMANY	A		
					SDF ITALY	ITALY	A		
					JCFC	JAPAN	A		
					JSW	JAPAN	A		
					BUDERUS EDESTAHL	GERMANY	A		
					Doosan	Korea	A		
208.1	GENERATOR SHAFT MACHINING	CAT I							
					TOSHIBA	JAPAN	A		
					TJPS	CHENNAI	A		
209	ETS MATERIAL	CAT II							
					NIPPON	JAPAN	A		
					JFE	JAPAN	A		

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210	RETAININIG RING FORGING (MAT-CrMn 18-18)	CAT II							
					SAARCSHMIEDE	GERMANY	A		
					JSW	JAPAN	A		
210.1	RETAINING RING MACHINING	CAT II							
					TOSHIBA	JAPAN	A		
					TJPS	Chennai	A		
211	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II							
					ORIENTAL COPPER	THAILAND	A		
212	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD	CAT II							
					KME	GERMANY	A		
					ORIENTAL COPPER	THAILAND	A		
					BAOSHIDA SWISS METAL	GERMANY	A		
213	CURRENT CARRYING BOLTS FOR ROTOR	CAT II							
					TOYO KOGYO	JAPAN	A		
					TOSHIBA	JAPAN	A		
214	ROTOR COIL FORMING	CAT II							
					TOSHIBA	JAPAN	A		
					TJPS	Chennai	A		
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		

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.

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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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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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11	ON LOAD TAP CHANGER	**CAT III**							
12	OFAF COOLER	**CAT III**							
13	RADIATORS	**CAT II**							
14	REGNENERATIVE MAINTENANCE FREE BREATHER	**CAT III**							
15	CMS System	**CAT I**							
16	CMS PANEL	**CAT II**							
17	TRANSFORMER TESTING & MAINTENANCE EQUIPMENTS	**CAT III**							
	L2 LIST OF BUS DUCTS								
1	Air Pressurisation Equipment	**CAT II**							
2	Hot Air Blower	**CAT II**							
3	LAVT Cubicle / NG Cubicle/ Marshalling Box	**CAT II**							
4	CT for IPBD	**CAT II**							
5	Epoxy Seal off bushing / Insulators	**CAT II**							
NOTE	**L2 LIST OF SWITCH GEAR**								SOURCES FOR THESE ITEMS SHALL BE FINALIZED DURING DETAILED ENGINEERING AND MQP FINALIZATION
1	Numerical Relays	**CAT I**							SUB-QR CLEARED VENDORS ARE ACCEPTABLE FOR NUMERICAL RELAYS
2	Silver Plating	**CAT III**							
3	LV Air Circuit Breaker	**CAT I**							
4	LT CT/PT/CBCT/ Control Transformer	**CAT II**							
5	MV Vacuum Type Circuit Breaker	**CAT I**							
6	MV CT / PT & CBCT	**CAT I**							
7	MCBs	**CAT III**							
8	ENERGY METER	**CAT III**							
9	H.V. Fuse	**CAT III**							
10	Terminal Blocks (Control)	**CAT III**							
11	Surge Capacitors	**CAT II**							

NOTES:

Note - 1 : Vendors to submit project specific documents as per Sub-QR requirements in case the Vendor is approved under collaboration agreement.

Note - 2: Vendors under 'A' are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.

Note - 3: Main contractor approved sub vendors are acceptable those are evaluated / assesesed as per Main contractor Quality Management System for vendor approval. Main contractor to inform the finaly selected vendor to NTPC as soon as PO is placed for these items. In case of sub-QR Note-1 is also applicable.

Note - 4 : BOI shall be reviewed and finalised during MQP approval for items/systems where ever applicable.

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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 Electrocare Industries, Mumbai	17. Poona Galvanizers Pune	
	6. M/S Steelite Engg, Mumbai	12. M/s B.G. Shirke, Pune	18. Neha Galvanizer-Kolkata	

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Note - 9: Relevant certificates shall be submitted for NTPC approval.Approval conditions attached to above identified vendors, as applicable shall be adhered to.

Note - 10 : Indigenous sub-vendors for Annexure-I items are acceptable subject to meeting the MLC (Minimum Local Content} in line with latest MOP order.

LEGENDS / संकेतिका

SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY /प्रणाली आपूर्तिकर्ता / सब –वेंडर की स्वीकृति की स्थिति की श्रेणी (SHALL BE FILLED BY NTPC एनटीपीसी द्वारा भरा जाएगा)

A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, , यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए ।

DR – For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत 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। हालांकि 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 सप्लाइर का स्थान.

: Control measure of item covered in quality plan of main item.

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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.Pl 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				Envirorment SA India Pvt. Ltd.	Mumbai	A			1.Analysers SO2,Nox,CO2 & SPM from Environment SA France, 2-Multipoint Calibrator From envoirenment 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.Pl 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. Pl refer Note-07

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		I				Hi-Tech Systems & Services Ltd (As a system Integrator of M/S Bonnenberg + Drescher GmbH, Germany)	Kolkata	A			1.All critical components are to be procured from M/S Bonnenberg + Drescher GmbH, Germany 2.Standard indiginious 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. Enclousure ,OWS ,Waveguide ,Tube box etc shall be from SEI approved sources to be tiedup in MQP. 3.Pl refer Note-07
		II				Bonnenberg + Drescher GmbH,	Germany	A			
		II				STOCK Equipment Co	USA	A			
3	Addressable Detector (Multisensor , Photo & Heat Detectors Type), Interface units & Manual call points										
		II				Honeywell Life Safety-HIIPL	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.Pl refer Note-07
		III				Raman Instruments (System Integrator of M/S Procon UK)	Delhi	A			1.M/S Procon UK Make system 2.Pl refer Note-07
		III				BHEL Ltd	Trichurapalli	A			
		III				Instrotech (PTY) Ltd	South Africa	A			

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		III				Rectuson Co. Ltd	S.Korea	A			
		III				Procon Engineering	UK	A			
		III				Acoustic Monitoring International Inc. (AMI)	USA	A			
7	CCTV System (IP Based)										
		III				Axis	Sweden	A			1-CCTV components will be of Axis communication AB,Sweden make & Video Management Software will be of Milestone Brand. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finaliztion 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 finaliztion 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 finaliztion 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 Bangaluru
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
		I				Koso India Pvt limited	Nasik	A			Up to A182F92 material with conditions as per approval letter
		I				Bomafa Special Valve solutions Pvt ltd	Ahmedabad	A			Up to A182F92 material with conditions as per approval letter
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			As per approval Ref: 02/CQA/SG/Tanda/MIL Dated 30.09.2015
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.MQP shall be vetted by M/S CCI -USA 2.Sources of major components like casting /forging and actuators shall be tied up during finalization of MQP
		II				Parcol SPA	Italy	A			
		II				Daume	Germany	A			
		II				HOLTER	Germany	A			
9-B	Control Valve for Start Up System										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				Emerson Process Management Ltd	Chennai	A			
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				SEMPELL AG	Germany	A			Up To size 20 Inches & 2500 ANSI Class
		II				Nihon Koso Co Ltd	Japan	A			
		II				HORA	Germany	A			
		II				CCI	S.Korea	A			
		II				Emerson (Fisher)	USA/France/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.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			Up to 10 Inches & 3400 ANSI class

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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 Masoneilan	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 Emision 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	EQMS										

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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.Pl 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.Pl 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				Codel	UK	A			
		III				Land Instruments International	UK	A			
		III				Sick AG	Germany	A			For In Situ Type
		III				Envoirenment 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				Envoirenment 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.Pl refer Note-07
		III				Emerson Process Management Ltd	Pawane	A			For In Situ Type For M/s Emerson USA make Analyser
		III				ABB	Bengaluru	A			For In Situ Type For M/s ABB UK make Analyser
		III				Yokogawa India	Bengaluru	A			For In Situ Type For M/s Yokogawa Japan make Analyser
		III				Enotech GmbH	Germany	A			For In Situ Type
		III				Ametek	USA	A			For In Situ Type
		III				Yokogawa Electric Corporation	Japan	A			For In Situ Type
		III				Servo max Group	UK	A			For In Situ Type
		III				Sick AG	Germany	A			For In Situ Type
23	Continous Emisson Monitoring system										

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LIST OF C&I ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL

