

**3X800 MW PATRATU STPP EXT.PH-I
PATRATU VIDYUT UTPADAN NIGAM LIMITED**

VOLUME – II B & III

**TECHNICAL SPECIFICATION
FOR
EFFLUENT TREATMENT PLANT**

SPECIFICATION NO.: PE-TS-434-164-A001 R0



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



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CONTENTS
VOLUME – II B

SECTION	DESCRIPTION	PAGE
	PROJECT INFORMATION	1-16
SECTION – I	SPECIFIC TECHNICAL REQUIREMENTS	17-18
SECTION – IA	SPECIFIC TECHNICAL REQUIREMENTS - MECHANICAL	19-34
	• ANNEXURE I : QUALITY PLAN	35-44
	• ANNEXURE II : SUB VENDORS LIST	45-315
	• ANNEXURE III : FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES	316-321
	• ANNEXURE IV : DRAWING/DOCUMENTS REQUIRMENT & DISTRIBUTION SCHEDULE	322-334
	• ANNEXURE V : MANDATORY SPARES	335-338
	• ANNEXURE VI : WATER ANALYSIS	339-340
	• ANNEXURE VII : SITE STORAGE AND PRESERVATION	341-354
	• ANNEXURE VIII : FORMAT FOR OPERATION AND MAINTENANCE MANUAL	355-357
	• ANNEXURE IX: INPUT DRAWINGS	358-365
	• ANNEXURE X: PAINTING SPECIFICATION	366-376
	• DATASHEET - A	377-412
SECTION – IB	SPECIFIC TECHNICAL REQUIREMENTS – ELECTRICAL	413-450
SECTION – IC	SPECIFIC TECHNICAL REQUIREMENTS – CONTROL & INSTRUMENTATION	451-593
SECTION – II	GENERAL TECHNICAL REQUIREMENTS	594
SECTION – IIA	GENERAL TECHNICAL REQUIREMENTS – MECHANICAL • GENERAL TECHNICAL REQUIREMENT FOR THE PROJECT/PACKAGE • GENERAL TECHNICAL REQUIREMENT LOW PRESSURE PIPING • GENERAL TECHNICAL REQUIREMENT PUMPS • GENERAL TECHNICAL REQUIREMENT ELEVATORS, CRANES AND HOISTS, WEIGH BRIDGE • GENERAL TECHNICAL REQUIREMENT OF MANDATORY SPARES • PRE-COMMISSIONING & COMMISSIONING ACTIVITIES • E-LEARNING PACKAGE FOR PRE TREATMENT PLANT • FILE FORMATS SUPPORTED BY SPPID, SPI, SPEL & SP3D	595-986
SECTION – IIB	GENERAL TECHNICAL REQUIREMENTS – ELECTRICAL	987-999

VOLUME – III

SECTION – III	LIST OF DOCUMENTS TO BE SUBMITTED ALONG WITH BID	1001
	COMPLIANCE CUM CONFIRMATION SCHEDULE	1002
	PRE BID CLARIFICATIONS SCHEDULE	1003
	SCHEDULE OF DECLARATION	1004
	SCHEDULE OF DEVIATIONS WITH COST OF WITHDRAWAL	1005



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	PATRATU STPS EXPANSION PHASE-I (3X800 MW)																	
1.00.00	BACKGROUND A Memorandum of Agreement (MOA) has been entered on 29.07.2015 amongst Govt. of Jharkhand (GoJ), Jharkhand Urja Vikash Nigam Limited (JUVNL), Jharkhand UrjaUtpadan Nigam Limited (JUUNL), Jharkhand BijliVitaran Nigam Limited (JBVNL) and NTPC Limited to form a Joint Venture Company of NTPC Limited& JBVNL for transfer of Patratu Thermal Power Station (PTPS) located in Ramgarh District of Jharkhand State to the proposed JV Company for Performance Improvement of existing capacity & 4000 MW Capacity expansion of PTPS. Further to signing of JV agreement on 29.07.2015, a Joint Venture Company namely Patratu Vidyut Utpadan Nigam Limited (PVUNL) has been incorporated amongst GoJ, JUVNL, JBVNL and NTPC Ltd. on 15.10.2015. The Performance Improvement of existing capacity and 4000 MW Capacity expansion of Patratu STPS will be implemented by the JV Company (JVC). The configuration of expansion of 4000 MW shall consist of 5 units of 800 MW to be implemented in two phases; Phase-I: 3x800 MW and Phase-II: 2x800 MW. The present proposal is for Patratu STPS Phase-I (3x800 MW). The project is envisaged to be commissioned during XIII Plan period.																	
2.00.00	CAPACITY Patratu STPS Phase-I: 3x800 MW - Present proposal																	
3.00.00	MODE OF OPERATION Base Load																	
4.00.00	LOCATION AND APPROACH																	
4.01.00	Patratu Thermal Power station (PTPS) is located just outside the coal belt of South Karanpura in Ramgarh District of Jharkhand State. The nearest Railway Station is Patratu which is at a distance of about 4 km on Barkakhana-Barwadih Railway line.																	
4.02.00	The latitudes and longitudes of the site are as follows: <table><tr><th>Corner name</th><th>Latitude</th><th>Longitude</th></tr><tr><td>Top Corner</td><td>23° 38 ' 60 '' N</td><td>85° 17' 51.5" E</td></tr><tr><td>Bottom Corner</td><td>23° 38 ' 12.5 '' N</td><td>85° 17' 27" E</td></tr><tr><td>Left Corner</td><td>23° 38 ' 22.5 '' N</td><td>85° 17' 10.6 '' E</td></tr><tr><td>Right Corner</td><td>23° 38 ' 40 '' N</td><td>85° 17' 57 '' E</td></tr></table>			Corner name	Latitude	Longitude	Top Corner	23° 38 ' 60 '' N	85° 17' 51.5" E	Bottom Corner	23° 38 ' 12.5 '' N	85° 17' 27" E	Left Corner	23° 38 ' 22.5 '' N	85° 17' 10.6 '' E	Right Corner	23° 38 ' 40 '' N	85° 17' 57 '' E
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Right Corner	23° 38 ' 40 '' N	85° 17' 57 '' E																
4.03.00	Airport The nearest commercial airport is Ranchi at about 45 km by road.																	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION															
			PAGE 1 OF 15															



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3 X 800 MW PATRATU STPP STAGE - I

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5.00.00	A copy of Vicinity plan of the project site is placed at Annexure - I. LAND The total land to be transferred to JV Company is 1859 acres. Out of 1859 acre, about 1234 acres of land has been envisaged for Plant, Ash pond and Land on railway track of the for Phase-I (3x800 MW). The balance 625 acre of land shall be transferred during commencement of Phase-II (2x800 MW).		
6.00.00	WATER The make-up water for PSTPS is to be met from Patratu Dam on Nalkari River (capacity 99 MCM i.e. 110 Cusecs). About 52.34 Cusecs of water will be available at 90% dependable monsoon flow after considering evaporation loss. GoJ/JUVNL owns and controls water of Patratu Dam. GoJ/JUUNL supplies water to PTSPS and to the other entities in the vicinity from this water reservoir. JUVNL had entered into agreements with these other entities for supply of water from water reservoir. JUVNL shall revisit these agreements to meet the requirement of water for expansion projects, if required. Make up water requirement of PSTPS, Phase-I (3x800 MW) would be about 27 Cusecs with "Air Cooled Condenser" based power plant. GoJ shall provide the required water from the existing reservoir to the JV Company. The JVC shall be responsible for the water supply arrangement starting at the downstream of intake chamber from where water supply commences for the Station. Ownership of the entire water supply system and related plant and equipment, including the water treatment plant, shall be that of the JVC and after the asset transfer, the JVC shall maintain, take care and use the same. The additional facility including addition of plant, equipment etc. for enhanced requirement (if any) and drawl of water shall be the responsibility of JVC and to be arranged by the JVC at their own cost.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION
			PAGE 2 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