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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				Envoirenment 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/SEnvoirenment SA India dated 12.02.2019
24	Furnace Flame viewing system (High Temperature CCTV Components)										
		III				Sertel Electronics Pvt. Ltd.	Chennai	A			Approved for Visible type only
		III				Hi Tech System and Service (System Integrator of M/S Lenox USA)	Kolkata	A			1.M/S Lenox USA Make System 2.Pl refer Note-07
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			1.Complete Camera Assembly, IRIS Control etc. from Durag Germany 2.Other Component like chiller, vedio monitor, OFC ,Panel from M/S Durag Approved sources
		III				TLT Engg Pvt. Ltd. (System Integrator of M/S Diamond Power USA/ Sweden make system)	Kolkata	A			1.M/S Diamond Power USA/ Sweden make system 2.Pl 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.Pl 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			Condtional 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	Khuskhera	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 Inftrastructure Ltd.	Khurdha	A			
		Note-2				CMI	Faridabad	A			
		Note-2				Advance Cables Pvt Ltd	Bengaluru	A			F&G Type Cable
		Note-2				Gemscab Industries Ltd	Bhiwadi (Raj)	A			F&G Type Cable
		Note-2				Apar Industries Limited	Valsad	A			F&G Type Cable
		Note-2				Suyog Electricals Ltd	Halol (Gujrat)	A			
		Note-2				Special Cables Pvt Ltd	Rudrapur	A			
		Note-2				T C Communication	Ghaziabad	A			
		Note-2				TEW & C	USA	A			
		Note-2				Habia cables	Sweden	A			
		Note-2				Kerpen cables	Germany	A			
		Note-2				Lapp cables	Germany	A			
		Note-2				Thermo elecrta Bv	Netherland	A			
30	Intelligent Battery charger 24V DC / DCDB/BHMS										
		II				Chabbi Electricals	Jalgaon	A			Rectifier module, Controller module and Battery Health monitoring system shall be of M/s Vertiv make
		II				Eltek SGS Pvt Ltd	Gurugram	A			
31	Large Video Screen (LED Based)										
		I				Pyrotech Electronics Pvt Ltd	Udaipur	A			
		I				Delta India Electronics Pvt Ltd	Gurugram	A			
		I				Barco Electronics system (P) Ltd	Noida	A			
		I				Planner System Inc	USA	A			
32	Level switch- Conductivity type										
		II				Raman Instruments (System integrator of Delta Morbey/ Emerson Mobrey /Solartron -Mobrey)	Delhi	A			1.M/S Emerson (Morbey) UK system 2.Pl refer Note-07
		II				HI Tech System & services Ltd (System Integrator of Levelstate systems Ltd ,UK)	Kolkata	A			1. M/S Levekstate UK System .Vessel from M/s Hi Tech 2.Pl refer Note-07
		II				BHEL	Trichurapalli	A			
		III				Emerson -Mobrey (Solartron mobrey)	UK	A			
		III				Levelstate Systems Ltd	UK	A			

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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 Electronik 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.Pl 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 plateforms 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 Controols 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 Rosemeount	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, Dissloved 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,Dissloved Oxygen,Hydrazine
		III				ABB	UK	A			For Chloride,Dissloved 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 Dissloved 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 caliberation 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 supervisiory Instruments along with vibration analysis system.										
		I				GE	Pune	A			For GE Bentlly ,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 Mechanlysis Ltd	Thane	A			Vibration sensors will be sourced from M/s Hansford UK ,however brand name of IRD and its logo is acceptable with suitable tracebility of M/s Hansford ,UK.
		II				Forbes Marshall Pvt Limited	Pune	A			VMS hardware , Sensors ,extention cables shall be shinkawa Japan make .2. All other BOI shall be from LOA agreed sources
		II				GE	Pune	A			For GE Bentley , USA Make
		II				Rockwell Automation	Sahibabad	A			For Rockwell USA make
		II				SKF	Pune	A			For SKF USA make
		II				Imageneous Engineering Pvt Ltd	Vadodara	A			1-For Meggitt Switzerland make 2- Refer note 7
		II				Shinkawa	Japan	A			
		II				GE	USA	A			Bentley Niveda brand
		II				Meggitt	Switzerland	A			
		II				Sensonic Limited	UK	A			
49	Wireless Solution (Microwave Tower Communication)										
		I				L&T Technology Services (LTTS)	Bengaluru	A			1- Wireless Product (Access Point, Antenna) shall be M/s Cambium UK Make 2- Other Item like Switch, Cat-6 Cable can be supplied from M/s LTTS approved sources meeting technical requirements.
		I				Lotus wireless technologies India Pvt Ltd	Visakhapatnam	A			
		I				Sheetal Wireless Technologies Pvt Ltd	Pune	A			
		III				Proxim Wireless Corporation	USA	A			BOI shall be as per approval letter

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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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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 Equpiment	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	Psycrometer	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 biomatric 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 alognwith 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 Insrument cable <= 1 KM inspection category CAT - III, For > 1 KM to <= 10 KM Inspecton category CAT - II COC & FOR> 10 KM Inspection category CAT-I

NOTE -3 : For Fiber Optic cable <=10KM inspection category CAT - III & for > 10KM Inspection category CAT-II

NOTE-4 : Batteries for UPS <= 10 KVA and batteries for intelligent battery charger 24 V DC <= 40 Amp inspection category CAT-III & for Batteries for UPS> 10KVA and batteries for intelligent battery charger 24 V DC > 40 Amp rating

NOTE-5 UPS <= 10 KVA rating inspection category CAT-III & for > 10KVA rating inspection category CAT-I

NOTE - 7 - EMPTY CABINETS, COMPUTERS, SIGNAL ISOLATOR/ MULTIPLIER and TB SHALL ALSO BE ACCEPTABLE FROM OWNER ACCPETED IN QP. IF THE TOTAL INTEGRATED PANEL AND FAT IS CONDUCTED INDEGENEOUSLY

NOTE-8 : For the C & I instrumnts mounted on the skid of the main item or supplied as a integral part of the main item, instrument to be supplied as per proven practice of the manufacturer meeting the Customer technical specification

NOTE-9- This item is a bought out componenet of main equipments like DDCMIS ,PLC,TSI,CCTV ,PA system etc

NOTE-10- For these controlled items, vendor shall be proposed for owner accpetance with-in the agreed contract schedule of the package

NOTE-11 - Major Bought-Out-Items are to be procured from LOA approved sources & the same shall be finalized during the finalization of Manufacturing Quality Plan . MQP shall be duly vetted by OEM with their project specific authorisation letter .

NOTE-12 : Main contractor apporved sub vendors are acceptable those are evaluated / assesesed as per Main contractor Quality Management System for vendor approval. Main contractor to inform the finaly selected vendor to NTPC as soon as PO is placed for these items. In case of sub-QR Note-1 is also applicable.

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** क़्वालिटी प्लान तथा सब – वेंडर के अनुमोदन सहित मदों की सूची **SUB-SYSTEM** उप-प्रणाली**: CIVIL WORKS**	**DOC. NO./** दस्तावेज सं.**:** CS-4540-001-2 **REV. NO.:** **DATE/** तिथि **: 03.02.2022** **PAGE/** पृष्ठ **: PAGE 1 OF 7**

S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यू पी. 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.	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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					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		
2.	COLOUR COATED METAL DECK & CLADDING/ROOFING SHEET (COIL)	I			TATA STEEL BSL LIMITED	RAIGAD	A		
					TATA STEEL BSL LIMITED	SAHIBABAD	A		
					TATA BLUESCOPE STEEL LTD	JAMSHEDPUR	A		AL-ZN COIL FOR CLADDING
					ESSAR STEEL LTD	PUNE	A		
					NATIONAL STEEL & AGRO INDUSTRIES LTD	DHAR	A		
					JSW STEEL COATED PRODUCTS LTD	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 MACHINARY & 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 REFIINARIES	-	-		
13.	PTFE BEARING / ELASTOMERIC BEARING	III			MORTH / RDSO APPROVED VENDORS	-	-		

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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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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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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 सप्लाइर का स्थान.

NOTE:

1. The sub vendor list above is indicative only and is subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

   Bidder to propose sub vendor list with following back up documents within 4 weeks of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained. The sub vendor list shall subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.

b) End user performance certificate that the equipment/system has been operating satisfactorily for minimum two years as on the scheduled date of bid opening.
   Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

2. The inspection category will be intimated after award of contract by BHEL/customer. However, the same will be adhered by the bidder without any commercial and delivery implication to BHEL/ customer.

	TITLE: **TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT** **TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)**	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

ANNEXURE-III

FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES

FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE AND GUARANTEE TESTS

(The term "Performance Guarantees" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly, the term "Performance Tests" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Guarantee Test(s)". The term "TMCR" (Turbine maximum continuous rating) appearing in the Technical Specification shall mean 660 MW electrical power output at generator terminals (power at generator terminals as per clause indicated in this sub-section) under rated steam parameters, 0% cycle make-up and 77 mm Hg (abs) condenser pressure unless used in conjunction with a different cycle make-up and/or a different condenser pressure.

1.00.00 PERFORMANCE GUARANTEES

1.00.01 General Requirements

a) The bidder shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in these specifications.
b) The guaranteed performance parameters furnished by the Bidder in his offer, shall be without any tolerance values and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures
c) The Contractor shall conduct performance test and demonstrate all the guarantees covered herein during functional guarantee / acceptance test. The various tests which are to be carried out during performance guarantee/acceptance test are listed in this Sub-section. The guarantee tests shall be conducted by the Contractor at site in presence of Employer on each unit individually.
d) All costs associated with the tests including cost associated with the calibration shall be included in the bid price.
e) It is the responsibility of the bidder to perform the Performance Guarantee/Acceptance test as specified in this subsection. The performance tests will be performed using only the normal number of Employer supplied operating staff. Bidder/ vendor or other subcontractor personnel shall only be used for instructional purposes or data collection. At all times during the Performance Tests the emissions and effluents if any as per scope from the Plant shall not exceed the Guaranteed Emission and Effluent Limits.
f) The Bidder shall make their system ready for the performance guarantee tests before start of initial operation.
g) The instruments to be used for process control shall also be used for PG test. Minimum number of instruments to be used for PG test has been identified in respective P&IDs with accuracy class meeting the code requirement. All instruments required for performance testing shall be of the type and accuracy required by the ASME PTC code. Prior to the start of the initial operation, the contractor shall get these instruments calibrated in an independent test Institute approved by the Employer. All test instrumentation, Personal computer(s), necessary server and required interface, software for on line computation of test results & report as required for PG tests shall be supplied by the contractor and shall be retained by the Employer. Separate system shall be supplied for each unit. All calibration procedures and standards shall be subjected to the approval of the Employer. The protecting tubes, pressure connections and other test connections required for conducting guarantee test shall conform to the relevant codes.
h) 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 as elsewhere of 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.

i) Tools and tackles, instruments/devices including flow devices, matching flanges, impulse piping & valves etc. and any special equipment, required for the successful completion of the tests, shall be provided by the contractor free of cost.

j) The Performance / Acceptance test shall be carried out as per the agreed procedure. The PG test procedure including demonstration tests shall be submitted within 90 days of the date of Notification of Award and finalization of the PG test procedure shall be done within 180 days from the date of Notification of Award. After the conductance of Performance test, the preliminary test results shall be calculated automatically by the server/software provided by the contractor. The correction curves approved by the employer shall be fed/inbuilt in the PG test program/software. Preliminary test reports shall be submitted to the Employer instantly after completing each test run. The contractor shall also submit the detailed test evaluation report of Performance test results to Employer promptly but not later than one months from the date of conductance of Performance test.