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7.00.00	COAL	
7.01.00	Coal Requirement, Availability and Linkage About 12 MTPA of coal will be required to meet coal requirement of the Phase-I (3x800 MW) of the project. The Banhardih captive coal block at a distance of about 155 km from plant is allocated to JUVNL for end use of Patratu expansion. The coal from Banhardih captive coal block shall be transferred to the JVC for the usage of PSTPS with the approval of Ministry of Coal, GOI. MOC (11.09.15) has accorded in-principle approval of the Central Govt. to assign Banhardih Coal Block allocated to JUVNL to the JV Company.	
7.02.00	Coal Transportation The envisaged mode of coal transportation from the coal mines to the power plant is by Indian Railways through BOBR / BOX- N wagons.	
7.03.00	Coal Quality 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.	
7.04.00	Fuel Oil The fuel oils to be used for start-up, coal flame stabilization and low load operation of the steam generator shall be Heavy Fuel Oils having the characteristics given at Annexure-IV-3 and Light Diesel Oil having the characteristics given at Annexure-IV-1.	
8.00.00	NOT USED	
9.00.00	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.	
10.00.00	FLUE GAS DESULPHURIZATION SYSTEM (FGD) & SCR:	
	The project is envisaged with Flue Gas Desulfurization (FGD) system and SCR 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.	
11.00.00	POWER EVACUATION SYSTEM	
	85% of power from the project is envisaged to be allocated to Jharkhand State subject to approval of Ministry of Power, while balance 15% would be as unallocated portion and Project is envisaged as regional project. Since major power (85%) is proposed to be absorbed by Jharkhand, the issue of Associated Transmission	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02
		SUB-SECTION-IB PROJECT INFORMATION
		PAGE 3 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

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	System for the project would be taken up with them for planning and execution of transmission system modalities as Inter-State System or ISTS System. Considering overall capacity of the project as 4000 MW, 765 kV step-up system has been envisaged. Two D/C 765 KV line, one each to New Ranchi (Bero) and Gaya has been envisaged. This would also form part of 765 kV transmission corridor connecting Ranchi to Gaya. These lines can be used to evacuate power to the Eastern Region ISTS as well as to Jharkhand State. In view of above, provision of four nos. of 765 kV outgoing Line bays has been kept in the new 765 kV generation switchyard. The issue of power evacuation of the proposed project shall be taken up with appropriate Transmission Utility (STU or CTU) as per regulatory provision, based on allocation of power.		
12.00.00	METEOROLOGICAL DATA		
	The meteorological data from nearest observatory is placed at Annexure-II .		
13.00.00	PLANT WATER SCHEME		
	The Plant water scheme is described below.		
13.01.00	Equipment Cooling Water (ECW) System (Unit Auxiliaries)		
	The plant auxiliaries of Steam Generator and Turbine Generator shall be cooled by Demineralized (DM) water in a closed circuit. The primary circuit DM water shall be cooled through plate type heat exchangers by Circulating Water tapped from ACW system in a secondary circuit. The station auxiliaries such as Air compressors, Compressors of ash handling plant, compressor of mill reject system etc. shall also be cooled by Demineralized (DM) water in a closed 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 Steam Generator & auxiliaries and TG & its auxiliaries.		
13.02.00	Not used		
13.03.00	Other Miscellaneous Water Systems		
	(a) The drinking water requirement of the plant shall be provided from water treatment plant.		
	(b) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water shall be provided from demineralizing plant.		
	(c) The quality of Raw Water & DM Water is enclosed with this sub-section as Annexure-III .		
	(d) Effluent from various areas in TG & SG system shall be collected in respective pits in their areas and pumped to a common terminal point as shown in plant water scheme.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION
			PAGE 4 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

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DATE : 29/05/2019

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14.00.00	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.		
15.00.00	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.		
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			PAGE 5 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

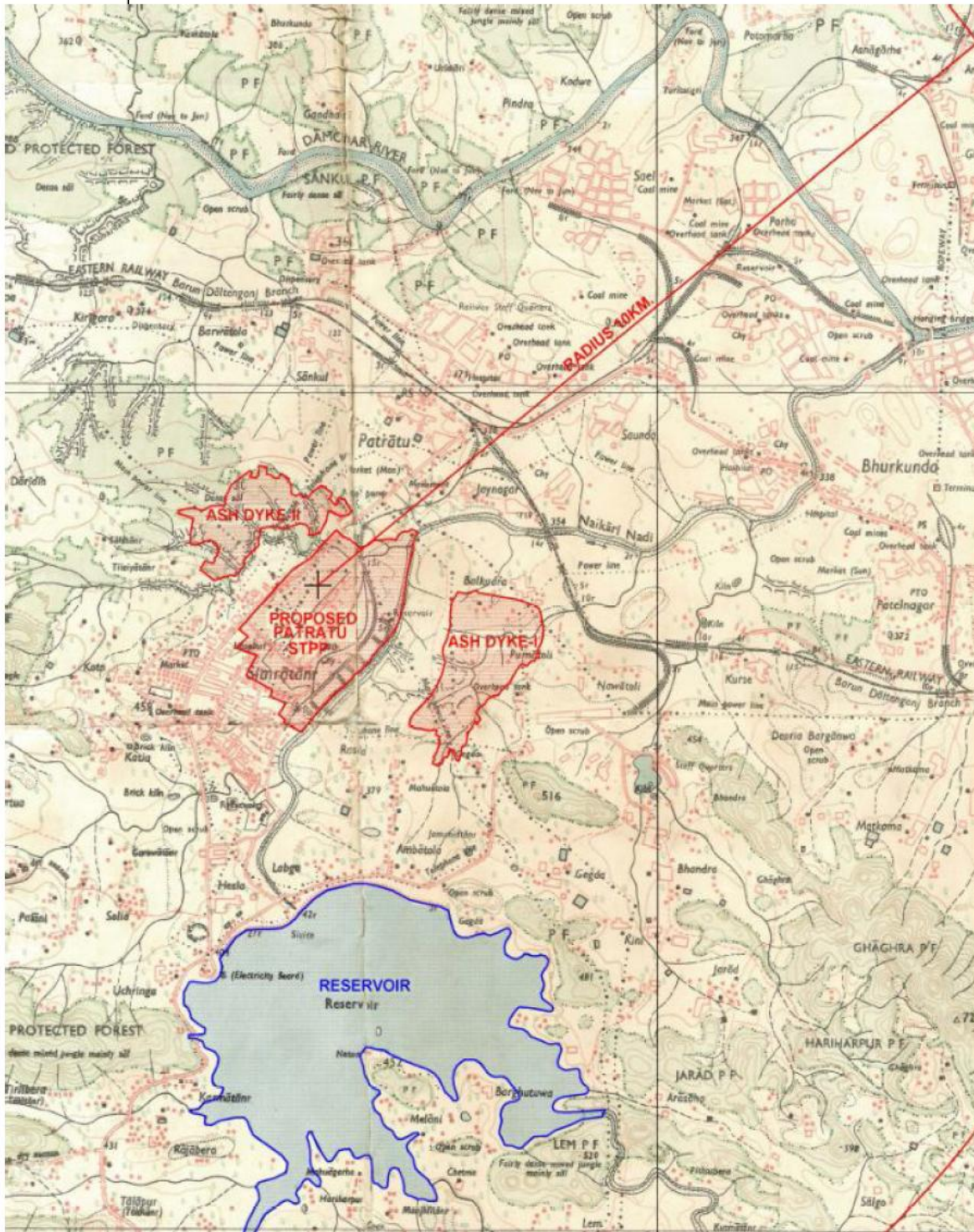
DATE : 29/05/2019

CLAUSE NO.

PROJECT INFORMATION



ANNEXURE-I



**EPC PACKAGE FOR
PATRATU SUPER THERMAL POWER
STATION EXPANSION PHASE-I (3X800 MW)**

**TECHNICAL SPECIFICATION
SECTION – VI, PART-A
BID DOC. NO CS-9585-001-02**

**SUB-SECTION-IB
PROJECT INFORMATION**

**PAGE
6 OF 15**



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT

REV. NO. 00

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CLAUSE NO.

PROJECT INFORMATION



ANNEXURE-II

जलवायवी सारणी
CLIMATOLOGICAL TABLE

स्टेशन : रंगरथ
STATION : Rangarh

मौसम की विशेषता		सर्त		ग्रीष्म		वसंत		शरद	
केवल दिनों की संख्या		सर्त की दिनों की संख्या (दिसंबर, जनवरी, फरवरी)		ग्रीष्म की दिनों की संख्या (मार्च, अप्रैल, मई)		वसंत की दिनों की संख्या (जून, जुलाई, अगस्त)		शरद की दिनों की संख्या (सितंबर, अक्टूबर, नवंबर)	
महीना	दिनांक	महीना	दिनांक	महीना	दिनांक	महीना	दिनांक	महीना	दिनांक
जनवरी	01-01-20	फरवरी	01-02-20	मार्च	01-03-20	अप्रैल	01-04-20	मई	01-05-20
जून	01-06-20	जुलाई	01-07-20	अगस्त	01-08-20	सितंबर	01-09-20	अक्टूबर	01-10-20
नवंबर	01-11-20	दिसंबर	01-12-20	जनवरी	01-01-21	फरवरी	01-02-21	मार्च	01-03-21
WEATHER PHENOMENA									
No. of days with		No. of days with		No. of days with		No. of days with		No. of days with	
PPT 0.3mm or more		WIND SPEED		WIND DIRECTION		WIND DIRECTION		WIND DIRECTION	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	
mm		kmph		N E S W NW NE		N E S W NW NE		N E S W NW NE	



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ANNEXURE-III

RAW WATER ANALYSIS

S.No	Constituent	As	mg/l
1	Calcium	CaCO ₃	105
2	Magnesium	CaCO ₃	81
3	Sodium	CaCO ₃	70
4	Potassium	CaCO ₃	7
	Total cations	CaCO ₃	263
5	M- Alkalinity	CaCO ₃	180
6	P- Alkalinity	CaCO ₃	0
7	Chloride	CaCO ₃	60
8	Sulphate	CaCO ₃	23
	Total Anions	CaCO ₃	263
9	Total Silica, Reactive	SiO ₂	17
	Silica, Reactive		15
	Silica, Colloidal		2
10	Iron (Total)	Fe	0.5
11	pH	-	7.0-7.8
12	Turbidity	NTU	100
13	Total dissolved solids		350-400
14	Temperature	Deg C	20-35
15.	TOC		1.93
16.	BOD		8
17.	COD		14
18.	Total Suspended Solids	mg/l	100

PATRATU SUPER THERMAL POWER
PROJECT PHASE-I (2X800 MW)
STEAM GENERATOR ISLAND PACAGE

TECHNICAL SPECIFICATION
SECTION VI PART-A
BID DOC. NO CS-9585-001-02

SUB-SECTION-IB
PROJECT INFORMATION

PAGE
9 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION		एन टी पी सी NTPC				
	ANNEXURE-III						
	THE MINIMUM QUALITY OF DM WATER TO BE CONSIDERED FOR MAKE-UP WATER						
	Sl.No. Characteristics		Value				
	1. Silica (Max.)		0.02 ppm as Sio2				
	2. Iron as Fe		Nil				
	3. Total hardness		Nil				
	4. pH value		6.8 -7.2				
5. Conductivity		Not more than 0.1micro mho/cm excluding the effects of free CO2					
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02		SUB-SECTION-IB PROJECT INFORMATION		PAGE 10 OF 15	



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION		
			
	ANNEXURE-IV-1		
	<u>LIGHT DIESEL OIL CHARACTERISTICS</u>		
	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	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION
			PAGE 11 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION					
						