The PG test procedures shall be submitted for equipment/ system & subsystem under Contractor's scope for all Guarantees under category I, II & III as per latest International codes / standard meeting the specification requirements. The procedure shall also include correction curves, detailed activity plan of conductance of test and sample calculations.

k) The Contractor shall submit for Employer's approval the detailed Performance Test procedure containing the following:
   a) Object of the test.
   b) Various guaranteed parameters & tests as per contract.
   c) Method of conductance of test and test code.
   d) Duration of test, frequency of readings & number of test runs.
   e) Method of calculation.
   f) Correction curves and respective equations for graphs to be fed for the online computation
   g) Instrument list consisting of range, accuracy, least count, and location of instruments along with reference approved P&IDs.
   h) Scheme showing measurement points.
   i) Sample calculation.
   j) Acceptance criteria.
   k) Any other information required for conducting the test.

l) In case during performance guarantee tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer and re-conduct the performance guarantee test(s) with Employer's consent. However, if the specified performance guarantee(s) are still not met but are achieved within the Acceptable Shortfall Limit specified at clause 1.01.02 of this subsection, Employer will accept the equipment/system/plant after levying liquidated damages as per clause 1.01.02 of this sub-section. If, however, the demonstrated guarantee(s) continue to be more than the stipulated Acceptable Shortfall Limit, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by the Employer, after the tests have been completed, the Employer will have the right to either of the following:

   (i) For Category-I Guarantees

   Reject the equipment / system / plant and recover from the Contractor the payments already made

   OR

   Accept the equipment /system/ plant after levying Liquidated Damages as specified hereunder. The liquidated damages for shortfall in performance indicated in clause 1.01.02 of this sub-section shall be levied separately for each unit. The liquidated damages shall be prorated for the fractional parts of deficiencies. The performance guarantees coming under this category are called 'Category-I' Guarantees.

(ii) For Category-II Guarantees

In case the performance guarantee(s) are not met by the Contractor during demonstration test, the Contractor shall carry out all necessary modifications and/or replacements to comply with the guaranteed requirements at no extra cost to the Employer and re-conduct the performance guarantee test(s) with Employer's consent

If, however, the demonstrated guarantee(s) are not met even after the above modifications / replacements within ninety (90) days, it will be concluded that, the equipment has failed to meet the guarantee(s).

In such case, Employer shall Reject the equipment / system/ plant and recover from the Contractor the payments already made. The performance guarantees under this category shall be called 'Category-II' Guarantees. Conformance to the performance requirements under Category-II is mandatory.

(iii) For Category-III Guarantees

Reject the equipment /system / plant and recover from the Contractor the payments already made.

OR

Accept the equipment/system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by the Employer. Such damages shall, however be limited to the cost of replacement of the equipment(s) / system(s), replacement of which shall remove the deficiency so as to achieve the guaranteed performance. These parameters/capacities shall be termed as Category-III Guarantees.

1.01.00 GUARANTEES UNDER CATEGORY I

NIL

1.02.00 GUARANTEES UNDER CATEGORY II

Noise as per GUARANTEES UNDER CATEGORY - II

1.03.00 GUARANTEES UNDER CATEGORY II

CONDENSATE POLISHING PLANT

1.03.01 Following shall be guaranteed by the Bidder in the relevant Guarantee Schedule of the Bid Document and falls under "GUARANTEE UNDER CATEGORY –III":

1.0 Effluent quality at outlet of each vessel at its rated design flow and design service length between two regenerations (as defined elsewhere).

2.0 As detailed below in Technical Requirement of PG Test Procedure for Condensate Polishing Unit System.

CLAUSE NO.	FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES

GUARANTEES UNDER CATEGORY - II

1.02.00 **Noise**

All the plant, equipment and systems covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency specified in General Technical Requirement, Part-C Section-VI of the technical specifications.

Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 61672-1 & 2 (latest edition)

Sound pressure shall be measured all around the equipment at a distance of 1.0 m horizontally from the nearest surface of any equipment/ machine and at a height of 1.5 m above the floor level in elevation.

A minimum of 6 points around each equipment shall be covered for measurement. Additional measurement points shall be considered based on the applicable standards and the size of the equipment. The measurement shall be done with slow response on the A - weighting scale. The average of A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value. Corrections for background noise shall be considered in line with the applicable standards. All the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests.

PG Test Procedure for Condensate Polishing Unit System

1.0 Scope of PG test:

PG Test shall be conducted after successful trial run to establish all the guaranteed parameters/ values for each service vessel:

1.1 Three run under normal condition at rated design flow.
1.2 One run under condenser leak condition at rated design flow.
1.3 Chemical consumption for regeneration as per technical specifications.
1.4 Pressure drop across the polisher service vessel in clean and dirty condition of resin at rated design flow.
1.5 100% Transfer of resins from CPU service vessel to regeneration vessel and vice-versa.
1.6 Performance of all the interlocks provided.
1.7 Noise, vibration levels, protection & interlock and other functional guarantees of different rotating machines and equipment

2.0 GUARANTEES:

The Condensate polishing system shall be designed to maintain the guaranteed effluent quality & length of service runs at normal condition, start-up, and condenser leakage conditions. The guarantees shall be as below:

2.1 INFLUENT AND EFFLUENT WATER QUALITIES FOR CONDENSATE POLISHING PLANT UNDER NORMAL RUN CONDITION:

Sl. No.	IONIC CONCENTRATION (as such)	INFLUENT	EFFLUENT (maximum)
1.	Ammonia, ppb	150	--
2.	Total dissolved solids, ppb	100	20
3.	Silica, ppb	30	5* (refer note below)
4.	Iron, ppb	50	5
5.	Sodium, ppb	10	2
6.	Chlorides, ppb	10	2
7.	pH	8.5-9.0	--
8.	Effluent conductivity after removal of ammonia & amines, µS/cm at 25^0C	---	< 0.10 or less
9.	Suspended matter (Crud), ppb	Not more than 25	<5

Note:

i) Silica value shall be 7 ppb as per resin supplier recommendations in case the temperature of the condensate is 50^0C & above.

ii) Under the above operating and design flow through the polisher units, the un-ammoniated resins shall not reach “ammonia break-point” in less than 30 days (720 hrs) of continuous operation while maintaining the above effluent quality. Whenever specific conductivity starts increasing from 0.1 micro mhos/cm in the effluent, it is deemed that “ammonia break point” is reached.

2.2 TEST UNDER STARTUP CONDITIONS (50 hrs at rated flow):

During startup conditions, the quality of influent shall be as follows:

S.No.	PARAMETER	INFLUENT (Maximum)	EFFLUENT (Maximum)
1.	TDS, ppb	2000	--

2.	Silica, ppb	150	--
3.	Crud, ppb	1000	150

Note:

i) For design purposes, average crud loading shall be considered as 500 ppb

ii) Useful service run between two successive regenerations at design flow rate with above conditions should not be less than 50 hours.

2.3 TEST UNDER CONDENSER LEAK CONDITION:

Under condenser tube leakage condition, the quality of influent shall be as follows:

S.No.	PARAMETER	INFLUENT	EFFLUENT (Maximum)
1.	TDS, ppb	2000	--
2.	Sodium, ppb	--	20
3.	Silica, ppb	--	20

Note:

i) The influent TDS will be in addition to the normal influent load. The anion and cation load in influent design TDS shall be based on circulating water analysis.

ii) Useful service run between two successive regenerations at design flow rate with above conditions should not be less than 50 hours.

2.4 TEST UNDER CONDENSER LEAK CONDITION:

The quantities of hydrochloric acid (as per IS:265, technical grade) required for regeneration of one vessel resin (cation) charge and the quantity of sodium hydroxide (as per IS:252, rayon grade) lye or as flakes required for regeneration of one vessel resin (anion) charge shall be as follows:

S.No.	REGENERANT	QUANTITY (Kgs)
1.	Hydrochloric acid (100%)	125 kg x design cation resin volume (M3)
2.	Sodium hydroxide (100%)	160 kg x design anion resin volume (M3)

2.5 PRESSURE DROP:

At the design flow rate, the maximum pressure drop across the polisher service vessels shall be as follows:

S.No.	PARAMETER	PRESURE DROP AT DESIGN FLOW RATE (Kg/cm^2)
1.	Under clean conditions	2.1
2.	Under dirty conditions	3.5

Note:

i) The pressure drop under clean conditions shall include losses due to entrance & exit nozzles, distributors, under drains, resins and the effluent resin traps.

ii) The pressure drop under dirty conditions shall include the pressure drop across effluent resin traps.

2.6 Transfer of resin from service vessel to regeneration vessel shall be complete (100%).

2.7 During PG test period, all service vessels shall also be checked for their rated design flow.

2.8 Parallel operation of all CPU vessels at total design flow should be checked once in all units during PG test.

3.0 GENERAL REQUIREMENTS:

The clauses as given in GTR (General technical requirements), Technical specifications and Notification of award shall be final and binding.

3.1 PG Test will be conducted within a period of two months after successful completion of trial operation.

3.2 The PG test shall be undertaken only after the resins have been subjected to at least three normal regeneration and service cycles after commissioning.

3.3 During PG Test all the alarms and inter-locks to be checked

3.4 All relevant analysis results and test certificates shall be submitted by the vendor for the exchanger bed media prior to the commencement of PG Test.

3.5 All the instruments required for conducting PG test shall be calibrated by the vendor in presence of NTPC representatives prior to the start of the PG Test by the standard methods acceptable to NTPC. Wherever this is not possible, valid calibration certificates by an approved agency shall be submitted by the vendor.

3.6 Standard analytical procedures shall be followed for the determination of various chemical parameters. Laboratory facilities as available at NTPC-Talcher site may be made available, if required. If laboratory facility does not exist for any test, the supplier will arrange the same from NTPC/Govt. approved laboratories.

3.7 The influent and effluent parameters shall be analyzed every 4-hour. However, online analyzers provided shall be taken for recording every 2-hour wherever applicable.

3.8 Necessary tools and instruments required for PG Test shall be arranged by the vendor. Laboratory facilities as available at site may be made available, if required. If laboratory facility does not exist for any test, the supplier will arrange the same from NTPC/Govt. approved laboratories.

3.9 In case, during PG test if the equipment/ system has failed to meet the guarantees, the vendor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer and re-conduct the PG Test with employer's consent.

3.10 Vendor will submit authenticated documents with signature and stamp on each page.

3.11 If start-up and condenser leak conditions do not exist during the entire PG test period, a joint protocol will be submitted for the same.

3.12 All the log-sheets and protocols of PG test shall be jointly signed by the supplier and NTPC-Talcher representatives. Unsigned or not jointly signed log-sheets & protocols will not be accepted for evaluation.

3.13 PG test report of total CPU package, complete in all respects, shall only be considered for evaluation.

3.14 Pre requisites for performance test:

i) Availability of NTPC & Supplier personnel / operational staff during the test.

ii) Uninterrupted power supply within specified parameters for the duration of the Test. Power supply is required for all Analysers.

iii) Adequate and uninterrupted Condensate Water and chemical supply.

iv) Sufficient illumination to be ensured in CPU Service area and Regeneration area.

4.0 PERFORMANCE GUARANTEE TEST PROCEDURE FOR CONDENSATE POLISHING UNIT:

S.NO.	EQUIPMENT	OBJECTIVE	PROCEDURE	REMARKS
1.	Condensate polishing plant for turbo generator units-1 & 2.	To establish the followings during three consecutive Normal Service runs.	---	----
		i). For CPU PG test, two number identified resin lots shall be tested for three service run by ensuring that at least two (if CPU is 3x50%)/ ~~three (if CPU is 4x33%)~~ number service vessels of each unit should be covered during PG test under normal service run. ii). During PG test period, all service vessels shall be checked for their rated design flow. iii). Parallel operation of three CPU vessels at total design flow should be checked once in all three units during PG test.	Using normal regeneration level, externally regenerate the resins filled in each service vessel one by one and re-fill the service vessels with regenerated resins. Start auto service run of first vessel by controlling inlet and bypass valves. After establishing design flow through the first vessel, start auto service run of second vessel and then third vessel by adjusting the above valves and ensuring the design flow passing through all the three vessels.	i). The test will be carried out with two (if CPU is 3x50%)/ ~~three (if CPU is 4x33%)~~ service vessels. ii). In case total design flow is not available, two vessels at their design flow (---- m^3/h) or one vessel at its design flow (---- m^3/h) will be tested for normal service PG test run. iii). Bypass valves should be full closed during PG test. iv). The flow rates through each service vessels and total flow will be measured with the help of online flow meters after half an hour from the time the vessels are put into service. v). Flow rate will be recorded every 2-hours.
		iv). Service length of 30 days (720 hours) at design flow between	The service run will continue till the effluent parameters remains within limits as given	Total flow through each vessel will be measured using

S.NO.	EQUIPMENT	OBJECTIVE	PROCEDURE	REMARKS
		two regenerations using single regenerant quantity. the un-ammoniated resins shall not reach "ammonia break-point" in less than 30 days (720 hrs) of continuous operation while maintaining the effluent quality as specified in **Section-2.1.** Whenever specific conductivity starts increasing from 0.1 micro mhos/cm in the effluent, it is deemed that "ammonia break point" is reached.	in **Section-2.1.**; the Specific conductivity of the effluent remains less than or equal to 0.100 µS/cm at 25^0C or throughput per vessel has reached -------- m^3 whichever occurs earlier. If the inlet quality is higher than the design value as per **Section-2.1**, service cycle will be reduced based on the load and the same shall be established. The revised calculations for higher inlet load than design will be accepted after approval of NTPC-Engg (CC). There will be three normal PG test runs with an identified resin lot for a unit preceded by single regeneration Average result from three consecutive PG test runs will be considered for evaluation.	online flow integrators. Flow rate, total flow and online parameters will be recoded every 2-hours. Other chemical parameters will be tested 4-hourly in the laboratory. In case a service run is interrupted & stopped for some time and again restarted after extra rinsing, such extra rinse water volume will be added to service run output.
		vi) Pressure drop across the polisher service vessel of 2.1 kg/cm^2 in clean and 3.5 kg/cm^2 under dirty conditions of resin at design flow.	The pressure drop under clean conditions will be measured after half an hour of the vessel containing freshly regenerated resins are put into service. The pressure drop under dirty conditions will be measured at the end of service run.	The pressure drop across the resin bed will be measured using online differential pressure indicator. The pressure drop under clean conditions shall include losses due to entrance & exit nozzles, distributors, under drains, resins and the effluent resin trap and under dirty conditions shall include the pressure drop across effluent resin traps. Pressure drop will be recorded every 2-hours.
2.	Condensate polishing plant for turbogenerator units- 1, & 2.	To establish the followings during start up condition run:	--	--
		i) Useful service run of not less than 50 hours. ii) Total crud	Freshly single regenerated resins are transferred to service vessel and the vessel is put into service.	The influent crud level during startup will be up to 1000 ppb.

S.NO.	EQUIPMENT	OBJECTIVE	PROCEDURE	REMARKS
		content of the effluent not more than 150 ppb.	The influent & effluent crud levels are measured every 4-hour.	The crud levels are measured gravimetrically using 0.45 micron filter paper.
3.	Condensate polishing plant for turbogenerator units- 1, & 2.	To establish the followings during condenser leak condition run:		
		i) Useful service run of not less than 50 hours. ii) Both sodium and silica contents of the effluent to be less or equal to 20 ppb. iii) All other effluent parameters as per Annexure -I.	Freshly single regenerated resins are transferred to service vessel and the vessel is put into service.	The influent TDS will be 2000 ppb in addition to the normal influent contaminants as stated in **Section-2.4.** Flow rate, total flow and online parameters will be recoded every 2-hours. Other chemical parameters will be tested 4-hourly in the laboratory.
4.	Condensate polishing plant for turbogenerator units- 1, & 2.	To establish all other guarantees/ parameters as specified in **Section 2.0** of this procedure and Scope.	--	--

5.0 **Agency should submit the detailed PG test procedure based on the above details for approval of NTPC**

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

ANNEXURE IV

DRAWING/ DOCUMENTS REQUIREMENT & DISTRIBUTION SCHEDULE

After award of LOI, the drawing documents listed in MDL are minimum drawing/documents, which shall be submitted by the bidder for BHEL and Customer approval. However, any additional drawing/document if found necessary for completion of the engineering, the same shall be submitted by bidder without any commercial & delivery implication to BHEL.

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.

Every revised submission incorporating BHEL/Customer comments shall be resubmitted within 7 days by bidder.

Bidder further confirmed that drawings submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

- List and schedule of drawings/documents to be submitted after award of contract shall be as per MDL.

- Bidder to note that drawings/documents submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drawings/documents approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.
  - Internet explorer version – Minimum Internet Explorer 7
  - Internet speed – 2 mbps (Minimum preferred)
  - Pop ups from our external DMS IP (124.124.36.198) should not be blocked
  - Vendor's internal proxy setting should not block DMS application's link
    - (http://124.124.36.198/wrenchwebaccess/login.aspx)

  - DMS user manuals to be used by BHEL PEM vendors for uploading, viewing, revising, commenting and tracking documents on PEM's DMS have been uploaded on PEM internet website (www.bhelpem.com) under the Vendor session.
  - For quick access bidder may refer the link http://bhelpem.com/DMSManuals/DMSManuals.html

- Bidder shall submit soft copy/hard copy/CD ROMs of all the finally approved drawings and O&M Manuals as required by Customer/Customer consultant/BHEL-site/BHEL-PEM. The exact number of hard copies/CD ROMs of these documents to be submitted shall be notified to the bidder at the time of detailed engineering and bidder shall submit the same without any commercial/delivery implications to BHEL/Customer.

- 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.

- Editable copy of all the drawings and documents shall be provided.

- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copes 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.

- Vendor 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-Excel/MS-word (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 and customer will also be submitted by the bidder without any delivery and commercial implication to BHEL and customer.

  - P&IDs.
  - Equipment lay out of CPU Plant.
  - Equipment Cable tray layout of CPU Plant.
  - Civil assignment drawings.
  - Piping lay out drawing of CPU Plant.

Other requirements

- Engineering for this project is to be carried out in Integrated Intelligent Engineering environment at BHEL end. The engineering platform on which BHEL is doing the project is based on Smart Plant Suite. This is being done to have automated interface checking and thereby minimising rework at site.
  Hence in line with above, bidder shall provide necessary support with respect to detailed piping drawing, isometric drawing, etc. as and when required during detail engineering.

- Successful bidder shall furnish detailed erection manual for each of the equipment as well as complete system supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.