	ANNEXURE-IV-2					
	<u>DOMESTIC COAL CHARACTERISTICS</u>					
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	17	11	18	10
1.2	Ash (%)	36	42	34	44	30
1.3	Volatile matter (%)	23	19	24	19	28
1.4	Fixed carbon (%)	27	22	31	19	32
2.0	ULTIMATE ANALYSIS					
2.1	Carbon (%)	33.31	27.23	39.07	25.72	44.43
2.2	Hydrogen (%)	3.49	3.05	3.53	2.93	3.72
2.3	Sulphur (%)	0.6	0.9	0.5	0.95	0.35
2.4	Nitrogen (%)	0.9	1.3	0.8	1.4	0.6
2.5	Oxygen (%) (By difference)	11.7	8.52	11.1	7	10.9
2.6	Total Moisture (%)	14	17	11	18	10
2.7	Ash (%)	36	42	34	44	30
2.8	GCV (kcal/kg)	3400	2900	3900	2800	4400
2.9	Hard Grove index	55	50	60	45	65
2.10	YGP Index (mg/kg)	75	80	70	85	65
2.11	Carbonates	0.3	0.38	0.27	0.2	0.43
2.12	Phosphorous	0.05	0.04	0.06	0.03	0.07
2.13	Chloride	0.08	0.15	0.05	0.18	0.04
2.14	Trace Elements (ppm)					
2.14.1	Arsenic	1	1.5	0.5	2.5	0.4
2.14.2	Lead	35	75	25	150	10
2.14.3	Mercury	0.1	0.5	0.08	0.6	0.06
2.14.4	Selenium	0.8	1	0.6	1.5	0.5
3.0	ASH ANALYSIS					
3.1	Silica (%)	59.25	63.4	56.92	63.56	54.2
3.2	Alumina (%)	27.62	27.29	28.47	27.2	29.89
3.3	Iron Oxide (%)	6.75	5.48	7	5.46	7.5
3.4	Titania (%)	1.95	0.88	2.5	0.98	2.82
3.5	P ₂ O ₅ (%)	0.24	0.3	0.11	0.35	0.1
3.6	Lime (%)	0.9	0.7	1.5	0.6	1.6
3.7	Magnesia (%)	0.2	0.3	0.15	0.35	0.1
3.8	Sulphuric Anhydride (%)	1.2	0.5	1.4	0.4	1.7
3.9	Sodium Oxide (%)	0.17	0.25	0.15	0.3	0.15
3.10	Balance Alkalies (By Difference) (%)	1.72	0.9	1.8	0.8	1.94
4.0	ASH FUSION RANGE (Under reducing atmosphere)					
4.1	Initial Deformation Temperature (°C)	1100	1100	1100	1100	1100
4.2	Hemispherical temperature (°C)	1300	1250	1350	1250	1350
4.3	Flow temperature (°C)	1400	1400	1400	1400	1400
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02		SUB-SECTION-IB PROJECT INFORMATION		PAGE 12 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION				
	ANNEXURE-IV-3				
	FUEL OIL CHARACTERISTICS				
	Sl. No.	Characteristics	Heavy Furnace Oil grade HV (HFO) IS-1593-1982	Low Sulphur Heavy Stock (LSHS) IS-11489-1985	Heavy Petroleum stock (HPS) IS-11489-1985
	1.	Total sulphur content	4.5% Max.	1.0% Max.	4.5% Max.
	2.	Gross calorific value (KCal/kg)	of the order of 10,000	of the order of 10,000	of the order of 10,000
	3.	Flash Point (Min)	66 deg C	76 deg C	66 deg C
	4.	Water content by volume (Max)	1.0%	1.0%	1.0%
	5.	Sediment by weight (Max)		0.25%	0.25% 0.25%
	6.	Asphaltene content by weight (Max.)	2.5%	2.5%	2.5%
	7.	Kinematic viscosity in Centistokes	370 at 50deg C	100 at 100deg C	100 at 100deg C
	8.	Ash Content by weight (Max.)	0.1%	0.1%	0.1%
	9.	Acidity (inorganic)	Nil	Nil	Nil
	10.	Pour Point (Max.)	57 deg C	66 deg C	72 deg C
	11.	Sodium content	—	—	100 ppm
	12.	Vanadium content	25 ppm	25ppm	25 ppm
13.	Specific heat below pour point (KCal/Kg °C)		0.65		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION	PAGE 13 OF 15	



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION		
			
	ANNEXURE-IV-4		
	TYPICAL IMPORTED COAL AND ASH CHARACTERISTICS		
	Sl.No.	Characteristics (as received basis)	Imported Coal Worst Best
	1.0	Proximate Analysis	
	1.1	Total Moisture (%)	20 16
	1.2	Ash (%)	10 10
	1.3	Volatile Matter (%)	30 45
	1.4	Fixed Carbon (%)	40 29
	1.5	Total (%)	100 100
	2.0	Ultimate Analysis	
	2.1	Carbon (%)	56.4 62.4
	2.2	Hydrogen (%)	4.5 4.9
	2.3	Sulphur (%)	0.9 0.8
	2.4	Nitrogen (%)	0.9 0.5
	2.5	Oxygen (%) (By difference)	7.3 5.4
	2.6	Carbonates (%)	0 0
	2.7	Phosphorous (%)	0 0
	2.8	Total Moisture (%)	20 16
	2.9	Ash (%)	10 10
		Total	100 100
	2.10	GCV (Kcal/Kg)	5800 6500
	2.11	Hard Grove Index	45 60
	2.12	YGP (mg/kg)	100 70
	3.0	Ash Analysis	
	3.1	Silica (SiO ₂) (%)	32.74 34.94
	3.2	Alumina(Al ₂ O ₃) (%)	30.5 28.43
	3.3	Iron Oxides(Fe ₂ O ₃) (%)	18.2 15.2
	3.4	Titania (TiO ₂)	1.56 1.76
	3.5	Phosphoric Anhydride(P ₂ O ₅) (%)	0.44 0.54
	3.6	Lime (CaO) (%)	6.12 7.62
	3.7	Magnesia (MgO) (%)	1.83 1.93
	3.8	Sulphuric Anhydride (%)	6.95 7.65
	3.9	Sodium Oxide (Na ₂ O) (%)	0.3 0.4
	3.10	Balance alkalies (by difference)	1.36 1.56
		Total	100 100
	4.0	Ash Fusion Temperature reducing temperature	
	4.1	Initial deformation Temp (°C)	1100 1250
	4.2	Hemispherical Temp. (°C)	1300 1350
	4.3	Flow Temp. (°C)	1400 1400
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION
			PAGE 14 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

CLAUSE NO.	PROJECT INFORMATION
	ANNEXURE-IV-5 LIMESTONE CHARACTERISTICS The details of Limestone data shall be furnished later.
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02
SUB-SECTION-IB PROJECT INFORMATION	PAGE 15 OF 15



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

SECTION – I SPECIFIC TECHNICAL REQUIREMENTS

SECTION – II GENERAL TECHNICAL REQUIREMENTS



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS

SECTION – IA - SPECIFIC TECHNICAL REQUIREMENTS – MECHANICAL

SECTION – IB - SPECIFIC TECHNICAL REQUIREMENTS – ELECTRICAL

SECTION – IC - SPECIFIC TECHNICAL REQUIREMENTS – CONTROL & INSTRUMENTATION



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

SUB-SECTION IA

SPECIFIC TECHNICAL REQUIREMENTS (MECHANICAL)



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

1.0 GENERAL

This specification is intended to cover for SUPPLY PART, SERVICES PART & MANDATORY SPARES comprising of design (i.e. preparation and submission of drawing/ documents including " As Built " drawings and O&M Manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles (as applicable), filling of lubricants & consumables, chemicals (as specified), mandatory spares along with spares for erection, startup and commissioning as required. Also, it comprises of forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in site transportation, assembly, minor civil works, erection & commissioning, trial run at site, preparation of drawings in 3D. Further, It also cover for carrying out performance guarantee /Functional / Demonstration tests at site (as applicable), training of customer/ client O&M staff (if applicable) & final handing over to end customer in flawless condition the **EFFLUENT TRATMENT PLANT** complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment and agreements.

2.0 SCOPE OF SUPPLY (MECHANICAL)

Broad scope of supply for this package is detailed below and as indicated in relevant portion of this specification.