- 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.

- 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. However, in case changes are necessitated due to any constraints at customer end, delay in review/ approval of such revised drawing beyond one month will be to customer’s account.

TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
	VOLUME II	
	SECTION – IA	
	REV. NO. 00	DATE:

MASTER DRAWING LIST (MDL)

Sl. No.	*NTPC Drawing No.*	*BHEL Drawing No.*	*Drawing/Document Title*	*No. Of Weeks for Document Submission After Placing LOI/LOA*
1	4540-001-110-PVM-L-039	PE-V0-497-155A-A001-1	P & I DIAGRAM OF CONDENSATE POLISHING PLANT (CPP)*	4
2	4540-001-110-PVM-L-040	PE-V0-497-155A-A001-2	P & I DIAGRAM OF REGENERATION SYSTEM OF CPP*	4
3	4540-001-110-PVM-U-002	PE-V0-497-155A-A004	PROCESS DESIGN & EQUIPMENT SIZING CALCULATION FOR CPP*	4
4	4540-001-110-PVM-U-003	PE-V0-497-155A-A004-1	PRESSURE & ATMOSPHERIC VESSELS/TANKS DESIGN CALCULATIONS OF CPP(INCLUDING DM TANKS IF APPLICABLE).*	4
5	4540-001-110-PVM-W-075	PE-V0-497-155A-A006	CONTROL WRITE UP / PHILOSOPHY FOR CONDENSATE POLISHING PLANT*	4
6	4540-001-110-PVM-Y-072	PE-V0-497-155A-A004-3	DATA SHEET OF RESINS WITH CURVES FOR CPU*	4
7		PE-V0-497-155A-A005	SUB VENDOR LIST & INSPECTION CRITERIA*	4
8	4540-001-110-PVM-F-023	PE-V0-497-155A-A003	GENERAL LAYOUT OF CONDENSATE POLISHING PLANT (CPP)*	6
9	4540-001-110-PVM-H-003	PE-V0-497-155A-A050	VALVE SCHEDULE - CPU	6
10	4540-001-110-PVM-H-004	PE-V0-497-155A-A122	PAINTING SCHEDULE-CPU	8
11	4540-001-110-PVI-H-263	PE-V0-497-155A-A147	LIST OF 230V AC UPS LOAD (FOR CPU)	8
12	4540-001-110-PVI-H-294	PE-V0-497-155A-A048	ALARM AND ANNUNCIATION LIST	8
13	4540-001-215-PVE-H-287	PE-V0-497-155A-A146	CABLE SCHEDULE (POWER) FOR CPU	8
14	4540-001-110-PVM-Y-076	PE-V0-497-155A-A032	GA DRAWING OF DM WATER STORAGE TANKS FOR CPU	10
15	4540-001-110-PVM-Y-083	PE-V0-497-155A-A037	GA DRAWING AF ACID MEASURING TANK	10
16	4540-001-110-PVM-Y-085	PE-V0-497-155A-A039	GA DRAWING OF ALKALI DAY TANK	10
17	4540-001-110-PVM-Y-092	PE-V0-497-155A-A051	GA DRAWING OF NEUTRALISATION PIT	10

18	4540-001-110-PVM-Y-071	PE-V0-497-155A-A034	GA DRAWING OF REGENERATION VESSELS (TYPE WISE)	10
19	4540-001-110-PVM-Y-073	PE-V0-497-155A-A057	DATASHEET & GA OF STRAINERS FOR CPU	10
20	4540-001-110-PVM-Y-074	PE-V0-497-155A-A046	GA DRAWING OF RESIN HOPPER	10
21	4540-001-110-PVM-Y-075	PE-V0-497-155A-A059	DATA SHEET OF AC FILLER MEDIA	10
22	4540-001-110-PVM-Y-077	PE-V0-497-155A-A033	GA DRAWING OF SERVICE VESSEL	10
23	4540-001-110-PVM-Y-081	PE-V0-497-155A-A035	GA DRAWING OF ACID STORAGE TANK	10
24	4540-001-110-PVM-Y-082	PE-V0-497-155A-A036	GA DRAWING OF ALKALI STORAGE TANK	10
25	4540-001-110-PVM-Y-084	PE-V0-497-155A-A038	GA DRAWING OF ALKALI PREPARATION TANK	10
26	4540-001-110-PVM-Y-086	PE-V0-497-155A-A040	GA DRAWING OF AC FILTER FOR ALKALI	10
27	4540-001-110-PVM-Y-087	PE-V0-497-155A-A061	ELECTRIC ACTUATOR FOR DIAPHRAGM VALVE - CPU	10
28	4540-001-110-PVM-Y-080	PE-V0-497-155A-A062	GA DRAWING OF EJECTOR	10
29	4540-001-110-PVM-Y-078	PE-V0-497-155A-A066	GA DRAWING MISCELLANEOUS ITEMS SUCH AS CO2 ABOSORBERS, FUME	10
30	4540-001-110-PVM-Y-091	PE-V0-497-155A-A043	GA DRAWING OF LIME TANK OF NEUTRALISATION PIT (IF APPLICABLE)	10
31	4540-001-110-PVM-Y-101	PE-V0-497-155A-A142	DATA SHEET AFONGWITH GA OF NON- RETURN VALVE	10
32	4540-001-110-PVI-Y-269	PE-V0-497-155A-A022	DATA SHEET FOR ELECTRONIC TRANSMITTERS	10
33	4540-001-110-PVI-Y-270	PE-V0-497-155A-A023	DATA SHEET FOR LEVEL TRANSMITTER - ULTRASONIC	10
34	4540-001-110-PVI-Y-271	PE-V0-497-155A-A024	DATASHEET OF SOLENOID VALVES	10
35	4540-001-110-PVI-Y-276	PE-V0-497-155A-A030	DATA SHEET FOR PNEUMATIC OPERATED CONTROL VALVES FOR CPP	10
36	4540-001-110-PVI-Y-291	PE-V0-497-155A-A045	DATA SHEET OF MOTORIZED BUTTERFLY VALVE	10
37	4540-001-110-PVI-Y-320	PE-V0-497-155A-A078	DATA SHEET AND GA FOR JUNCTION BOX / ANALYZER PANEL AND JB LAYOUT	10
38	4540-001-110-PVI-Y-342	PE-V0-497-155A-A136	DATA SHEETS OF INSTRUMENTS FOR STG BALANCE TG INSTRUMENTS (FOR CPP)	10
39	4540-001-110-PVM-Y-089	PE-V0-497-155A-A041	GA DRAWING OF HOT WATER TANK	10

40	4540-001-215-PVE-F-031	PE-V0-497-155A-A150	ELECTRICAL EQUIPMENT & CABLING LAYOUT IN CPU	10
41	4540-001-215-PVE-F-288	PE-V0-497-155A-A130	EARTHING LAYOUT OF CPU SERVICE VESSEL AREA	10
42	4540-001-215-PVE-F-289	PE-V0-497-155A-A131	EARTHING LAYOUT OF CPU REGENERATION AREA	10
43	4540-001-136-PVI-Y-012A	PE-V0-497-155A-A026	DATA SHEET FOR PH ANALYSER	10
44	4540-001-136-PVI-Y-014A	PE-V0-497-155A-A028	DATA SHEET FOR CONDUCTIVITY ANALYSER	10
45	4540-001-136-PVI-Y-016A	PE-V0-497-155A-A027	DATA SHEET FOR SODIUM ANALYSER	10
46	4540-001-110-PVM-Y-094	PE-V0-497-155A-A068	GA & C/S OF REGENERATION PUMPS	12
47	4540-001-110-PVM-Y-095	PE-V0-497-155A-A086	GA & C/S OF RESIN TRANSFER PUMPS	12
48	4540-001-110-PVM-Y-096	PE-V0-497-155A-A076	DATA SHEET OF SAFETY SHOWERS FOR CPU	12
49	4540-001-110-PVM-Y-097	PE-V0-497-155A-A077	DATA SHEET OF AGITATORS FOR ALKALI PREPARATION AND ALKALI DAY TANK	12
50	4540-001-110-PVM-Y-098	PE-V0-497-155A-A079	DATA SHEET ALONGWITH GA OF DIAPHRAM TYPE VALVES (MANUAL TYPE)	12
51	4540-001-110-PVM-Y-099	PE-V0-497-155A-A081	DATA SHEET ALONG WITH GA OF BUTTERFLY TYPE VALVES (MANUAL TYPE)	12
52	4540-001-110-PVM-Y-100	PE-V0-497-155A-A082	DATA SHEET AFONG WITH GA OF BUTTERFLY TYPE VALVES (AUTO - DOUBLE ACTING)	12
53	4540-001-110-PVM-Y-102	PE-V0-497-155A-A063	DATA SHEET AIONGWILH G A OF BALL VALVE (MANUAL)	12
54	4540-001-110-PVM-Y-103	PE-V0-497-155A-A065	DATA SHEET ALONGWILH GA OF ISOLATION GATES (N.PIT)	12
55	4540-001-110-PVM-Y-104	PE-V0-497-155A-A069	GA, CROSS-SECTION, CH CURVE & DATASHEET OF ACID UNLOADING PUMPS	12
56	4540-001-110-PVM-Y-107	PE-V0-497-155A-A074	DATA SHEET AJONGWITH GA . C/S OF BLOWERS OF SERVICE AREA	12
57	4540-001-110-PVM-Y-108	PE-V0-497-155A-A075	DATA SHEET ALONGWITH GA, C/S OF BLOWERS OF REGENERATION AREA	12
58	4540-001-110-PVM-Y-093	PE-V0-497-155A-A064	DATA SHEET ALONGWITH GA OF BALL VALVE (AUTO)	12
59	4540-001-110-PVM-Y-105	PE-V0-497-155A-A070	GA, CROSS-SECTION, CH CURVE & DATASHEET OF ALKALI UNLOADING PUMPS	12
60	4540-001-110-PVM-Y-106	PE-V0-497-155A-A085	GA, CROSS-SECTION, CH CURVE & DATASHEET OF ALKALI TRANSFER CUM RECIRCULATION PUMPS	12