- 2.1 Four (4) nos. (2W+2S) TG UNIT-1 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.2 Two (2) nos. (1W+1S) BFP-A UNIT-1 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.3 Two (2) nos. (1W+1S) BFP-B UNIT-1 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.4 Two (2) nos. (1W+1S) COT/DOT WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.5 Four (4) nos. (2W+2S) TG UNIT-2 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.6 Two (2) nos. (1W+1S) BFP-A UNIT-2 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.7 Two (2) nos. (1W+1S) BFP-B UNIT-2 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.8 Four (4) nos. (2W+2S) TG UNIT-3 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.9 Two (2) nos. (1W+1S) BFP-A UNIT-3 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.10 Two (2) nos. (1W+1S) BFP-B UNIT-3 WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.11 Two (2) nos. (1W+1S) SG UNIT-1 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.12 Two (2) nos. (1W+1S) SG UNIT-2 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.13 Two (2) nos. (1W+1S) SG UNIT-3 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.14 Two (2) nos. (1W+1S) ESP UNIT-1 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.15 Two (2) nos. (1W+1S) ESP UNIT-2 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.16 Two (2) nos. (1W+1S) ESP UNIT-3 FLOOR WASH WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.17 Two (2) nos. (1W+1S) FO WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 2.18 Two (2) nos. (1W+1S) SCS WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.19 Two (2) nos. (1W+1S) ACC WASTE WATER TRANSFER PUMPS UNIT 1 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.20 Two (2) nos. (1W+1S) ACC WASTE WATER TRANSFER PUMPS UNIT 2 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.21 Two (2) nos. (1W+1S) ACC WASTE WATER TRANSFER PUMPS UNIT 3 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.22 Two (2) nos. (1W+1S) MRS AREA WASTE WATER TRANSFER PUMPS UNIT 1 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.23 Two (2) nos. (1W+1S) MRS AREA WASTE WATER TRANSFER PUMPS UNIT 2 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.24 Two (2) nos. (1W+1S) MRS AREA WASTE WATER TRANSFER PUMPS UNIT 3 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.25 Two (2) nos. (1W+1S) CLEAN WATER DRAINAGE WATER TRANSFER PUMPS UNIT 1 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.26 Two (2) nos. (1W+1S) CLEAN WATER DRAINAGE WATER TRANSFER PUMPS UNIT 2 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.27 Two (2) nos. (1W+1S) CLEAN WATER DRAINAGE WATER TRANSFER PUMPS UNIT 3 complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.28 Two (2) nos. (1W+1S) TRANSFORMER YARD UNIT-1 OILY WASTE TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.29 Two (2) nos. (1W+1S) TRANSFORMER YARD UNIT-2 OILY WASTE TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.30 Two (2) nos. (1W+1S) TRANSFORMER YARD UNIT-3 OILY WASTE TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.31 Three (3) nos. (3W) trolley mounted EFFLUENT TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling, hose pipe, etc.
- 2.32 One (1) no. WASTE SERVICE WATER SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
- 2.33 Three (3) nos. (2W+1S) WASTE WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.34 Two (2) nos. (2W) Drum type Oil Skimmers complete with all instrumentation, valve, piping, fittings etc., along with MS oil drum of 200 litre capacity.
- 2.35 One (1) nos. trolley mounted Centrifuge complete with all accessories as required.
- 2.36 Two (2) nos. (1W+1S) LAMELLA CLARIFIER/TUBE SETTLER I along with flocculation tank, flash mixer, fittings, , media, plate packs and all accessories.
- 2.37 One (1) no. TREATED WATER SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
- 2.38 Three (3) nos. (2W+1S) TREATED WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.39 One (1) no. CENTRAL MONITORING BASIN (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
- 2.40 Two (2) nos. (1W+1S) RO EFFLUENT PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.41 One (1) nos. Stilling chamber of RCC Construction (RCC by BHEL) of required capacity along with isolation gates at the inlet to the inlet channels for HRSCC Clarifier.
- 2.42 One (1) nos. of inlet channel with flow measuring element in each channel (parshall flume) of RCC Construction (RCC by BHEL).
- 2.43 One (1) nos. of Inlet Chamber (RCC by BHEL) at the inlet to HRSCC as per P&ID enclosed for Effluent Treatment Plant.
- 2.44 One (1) nos. High Recovery Solid Contact Type Clarifier (HRSCC) of RCC Construction (RCC by BHEL) with sampling points at different elevation of clarifier along with telescopic device and other accessories as required.
- 2.45 Clarifier bridges assembly along with mechanism, VFD (variable frequency drive), hand railings, required



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- motors, valves, piping, instrumentation etc.
- 2.46 Outlet channels of RCC Construction (RCC by BHEL) from HRSCC up to the Gravity Filters, with isolation gates at the outlet to the inlet channels for Gravity Filters.
 - 2.47 Sludge disposal system from HRSCC and Lamella clarifiers and Oil water separator with piping, valves, instrumentation up to sludge sump as indicated in P & ID of Effluent Treatment Plant.
 - 2.48 Two (2) nos. (1W+1S) Gravity Filters (twin section, RCC by BHEL) of RCC Construction. Shuttering plates & filter medium with piping, instruments, valves, etc. up to Filtered Water Storage Tank shall be in bidder's scope.
 - 2.49 Two (2) nos (1W+1S) Air blowers of oil free type of required capacity, its drives and associated accessories, air piping from blowers to each section of the Gravity filters for air scouring of Gravity filters during backwash operation.
 - 2.50 Two (2) nos. FeCl₃ dosing tank for Lamella clarifier / tube settler I & II and HRSCC clarifier including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.51 Six (6) (3W+3S) nos. pumps of positive displacement type suitable for dosing FeCl₃ in Lamella Clarifier I & II and HRSCC clarifier at design dosage rate specified and head as required. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc. for lamella clarifier / tube settler and clarifier.
 - 2.52 Two (2) nos. LIME dosing tank for Lamella clarifier / tube settler I & II and HRSCC clarifier including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.53 Six (6) (3W+3S) nos. pumps of positive displacement type suitable for dosing LIME in Lamella Clarifier I & II and HRSCC clarifier at design dosage rate specified and head as required. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc. for lamella clarifier / tube settler and clarifier.
 - 2.54 Two (2) nos. PE dosing tank for lamella clarifier / tube settler and HRSCC including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.55 Four (4) (2W+2S) nos. pumps of positive displacement type suitable for dosing PE in HRSCC clarifier and Centrifuge at design dosage rate specified and head as required. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc. for lamella clarifier / tube settler and clarifier.
 - 2.56 Two (2) nos. NaOCl dosing tank for HRSCC clarifier including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.57 Two (2) (1W+1S) nos. pumps of positive displacement type suitable for dosing NaOCl in HRSCC clarifier at design dosage rate specified and head as required. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc. for lamella clarifier / tube settler and clarifier.
 - 2.58 One (1) no. GRAVITY FILTER BACKWASH SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.59 Two (2) nos. (1W+1S) GRAVITY FILTER BACKWASH WATER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.60 Two (2) nos (1W+1S) Air blowers of oil free type of required capacity, its drives and associated accessories, air piping from blowers to each section of the GRAVITY FILTER BACKWASH SUMP AND LAMELLA CLARIFIER II SLUDGE SUMP for air scouring.
 - 2.61 One (1) no. SLUDGE SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.62 Two (2) nos. (1W+1S) SLUDGE DISPOSAL PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.63 Two (2) nos. (1W+1S) Air Blowers of oil free type of required capacity, its drives and associated accessories, air piping from blowers to each section of the SLUDGE SUMP AND RO REJECT CUM BACKWASH WATER SUMP for air scouring.
 - 2.64 One (1) no. FILTERED WATER STORAGE SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.65 Three nos. (3) Nos. (2W+1S) UF FEED PUMPS with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 2.66 Two nos. (2X100%) SELF CLEANING STRAINERS (basket type strainers) at Inlet to UF skid along with necessary piping, valves, fittings, instrumentation, backwash arrangement and associated accessories.
- 2.67 Two (2) nos. (1W+1S) GRAVITY FILTER BACKWASH WATER PUMPS with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.68 Two nos. (2X50%) Ultrafiltration System (Skid based) along with piping, valves, fittings, instrumentation and associated accessories.
- 2.69 One (1) no. UF Permeate Cum Backwash tank along with piping, valves, fittings, instrumentation and associated accessories.
- 2.70 Three nos. (3) Nos. (2W+1S) UF PERMEATE TRANSFER PUMPS with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.71 Two nos. (1W+1S) UF FILTRATE CUM BACKWASH WATER PUMPS with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.72 Three nos. (2W+1S) Micron Cartridge Filters along with piping, valves, fittings, instrumentation, backwash arrangement and associated accessories.
- 2.73 One no. acid dosing tank for UF system with fume absorber, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
- 2.74 Two (2) (1W+1S) of positive displacement type suitable for dosing acid at design dosage rate specified and head as required in UF system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
- 2.75 One no. alkali dosing tank for UF system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
- 2.76 Two (2) (1W+1S) of positive displacement type suitable for dosing alkali at design dosage rate specified and head as required in UF system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
- 2.77 One no. bio dispersant dosing tank for UF system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
- 2.78 Two (2) (1W+1S) of positive displacement type suitable for dosing bio dispersant at design dosage rate specified and head as required in UF system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
- 2.79 One no. UF Chemical Cleaning (CIP) tank for UF system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
- 2.80 Two (2) (1W+1S) UF Chemical Cleaning Dosing Pumps along with motor, piping, valves, fittings, instrumentation and associated accessories.
- 2.81 Three nos. (3) Nos. (2W+1S) RO high pressure pumps for Stage I with all instrumentation, valves, piping, fittings, motor etc.
- 2.82 Two (2) nos. RO Module for Stage-1 along with piping, valves, fittings, instrumentation and associated accessories.
- 2.83 Three nos. (3) Nos. (2W+1S) RO high pressure pumps for Stage 2 with all instrumentation, valves, piping, fittings, motor etc.
- 2.84 Two (2) nos. RO Module for Stage-2 along with piping, valves, fittings, instrumentation and associated accessories.
- Note: Bidder to note that the number of stages is indicative only and if required, bidder shall increase number of stages to achieve the guaranteed design recovery of not less than 80%)**
- 2.85 One no. Degasser Tower along with piping, valves, fittings, instrumentation and associated accessories.
- 2.86 Two nos. (2X100%) Air Blowers (Centrifugal /Twin Lobe Type) for DEGASSER TOWER along with suction filter, silencer, motors, piping, valves, fittings, instrumentation and accessories associated with the same.
- 2.87 One (1) no. (1 x 100%) RO Permeate Water Storage tank along with piping, valves, fittings, instrumentation and associated accessories.
- 2.88 Two nos. (1W+1S) RO permeate water transfer pumps with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
- 2.89 One no. acid dosing tank for RO system with fume absorber, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
- 2.90 Two (2) (1W+1S) of positive displacement type suitable for dosing acid at design dosage rate specified and head as required in RO system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- dampeners, safety relief valves etc.
- 2.91 Two (2) no. Scale inhibitor dosing tank for RO system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.92 Two (2) (1W+1S) of positive displacement type suitable for dosing Scale inhibitor at design dosage rate specified and head as required in RO system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
 - 2.93 Two (2) no. SMBS dosing tank for RO system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.94 Two (2) (1W+1S) of positive displacement type suitable for dosing SMBS at design dosage rate specified and head as required in RO system. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
 - 2.95 One no. Na₂CO₃ dosing tank for pH correction of RO permeate water including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.96 Two (2) (1W+1S) of positive displacement type suitable for dosing Na₂CO₃ at design dosage rate specified and head as required for pH correction in RO permeate water. Pumps shall be provided with accessories such as Y-type suction strainers, pressure dampeners, safety relief valves etc.
 - 2.97 One no. RO Chemical Cleaning (CIP) tank for RO system including slow speed gear operated agitator driven by motor complete with overflow seal, integral pipe works, valves, instrumentation and all other accessories required.
 - 2.98 Two (2) (1W+1S) RO Chemical Cleaning Dosing Pumps along with motor, micron cartridge filter (1X100%), piping, valves, fittings, instrumentation and associated accessories.
 - 2.99 One (1) no. RO REJECT CUM BACKWASH WATER SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.100 Two (2) nos. (1W+1S) RO REJECT DISPOSAL PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.101 One (1) nos. (1W) LAMELLA CLARIFIER/TUBE SETTLER II along with flocculation tank, flash mixer, fittings,, media, plate packs and all accessories.
 - 2.102 One (1) no. LAMELLA CLARIFIER II TREATED WATER SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.103 Two (2) nos. (1W+1S) LAMELLA CLARIFIER II TREATED WATER TRANSFER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.104 One (1) no. LAMELLA CLARIFIER II SLUDGE SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.105 Two (2) nos. (1W+1S) LAMELLA CLARIFIER II SLUDGE PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.106 Two (2) nos. Centrifuge along with drive motor, VFD panel, fluid coupling, piping, valves, fittings, instrumentation, trolley and all other accessories.
 - 2.107 One (1) nos. TPI type Oil Water Separator along with plate packs/ media, oil collection drum, piping, valves, fittings, instrumentation, mechanism with MS oil drum of 200 liters capacity and all other accessories as required.
 - 2.108 One (1) no. OWS CLEAN WATER SUMP (in twin section, RCC by BHEL) with common inlet and outlet chamber interconnected through valves.
 - 2.109 Two (2) nos. (1W+1S) OWS CLEAN WATER PUMPS complete with all instrumentation, valves, piping, fittings, motor, base plate, coupling etc.
 - 2.110 Bidder to take care the length of piping as included elsewhere in specification of Effluent Treatment plant. Pipe routing shall be decided during detailed engineering, however bidder will consider 12m static head + 10% margin, in addition to the losses in straight length and bend in pipes and valves etc. during pump selection for outside ETP area, Treated Water transfer pumps, Sludge disposal pumps, RO reject disposal pumps and RO permeate transfer pumps.
 - 2.111 Pipe racks shall be provided by BHEL wherever available. However, where pipe racks are not available the pipe shall run on pipe pedestals. All auxiliary steel structures (U-clamps, nuts, bolts, channels etc.) for fixing the pipe on the pedestal or trestles shall be in the scope of bidder. If buried piping is required, Wrapping, coating and protection of all the buried pipe is also in bidder's scope & shall be as per IS 10221.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 2.112 All steel inserts plates with lugs, rungs, ladder, puddle pipes, bolts, edge angle in desired shape, nuts, sleeves, and all other embedding components etc as required to grout in BHEL civil works and to support/hold the equipments being supplied under this specification shall be in bidder's scope.
- 2.113 Any statutory clearance required for the system from MOEF or local pollution control board in bidder's scope.
- 2.114 Initial charge of all lubricants & grease in bidder's scope.
- 2.115 All motorized valves shall be provided with integral starter.
- 2.116 Instrument hook up material shall be in bidder's scope.
- 2.117 Edge angle required in a proper shape for edge protection in civil works will be provided by bidder.
- 2.118 The pipe sizes indicated in the tender specification/ P & I diagram are minimum. Wherever pipe sizes are not indicated, the same shall be selected based on the specification requirement and shall be subject to BHEL / customer approval during detailing engineering. All pipes shall be carbon steel unless exclusively mentioned.
- 2.119 All necessary drains, vents and sampling points with valves as specified and as required are in bidder's scope.
- 2.120 Monitoring gadgets, instruments and equipments required for maintenance (till demonstration test & plant handover).
- 2.121 Associated piping, instrumentation and valves required for the system.
- 2.122 All necessary instruments and controls required for easy and safe operation of the system.
- 2.123 Wherever terminal points between BHEL and bidder indicated, bidder shall provide pipes with counter flange.
- 2.124 All pipes, fittings etc. required for hand railing, platforms, and ladders shall be in the scope of bidder. All ladders shall be non-civil work. All insert plates, nuts and bolts, puddle pipes, counter flanges wherever applicable shall be in the scope of bidder. Supply and erection of Hand railing as desired for safety purpose will be in bidder's scope.
- 2.125 All the sumps, tanks, reservoirs and other water retaining structures shall be provided by bidder with access ladders/rungs from operating platforms/ground level as the case may be and de-watering pits one for each section (civil work by BHEL).
- 2.126 Two sets of safety equipment each comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided by the bidder. Near acid alkali handling area, the bidder shall provide two nos. personnel drench safety shower and eye fountains.
- 2.127 Instrumentation, valves etc. indicated in P & ID of effluent treatment plant are bare minimum requirement; however, bidder has to provide complete system for trouble free operation meeting technical specification requirement.
- 2.128 Effluent lifting sumps E1, E1A, E1B, E1C, E2, E2A, E2B, E3, E3A, E3B, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, and E23 shall be located outside ETP area. However, rest facilities indicated in P & ID of ETP shall be located inside ETP area provided in plot plan included in this specification.
- 2.129 All blank flanges/counter flanges, isolations valves, tees etc. to interconnect the pipes at all terminal points.
- 2.130 Mandatory spares as per list attached in ANNEXURE V.
- 2.131 Special tools and tackles as required for the system.
- 2.132 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.
- 2.133 Start-up and commissioning spares as required.
- 2.134 All the first fill and one Year's topping requirements of consumable such as greases, oil, lubricants, servo fluids/control fluids, gases and etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be furnished by the bidder. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.
- 2.135 Electric hoist and chain pulley block as per specification requirement.
- 2.136 RO permeate booster pumps if applicable.
- 2.137 Grouting of equipments and grouting material is in bidder's scope.
- 2.138 PIPING**
- 2.138.1 Complete piping indicated in P & ID of Effluent treatment plant is in bidder's scope of supply and erection. In addition, any additional piping required to make the system complete inside ETP area shall be in bidder's scope. Pipe length inside ETP area has to be considered by bidder in their scope suitably.
- 2.138.2 Pipe distances from sumps outside ETP area upto inside ETP area and inside ETP area to respective location have been indicated in P & ID. Bidder to note that no commercial settlement / adjustment shall be entertained for variation upto +/- 10% of pipe lengths during detailed engineering.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