61	4540-001-110-PVM-Y-109	PE-V0-497-155A-A071	GA, CROSS-SECTION, CH CURVE & DATASHEET OF EFFLUENT DISPOSAL PUMPS (IF APPLICABLE)	12
62	4540-001-110-PVM-Y-110	PE-V0-497-155A-A087	GA, CROSS-SECTION, CH CURVE & DATASHEET OF RESIN WASTE WATER RECIRCULATION PUMPS	12
63	4540-001-110-PVM-Y-111	PE-V0-497-155A-A072	GA, CROSS-SECTION, CH CURVE & DATASHEET OF METERING PUMPS (ALKALI)	12
64	4540-001-110-PVM-Y-112	PE-V0-497-155A-A073	GA, CROSS-SECTION, CH CURVE & DATASHEET OF METERING PUMPS (ACID)	12
65	4540-001-110-PVM-Y-090	PE-V0-497-155A-A042	GA DRAWING OF PRIMING TANK OF NEUTRALISATION PIT (IF APPLICABLE)	12
66	4540-001-110-PVI-L-010	PE-V0-497-155A-A145	HMI - LOGS, TRENDS AND BAR CHARTS FOR CPU	12
67	4540-001-110-PVI-T-009	PE-V0-497-155A-A144	CONTROL LOGICS FOR CPU	12
68	4540-001-110-QVM-Q-286	PE-V0-497-155A-A101	MQP FOR AIR BLOWERS -LOBE TYPE	12
69	4540-001-110-QVM-Q-287	PE-V0-497-155A-A143	MQP FOR CPU SERVICE VESSEL	12
70	4540-001-110-QVM-Q-289	PE-V0-497-155A-A100	MQP FOR VALVE- DIAPHGRAGM TYPE	12
71	4540-001-110-QVM-Q-290	PE-V0-497-155A-A060	MQP FOR VALVE-PLUG	12
72	4540-001-110-QVM-Q-291	PE-V0-497-155A-A107	MQP FOR VALVE-BUTTERFLY	12
73	4540-001-110-QVM-Q-292	PE-V0-497-155A-A111	MQP FOR VALVE-BALL	12
74	4540-001-110-QVM-Q-293	PE-V0-497-155A-A109	VALVE-DUAL PLATE CHECK	12
75	4540-001-110-QVM-Q-297	PE-V0-497-155A-A103	MQP FOR PIPING FABRICATION -HP>300PSI	12
76	4540-001-110-QVM-Q-298	PE-V0-497-155A-A088	MQP FOR PUMPS- HORIZONTAL & VERTICAL CENTRIFUGAL	12
77	4540-001-110-QVM-Q-299	PE-V0-497-155A-A096	MQP FOR PUMP-METERING/DOSING	12
78	4540-001-110-QVM-Q-300	PE-V0-497-155A-A099	MQP FOR PUMP - PP- ACID/ ALKALI UNLOADING	12
79	4540-001-110-QVM-Q-301	PE-V0-497-155A-A093	MQP FOR RUBBER LINING OF TANKS/ VESSELS/ PIPES/ VALVES/FITTINGS	12
80	4540-001-110-QVM-Q-288	PE-V0-497-155A-A089	MQP FOR PUMP -SUBMERSIBLE / SUMP	12
81	4540-001-110-QVM-Q-294	PE-V0-497-155A-A090	MQP FOR PIPE-MS (BLACK/GI)	12

82	4540-001-110-QVM-Q-295	PE-V0-497-155A-A091	MQP FOR PIPE-SS ASTM A 312	12
83	4540-001-110-QVM-Q-296	PE-V0-497-155A-A092	MQP FOR PIPE- CS SEAMLESS PIPE	12
84	4540-001-110-PVM-L-041	PE-V0-497-155A-A056	EXTERNAL PIPING LAYOUT FROM REGENERATION BUILDING TO AUXILIARY PUMP HOUSE	14
85	4540-001-110-PVM-L-042	PE-V0-497-155A-A055	INTERNAL PIPING LAYOUT IN REGENERATION BUILDING	14
86	4540-001-110-PVM-L-043	PE-V0-497-155A-A052	EXTERNAL PIPING LAYOUT FROM CPP SERVICE VESSELS TO REGENERATION AREA	14
87	4540-001-110-PVM-L-044	PE-V0-497-155A-A053	EXTERNAL PIPING LAYOUT IN REGENERATION AREA	14
88	4540-001-110-PVM-P-003	PE-V0-497-155A-A054	PIPING LAYOUT AROUND SERVICE VESSELS	14
89	4540-001-110-PVM-P-004	PE-V0-497-155A-A049	CPU PIPING SCHEDULE	14
90	4540-001-110-PVI-W-387	PE-V0-497-155A-A067	TYPE TEST REPORT OF CV TEST FOR CONTROL VALVE (FOR CPP)	16
91	4540-001-110-PVM-W-291	PE-V0-497-155A-A133	TYPE TEST REPORT FOR FLOW NOZZLES & ORIFICE PLATES (FOR CPP)	16
92	4540-001-110-PVI-H-297	PE-V0-497-155A-A148	INTERCONNECTION SCHEDULE FOR CPU	16
93	4540-001-110-PVI-L-007	PE-V0-497-155A-A125	INSTRUMENTATION CABLE LIST & ICS FOR CPP	16
94	4540-001-110-PVI-W-381	PE-V0-497-155A-A012	TYPE TEST REPORT FOR ELECTRONIC TRANSMITTERS (FOR CPP)	16
95	4540-001-110-PVI-W-385	PE-V0-497-155A-A016	TYPE TEST REPORT OF JUNCTION BOX (DEGREE OF PROTECTION) FOR CPP	16
96	4540-001-110-PVM-W-077	PE-V0-497-155A-A110	PERFORMANCE & GUARANTEE TEST PROCEDURE FOR CONDENSATE POLISHING PLANT	16
97	4540-001-110-PVM-W-076	PE-V0-497-155A-A058	OPERATION AND MAINTENANCE MANUAL FOR CONDENSATE POLISHING PLANT	20

Note-The drawing/document marked as (*) shall be considered as basic drawings/documents and payment as per suggested price format shall be made after approval of drawings/ documents marked as (*) in either CAT-I/II/IV.

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

DRAWING/DOCUMENTS DISTRIBUTION SCHEDULE

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

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 i) First Submission	1 set	--
	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 i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

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

	TITLE: TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	BHEL DOCUMENTS NO.: PE-TS-497-155-A001	
		VOLUME II	
		SECTION – IA	
		REV. NO. 00	DATE:

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.
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copes 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 of the service vessel area and regeneration area.
    - Equipment Cable tray layout for service vessel area and regeneration area
    - Equipment earthing layout service vessel area and regeneration area
    - Civil scope drawings.
    - Piping lay out drawing for Service vessel area, regenerative area and yard piping layout.
    - Valve schedule.
    - Instrument schedule.
    - Any Other Dwg/Docs as required.

ANNEXURE-V

MANDATORY SPARES FOR CONDENSATE POLISHING UNIT

S. N.	Description	UNIT	Quantity
1.00.00	**MECHANICAL**		
1.00.01	Nozzles/Strainers for Service Vessel	Set	1 set of required qty for one vessel
1.00.02	Nozzles/Strainers for Regeneration area Vessels	Set	One fourth of required quantity of one vessel
1.00.02	Bottom Consep for ARU/CRU	Number	1 no.
1.01.00	CPU/Regen Area Blowers		
1.01.01	Impeller with lock nuts and washers	Set	1 set
1.01.02	Air Filters	Number	2 no.
1.01.03	Bearings for drive & driven	Set	1 set
1.01.04	Gears	Set	1 set
1.01.05	V-belts	Set	1 Set for each drive
1.02.00	CPU/Regen Area Pumps including N-pit & Backwash		
1.02.01	Impeller for each type	Set	1 set
1.02.02	Wearing rings – Impeller for each type (if applicable)	Set	1 set
1.02.03	Wearing rings – Casing for each type (if applicable)	Set	1 set
1.02.04	Shaft for each type	Set	1 set
1.02.05	Shaft Sleeves for each type	Set	1 set
1.02.06	Stuffing box for each type	Set	1 set
1.02.07	Pump bearings for each type	Set	1 set
1.02.08	Gland , Packing & Gland Assembly/Mechanical seal assy. for each type (as applicable)	Set	1 set
1.02.09	Diaphragm Pump for acid/alkali injection & dosing	Set	1 complete pump set
1.02.10	Diaphragms for acid/alkali injection & dosing	Number	Minimum 2 no. each type, size & rating
1.02.11	Strainers in pipelines	Number	Minimum 1 no. each type, size & rating
1.02.12	Relief Valves in Air Blowers unit	Number	Minimum 1 no. each type, size & rating
1.03.00	CPU/Regen Area Valves		