Distances given are from one area to other area only, however inside piping in respective area shall be in bidder's scope which has to be suitably consider by bidder as additional.

- 2.139 Two (1W+1S) Flushing pumps along with all instrumentation, valves, piping, fittings, motor etc.
- 2.140 Isolation gates as per P & ID enclosed.
- 2.141 Control valves as per P & ID enclosed. However, additional control valves required to make the system functional and complete shall be in bidder's scope.
- 2.142 Chemicals i.e. Bio dispersant, UF cleaning chemical, scale inhibitor and RO cleaning chemical for continuous operation of entire ETP plant for 6 months and for pre commissioning, commissioning, trial and demonstration / PG test activities.
- 2.143 Bidder to adhere Format of operation and maintenance manual requirement as per Annexure VIII during detailed engineering.
- 2.144 Bidder to adhere site storage and preservation requirement as per Annexure VII during detailed engineering.
- 2.145 Bidder to refer Plot plan as per Annexure IX. Location of effluent sumps is located in plot plan along with tentative routing for bidder's information.
- 2.146 Bidder to refer Annexure III for Functional / performance / demonstration guarantee requirements.
- 2.147 Bidder to refer Annexure VI for water analysis.
- 2.148 One no. filtered water overhead tank (RCC work by BHEL) along with piping, valves, fittings, instrumentation and associated accessories.
- 2.149 Sumps E1, E1A, E1B, E1C, E2, E2A, E2B, E3, E3A, E3B, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, and E23 (RCC work by BHEL) along with piping, valves, fittings, instrumentation and associated accessories.
- 2.150 Bidder to refer datasheet A for technical requirements.

3.0 SCOPE OF SUPPLY (ELECTRICAL)

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

4.0 SCOPE OF SUPPLY (C&I)

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

5.0 SCOPE OF SUPPLY (CIVIL)

Total Civil (Design and Construction) is in BHEL Scope of work, however Civil Input drawing shall be provided by bidder.

6.0 SCOPE OF SERVICE

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

- a. Unloading, Storage, handling and transportation at site.
- b. Minor civil work like 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 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.
- c. 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 pre-commissioning activities shall be arranged by the successful bidder at their own cost.
- d. Erection and Commissioning of entire Effluent Treatment Plant.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- e. Arrangement of all lubricants, instruments, reagents for carrying out trial run, commissioning and demonstration test.
- f. Monitoring gadgets, instruments and equipment required for maintenance (till demonstration test & Plant Hand over).
- g. All personnel required during commissioning, trial run and demonstration Test.
- h. Trial run for requisite period.
- i. Performance testing.
- j. Training of plant Owner's personnel, O&M operators' personnel on plant operation and maintenance.
- k. All other facilities/ services as described in section on site services in specification and related to Effluent Treatment Plant scope of work.
- l. Relevant requirements as per GTR, GCC, ECC & SCC.
- m. 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.
- n. Painting as per enclosed painting schedule ANNEXURE X. However, any variation in the painting schedule as finally approved by customer / BHEL shall be taken care by bidder without any commercial and delivery implication. Colour-coding scheme shall be intimated to vendor during detailed engineering.

7.0 TERMINAL POINTS

- a. Service water line (50 NB) will be provided by BHEL at 5 m distance from ETP area. Further distribution inside ETP area will be in bidder's scope. Bidder to note that pressure available at terminal point for service water will be 2 kg/cm² approx (max.); hence bidder will take care for their pump lubrication / cooling accordingly.
- b. Instrument air pipe (25 NB) will be provided by BHEL at 5 m distance from ETP area. Further distribution inside ETP area will be in bidder's scope.
- c. Service air pipe (25 NB) will be provided by BHEL at 5 m distance from ETP area. Further distribution inside ETP area will be in bidder's scope.
- d. DM plant regeneration waste shall be terminated by DM plant vendor in Central Monitoring Basin.
- e. ACW blow down (80NB) shall be terminated by BHEL at 5 m distance from ETP area. Further piping to Central Monitoring Basin shall be in bidder's scope.
- f. AC Plant reject waste shall be terminated by AC Plant vendor in Central Monitoring Basin.
- g. Potable Water line (25 NB) will be provided by BHEL at 5 m distance from ETP area. Further distribution inside ETP area will be in bidder's scope.