1.03.01	Diaphragm Valves of All types	Number	1 no of each type, size & rating for total population < 10 nos 2 nos of each type, size & rating for total population ≥ 10 nos
1.03.02	Diaphragms	Number	One fourth quantity of total population
1.03.03	NRV (Flap type and Dual Plate Type)	Number	Minimum 1 no. each type, size & rating
1.03.04	Ball Valves of all types	Number	Minimum 1 no. each type, size & rating
1.03.05	Butterfly Valves of all types	Number	Minimum 1 no. each type, size & rating
1.03.06	Any other type valve	Number	Minimum 1 no. each type, size & rating
1.04.00	Agitators		
1.04.01	Agitator assy. With motor and gear box - Alkali Preparation Tank	Set	1 complete set
1.04.02	Agitator assy. With motor and gear box - Alkali Day Tank	Set	1 complete set
1.04.03	Agitator assy. With motor and gear box - Lime Tank near N-pit	Set	1 complete set
1.04.04	Any other agitator assembly with motor & gear box	Set	1 complete set
2.00.00	**MEASURING INSTRUMENTS**		
2.01.00	Electronic Transmitters		
2.01.01	Transmitters of all types and model. (for the measurement of Pressure, differential pressure, flow, level, etc.) including local indication (if applicable)	Number	10 % or 1 no. of each type and model whichever is more
2.02.00	Temperature elements		
2.02.01	Temperature Transmitter	Number	10 % or 1 no. of each type and model whichever is more
2.02.02	RTD's*	Number	1 no. of each type
2.02.03	Thermo well**	Number	1 no. of each type
	* (With head assembly, terminal block and nipple)		
	** (to be divided into various insertion lengths in proportion to main population)		

2.03.00	Local Indicators (Non-Electrical type) - As applicable for the package as per the following items		
2.03.01	Temperature gauges	Number	1 no. of each range and type
2.03.02	Pressure gauges	Number	1 no. of each range and type
2.03.03	Differential Pressure Gauges,	Number	1 no. of each range and type
2.03.04	Level gauges	Number	1 no. of each range and type
2.03.05	Flow gauges excluding Rota meters	Number	1 no. of each range and type
2.03.06	All types of Rota meters	Number	1 no. of each range and type
2.04.00	Process Actuated Switch Devices -As applicable for this package, as per the following items		
2.04.01	Temperature switches	Number	1 no. of each range and type
2.04.02	Pressure switches	Number	1 no. of each range and type
2.04.03	Differential Pressure switches	Number	1 no. of each range and type
2.04.04	level switches	Number	1 no. of each range and type
2.04.05	Flow switches	Number	1 no. of each range and type
2.05.00	Solenoid Valves	Number	10 % or 1 no. of each type and model whichever is more
2.06.00	Limit Switches (for Pneumatic Valves and Manual valves)	Number	2 no. of each type
2.07.00	ANALYSERS		
2.07.01	Complete PH Analyzer (including Flow through type cell and electrode, Electronic transmitter unit, Pre-fabricated cable with connector as minimum)	Set	1 Set of each type
2.07.02	Complete Conductivity Analyzer (including Flow through type cell and Electrode, electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	Set	1 Set of each type
2.07.03	Complete Silica Analyzer (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector Rubber Tubes & Capillary Tubes, solenoid valves, as minimum) along with sample sequencing unit	Set	1 Set of each type

2.07.04	Complete Turbidity Analyzer (including sensing unit, Electronic Transmitter unit, Pre-fabricated cable with connector as minimum)	Set	1 Set of each type
2.07.05	Dissolved O2 Analysers (if applicable) - Similar spares as above analysers		
2.07.06	Turbidity analysers (if applicable) - similar spares as above analyesrs		
	Note - Reagents for analysers of SWAS and DM/CPU systems should be supplied at the time of commissioning of the analysers		
2.08.00	CONTROL VALVES, ACTUATORS AND ACCESSORIES		
2.08.01	Pneumatic and electro-hydraulic actuator assembly	Number	1 no. of each type, model and rating.
2.08.02	Diaphragms, O' rings, seals etc. of all types make etc.	Number	5 Nos.
2.08.03	Solenoid valves (if applicable)	Number	2 nos.
2.08.04	Positioner units /smart positioners (complete unit) & accessories (link assembly)	Number	1 no.
2.08.05	Pneumatic air-filter/Regulator of each type, make rating etc.	Number	2 Nos.
2.08.06	Air lock relays	Number	2 nos. of each type
2.09.00	PNEUMATICALLY OPERATED ISOLATION / BLOCK VALVES, ACTUATORS & ACCESSORIES (For all ON/OFF valves supplied under this package even if one or more of these items are also specified elsewhere under mandatory spares)		
2.09.01	Pneumatic actuator assembly.	Number	1 no. of each type, model and rating.
2.09.02	Diaphragms, O' rings, seals etc. of all types make etc.	Number	5 Nos.
2.09.03	Limit switches (complete unit)& accessories (link assembly)	Number	2 nos.
2.09.04	Pneumatic air-filter/Regulator of each type, make rating etc.	Number	2 nos.
3.00.00	**Electrical Motor**		
3.01.00	DM Water (Regeneration) pump motor	Number	1 no.
3.02.00	DM Water (Resin Transfer) pump motor	Number	1 no.
3.03.00	Alkali Transfer cum Recirculation Pump motor.	Number	1 no.

3.04.00	Agitator Assembly with Motor & Gear Box – Alkali Preparation Tank	Set	1 Set
3.05.00	Agitator Assembly with Motor & Gear Box – Alkali Day Tank	Set	1 Set
3.06.00	Acid dosing pump motor	Number	1 no.
3.07.00	Alkali dosing pump motor	Number	1 no.

Notes:

1) Mandatory spare requirements of Valves and specialties for power cycle piping systems specified above does not include items/valves/specialties which are already specified/ covered elsewhere in this Technical specification for mandatory spare requirement.

2) Wherever complete valve assembly as mandatory spare has been specified above for power cycle piping, it shall include complete gear operator/ box assembly which forms part of original valve assembly / supply.

3) Mandatory spares for valve actuators (for Pneumatically & Electrically operated valves) shall be supplied as per actuator quantity/details specified elsewhere in this technical specification for mandatory spare requirement.

4) Mandatory spare requirement for complete valve assembly above 50NB in power cycle piping systems shall include Gate valve, Globe valve, check valve, safety valve, relief valve, safety relief valve, Angle valve, butterfly valve etc.

5) In case the quantity of mandatory spares so calculated happens to be a fraction, the same shall be rounded off to next higher whole number. For example, 10% of 11 is equal to 1.1, then it should be rounded as 2 instead of 1.

6) 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.

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES

1.00.00 **SPARES**

The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spares is given below:-

1.01.00 **MANDATORY SPARES**

(a) The list of mandatory spares considered essential by the Employer is indicated in this chapter. The bidder shall indicate the prices for each and every item in the 'Schedule of mandatory Spares' whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item in the Bid Forms and Price Schedules. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.

(b) The Employer reserves the right to buy any or all the mandatory spares parts.

(c) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.

(d) 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.

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

1.02.00 **RECOMMENDED SPARES**

(a) In addition to the spare parts mentioned above, the contractor shall also provide a list of recommended spares for 3 years of normal operation of the plant and indicate the list and total prices in relevant schedule of the Bid Form and Price Schedules. This list shall take into consideration the mandatory spares specified in this Section-VI, Part-A and should be independent of the list of the mandatory spares. The Employer 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.

(b) Price of recommended spars will not be used for evaluation of the bids. The price of these spares will remain valid upto 6 months after placement of Notification of Award for the main equipment. However, the Contractor shall be liable to provide necessary justification for the quoted prices for these spares as desired by the Employer.

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES
1.03.00	**START-UP & COMMISSIONING SPARES** Start-up and commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used till the plant is handed over to the employer shall come under this category. The Contractor shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipments are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Contractor.
1.04.00	The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spars is given below.
2.00.00	The Contractor shall indicate the service expectancy period for the spares parts (both mandatory and recommended) under normal operating conditions before replacement is necessary.
3.00.00	All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.
4.00.00	All the spares (both recommended and mandatory) shall be manufactured alongwith the main equipment components as a continuous operation as per same specification and quality plan.
5.00.00	The contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalise order for recommended spares.
6.00.00	Each spares part shall be clearly marked or labelled on the outside of the packing with its description. When more than one spares part is packed in a single case, a general description of the content 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 purposes of identification.
7.00.00	All cases, containers or other packages are to be opened for such examination as may be considered necessary by the Employer.
8.00.00	The contractor will provide the Employer with all the addresses and particulars of his sub suppliers while placing the order on vendors for items/components/equipments covered under the contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES
9.00.00	The Contractor shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.
10.00.00	In addition to the recommended spares listed by the contractor, if the employer further identifies certain particular items of spares, the contractor shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the Employer and placement of order for additional spares if the Employer so desires.
11.00.00	The Contractor shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the contract. The Contractor shall guarantee that before going out of production of spares parts of the equipment covered under the Contract, he shall give the Employer atleast 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-contractors. Further, in case of discontinuance of manufacture of any spares by the Contractor and/or his sub contractors, Contractor will provide the Employers, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of manufacture/ procurement of such items.
12.00.00	Material Codification The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare as brought out in GCC. The bidder shall extend all necessary assistance in this regard.

Annexure - VI

OPERATION AND MAINTENANCE SERVICES

1.0 OPERATION AND MAINTENANCE SERVICES

The bidder scope also covers the Operation and Maintenance (O&M) services for Preventive and Breakdown maintenance from the date of successful commissioning till handing over. The date of start of O&M services shall be communicated to successful bidder by BHEL site personnel.

Bidder to note that the spares and consumables (except regeneration chemicals i.e. HCL & NaOH) required for maintenance of the equipment during this O&M period shall be in bidder's scope of supply. Bidder shall use only genuine parts as mentioned in O&M Manual. Any damage or malfunction caused by the use of unauthentic parts or unqualified personnel shall be responsibility of bidder and as a consequence of above bidder is required to replenish the unauthorised part and abridge the qualified person without any commercial implication to BHEL.

O&M Services scope also covers all regular maintenance by trained service engineers and supply of genuine parts and lubricants as per the original equipment manufacturer's recommendations.

For the purpose of Operation of CPU System, One-day shall be considered as 24 hours i.e. 3 shifts of 8 hours each. The CPU (along with related accessories) shall be operated on Round-the-clock basis on all the days of the year including Sundays and Public Holidays meeting outlet guarantee parameter along with service run as defined in Section IA Clause No. 4.

O & M Personnel should be acquainted with local language. Governmental / Statutory approval w.r.t. O&M service as applicable shall be in bidder's scope.

Total duration of the Operation and Maintenance services has been envisaged for six (6) months for complete Condensate Polishing Unit identified in price format/specification. The duration of operation & maintenance services can be increased or decreased as per requirement and payment in such case shall be made on pro-rata basis.

The operation and maintenance services can be continuous or intermittent as per site requirement for complete Condensate Polishing Unit identified in price format/specification.

Bidder has to compulsorily maintain log book for the O & M staff engaged for O&M jobs and submit to Engineer in charge for certification for realization of the bills. After certification of the bill by Engineer in charge of BHEL, bidder shall claim the amount after completion of minimum 30 days.

Depending on start of O&M services, there is a possibility that some period of O&M services and Warranty period may overlap. However, it is clarified that any maintenance required or any spare of CPU System required to be replaced during Warranty period (as

part of warranty clause requirement) shall not be made part of O&M Services. Bidder may take care of this fact while working out the prices of O&M services.

Wherever CPU (Condensate Polishing Unit) has been written in O&M Service Specification, the same shall be deemed as complete CPU (Condensate Polishing Unit) with Regeneration Facility.

The vendor shall deploy following minimum manpower for Operation of CPU.

i. One qualified and experienced CPU operator per shift on "Round the Clock" basis throughout the year for all days of the year including Sundays & Public Holidays. There must be minimum 30 minutes overlapping between two shift operators to get familiarize with the status of CPU.

ii. Two Helper per shift on " Round the Clock" basis throughout the year for all the days of the year including Sundays and Public Holidays. The helper shall assist the CPU Operator in day to day operation of CPU and accessories and shall assist him for keeping CPU equipment's in neat and tidy condition.

iii. Wages of all manpower deployed for O&M shall be borne by bidder.

1.1 Responsibility of CPU Operator

i. CPU operator shall be responsible for proper sequential operation of CPU including operation of standby equipment in a predefined sequence and stopping the same (when necessary) as per the procedural practice. In case of any abnormality (like non availability of power supply at incomer of CPU), he shall immediately report the matter to BHEL site Engineer for further action. Similarly, any malfunctioning in the system shall be immediately resolved by CPU operator with suitable corrective action irrespective of time of occurrence of malfunctioning / abnormality in the system in consultation with BHEL site Engineer. A log book of all such outrages shall be maintained by CPU operator, which shall be shared with BHEL site engineer on periodic basis.

ii. CPU operator shall take reading of all the parameters of CPU periodically as per requirement which shall be mutually discussed and finalised with BHEL site engineer. However, the frequency of taking the reading may change based upon instruction from BHEL site Engineer. All the readings shall be recorded in a logbook register.

1.2 Responsibility of Helper.

i. The CPU helper shall assist CPU operator for day to day smooth operation of CPU. He shall be responsible for keeping all the equipment's of CPU in clean and tidy condition. He shall also carry out general cleaning of all CPU equipment's including Electrical & Control Panels (Part of CPU), etc. on regular basis.

ii. The helper shall work under the control of CPU operator and shall always ensure that unusable junk materials are not allowed to be kept in CPU area. Under such eventuality, he will report the matter to Plant Operator, who in turn will take suitable action including reporting the matter to BHEL site Engineer.

1.2.1 All the log book registers shall be arranged by vendor. Log book register duly paged and bounded will be maintained in good condition by vendor.

1.2.2 All the necessary tools & tackles and other materials, required for operation of CPU shall be kept by vendor under the control of CPU operator, which shall be handed over to customer in new condition. Required testing instruments should also be always available with Plant Operator.

1.2.3 In case of any operator / helper being on leave, vendor shall immediately take advance action and provide substitution so that minimum manpower as indicated above is not reduced on any day. In case a particular shift duty CPU Operator or helper does not turn up due to any reasons, the earlier duty person shall continue to make sure that CPU never remains unattended.

2.0 Maintenance of CPU

i. Maintenance work under scope of the vendor shall broadly include but in no way limited to the following:

a) Preventive maintenance of the plant.

b) Servicing of the CPU and associated equipment's at regular interval

c) Attending to complaints.

d) Replacement of worn out or defective components

e) Replacing of consumables like greases, oil, lubricants, servo fluids/control fluids, gases, reagents for analysers and etc as and when required.

No consumable or any other items of CPU shall be arranged by Customer & BHEL and no extra payment shall be made by customer & BHEL in this regard.

ii. Vendor shall be responsible at all time, during the entire period of contract for satisfactory performance of CPU (including accessories) with zero down time. During emergency or breakdown, vendor's Engineer along with related technicians shall be available immediately even though it may be beyond normal working hours or on public holidays till the CPU is restored back into normal satisfactory condition. Response time for attending breakdown complaints shall not exceed 2 hours.

iii. Defective / worn out components shall be replaced only by genuine and original parts. OEM or its authorized dealer's invoice shall be submitted as proof of using genuine parts. All common spares required for CPU shall normally be kept available in the plant by the vendor. However, for critical spares, the same shall be made available in not more than 72 hours from the time of break-down requiring such spare.

iv. Preventive Maintenance, servicing of CPU equipment's and accessories etc. shall be done by vendor in a planned manner in consultation with concerned BHEL engineer. Preventive maintenance and service should be done as per the recommendations / guidelines of various OEMs

v. Vendor shall arrange and maintain separate logbook register for services / maintenance of CPU. Record of work done for services/maintenance repairs etc. shall be recorded by vendor's engineer in this register. This register shall always be with updated records & shall be produced to BHEL engineer on weekly basis or as & when required by him.

vi. Vendor shall arrange and maintain sufficient stock of spares and consumable at site. Similarly, all necessary tools & instruments required for the purpose of servicing / maintenance / routine testing etc. shall also be arranged by vendor and should be available at site at all times.

vii. Repairs / servicing works shall normally be done by vendor at site up to maximum possible extent. However, in case any equipment or accessories is essentially required to be taken by vendor out of the plant premises for repairing / servicing, all necessary arrangements including to and fro transportation shall be the responsibility of vendor. Vendor shall also inform concerned BHEL & customer's engineer for doing procedural formalities (like issue of gate pass etc.), prior to taking out the materials out of Plant premises.

viii. In case bidder fails to supply the spares required for maintenance of the equipment, same shall be provided by BHEL at Bidders risk and cost.

ix. Vendor shall be fully responsible for safety of his personal at all times. Vendor shall also be responsible for taking all safety precautions at all the times, especially during servicing / preventive maintenance and repairs of CPU.

x. Technicians & helpers engaged by the vendor shall wear uniform with nameplate for easy identification, while being within plant premises

xi. Vendor's engineer shall be focal point for BHEL & customer. He shall report to BHEL engineer on daily basis, for taking necessary instructions and to update the status of CPU

xii. If any damage to the equipment and its accessories has happened due to improper maintenance by bidder, same shall be recovered from the bidder.

xiii. Bidder is to arrange all the safety gears like helmets, air plugs, safety shoes, googles, Personal Protection Equipment (PPE)] comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided by bidder etc. during the maintenance for the O&M Staff. The safety items are only over and above the safety items as included in safety items included in Section IA datasheet A.

xiv. Fabrication and erection of platform/extra support for maintenance of any type of CPU equipment, if felt necessary during operation and maintenance of the system, has to be done by the bidder.

Notes:

1. The bidder shall take approval from Engineer-in charge of BHEL by submitting organization Chart of O&M staff for this site clearly indicating man power deployment with their educational background & experience with supporting documents.

2. The bidder shall be solely and wholly responsible for safety and security of workers engaged in the job and the BHEL property. In case of any accident the contractor shall pay proper compensation to the workers as per workmen's compensation act and repair/replace BHEL property at their own cost & arrangement. The bidder shall also make adequate provision of insurance for their workers at their own cost to cover them against the risk of accident.

3. The bidder and their workers engaged in the job shall follow all safety rules at the time of execution of work. It shall be responsibility of the bidder to supply all safety equipment as necessary to its O&M staff.
4. Beyond general shift if any trouble/breakdown occurs in the plant, Maintenance team must reach the plant without any delay along with Engineer/Site In-charge.
5. No Person from the list of manpower shall leave the plant site without prior permission from the Engineer in charge of BHEL.
6. However, in operation part, if any person is absent, substitute must be given immediately otherwise proportionate deduction will be made.
7. The replacement / substitute personnel for maintenance, manpower shall have the same educational qualification and experience.
8. If any additional manpower is required during O&M whatsoever under the scope of contract the same shall be made available by bidder in time within the cost. To cater the need of time bound maintenance jobs, the bidder shall depute additional manpower without any cost implication to BHEL
9. During execution of work if any personnel is found not suitable for the job or his presence inside premises is felt undesirable, the personnel has to be replaced within 15 days by bidder.
10. BHEL will not be responsible for payment towards idle labour charges
11. Power Cost during O&M period shall not be the part of bidder's scope.

Statutory Compliance by the bidder:

All Statutory compliances related to Labour, Health & Safety, Quality & Environment protection and insurance shall be as GCC Rev-07.