8.0 EXCLUSIONS

- 8.1 All civil works including foundation of equipment, excavation & back filling. However complete grouting for equipment, grouting material, fixing and any concreting inside vessels and lining shall be in the scope of the bidder.
- 8.2 Main pipe trestles.
- 8.3 Air conditioning, ventilation & firefighting facilities.
- 8.4 Other exclusions are mentioned in the electrical & C&I parts of this specification.
- 8.5 Service water up to terminal points.
- 8.6 Acid, alkali, PE, FeCl₃, NaOCl, SMBS, Na₂CO₃ and lime Chemicals.

9.0 QP AND SUBVENDOR APPROVAL:



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 9.1 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.
- 9.2 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.
- 9.3 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.
- 9.4 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.

10.0 DESIGN /CONSTRUCTION

In addition to the requirements of Section I and II the following shall also be complied under scope of this specification.

The P&I diagram is enclosed in Annexure IX 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.

11.0 INFLUENT QUALITY AND OUTLET GUARANTEE PARAMETERS:

11.1 INFLUENT QUALITY:

- a) FREE OIL & FLOATING OIL IN LAMELLA CLARIFIER / TUBE SETTLER: 50 PPM
- b) FREE OIL & FLOATING OIL IN OIL WATER SEPARATOR: 50 PPM
- c) TSS IN LAMELLA CLARIFIER / TUBE SETTLER: 500 PPM
- d) TSS IN CT (COOLING TOWER) BLOWDOWN: AS PER WATER ANALYSIS ATTACHED IN ANNEXURE VI.
- e) TDS IN CT (COOLING TOWER) BLOWDOWN: AS PER WATER ANALYSIS ATTACHED IN ANNEXURE VI.
- f) TDS FROM DM PLANT REGENERATION WASTE: 6000 PPM
- g) TSS FROM DM PLANT REGENERATION **WASTE: 200 PPM**
- h) TDS FROM AC PLANT REJECT WASTE: 10000 PPM
- i) CLARIFIED WATER WILL BE USED FOR WASHING

11.2 OUTLET GUARANTEE PARAMETERS:

- a) OIL QUANTITY AT LAMELLA CLARIFIER / TUBE SETTLER OUTLET: As per Annexure III
- b) TSS AT LAMELLA CLARIFIER / TUBE SETTLER OUTLET: As per Annexure III
- c) SDI AT UF PERMEATE: As per Annexure III
- d) TDS OF RO PERMEATE: As per Annexure III

12.0 DRAWING/DOCUMENTS REQUIREMENT

- 12.1 For the Drawings/Documents distribution Procedure, please refer attached Annexure-IV. 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. The numbers of soft copies & hard copies of drawing/documents to be submitted by the bidder shall be as per enclosed Annexure-IV.
- 12.2 After award of LOI/LOA, drawing/documents to be submitted by the bidder for BHEL/Customer approval has been indicated in Annexure IV. However, any additional drawing/document if found necessary for completion



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

of the engineering, the same shall be submitted by bidder without any commercial & delivery implication to BHEL.

12.3 Bidder to note that the successful bidder, during detail engineering, will submit the drg/doc through web based Document Management System in addition to hard copies to be submitted as per the Annexure IV of this specification. Bidder would be provided access to the DMS for drg/doc 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>

13.0 SPARES

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

13.1 MANDATORY SPARES

- a. The list of mandatory spares which is to be considered by bidder in their scope are indicated in Annexure V.
- b. 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.
- c. Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.
- d. Inspection of mandatory spares shall be in line with the approved quality plans for the respective items/equipments. The inspection categorization of mandatory spares shall also be in line with the approved Categorization plan for the respective items/equipment.

13.2 START-UP & COMMISSIONING SPARES

- a. 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.
- b. The Bidder shall indicate the service expectancy period for the spares under normal operating conditions before replacement is necessary.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- c. 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.
- d. All the spares (mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.
- e. 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.
- f. All cases, containers or other packages are to be opened for such examination as may be considered necessary by BHEL / Customer.
- g. 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.
- h. 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.
- i. 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.

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

14.0 ADDITIONAL REQUIREMENT

- Lamella clarifier and HRSCC clarifier dosing system, UF system, dosing system of UF system, RO system, dosing system of RO system shall be located in side industrial shed. Wastewater UF+RO palnt to be kept under shed open from side and UF, RO system to be covered from top. Rest all equipment / facilities shall be located outside open to sky. Chemical storage for FeCl₃, lime, PE, NaOCl, & Na₂CO₃ shall be located in side industrial shed adjacent to control room for 15 days. Storage space for one-time chemical cleaning chemicals (Scale inhibitor, SMBS, Bio dispersant, alkali, RO and UF chemical cleaning chemicals) of UF and RO system shall also be provided by bidder in this shed.
- Control room and MCC room shall be located inside single story RCC building.
- Bidder to submit BBU during detailed engineering after approval of Basic documents. BBU shall be equal to BOQ for the package and there shall be no price and delivery implication is applicable to BHEL / customer for the same. None of the items supplied for the project as non-billable. Incomplete BBU shall not be review by BHEL.
- Any statutory requirement / clearance required for the package from government / local body shall be in bidder's scope.
- All interconnecting piping, valves, fittings including dosing piping, drain piping from chemical storage dyke to nearby drain through lime pit provided in the dyke area, flushing lines from nearest available water source, valves, fittings and accessories is also in bidder's scope.
- All the vertical pumps shall be self-lubricating type.
- 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



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 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.
- 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.
 - KKS numbering if required, as per BHEL/Customer requirement shall be provided by the Bidder during detailed engineering stage without any commercial/delivery implication to BHEL.
 - Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the works for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The bidder without any extra charge shall provide the same.
 - Buried piping shall be protected as under (as per IS-10221).
 - Surface cleaning by wire brush, power tool cleaning etc.
 - Apply one coat of coaltar/primer/enamel.
 - Apply one layer of tape comprising of coaltar. Application of tape shall conform to AWWA C- 203/IS 10221 (Appendix-B) with Minimum thickness of tape as 4MM +10%
 - All drawings/documents shall be approved by BHEL/Customer during detailed engineering stage. Successful Bidder shall comply with the comment of the customer/BHEL without price & delivery implication.
 - 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.
 - 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.
 - 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 bidder, BHEL reserves the right to debit cost of such rework to bidder.
 - 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.
 - 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.
 - 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. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of BHEL/ Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by BHEL/ Customer as and when brought to their notice either by the bidder or by BHEL/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication to BHEL / Customer.
 - The bidder 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



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- 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 Effluent Treatment system within quoted price.
- 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.
 - 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.
 - BHEL's/Customer's representative shall be given full access to the shop in which the equipment is being manufactured or tested and all test records shall be made available to him.
 - Wherever local instruments for measurement of Flow, Pressure, Level is indicated in the P&ID, Bidder to provide Diaphragm seal type instrument for Chemical (all type and concentration), corrosive, viscous fluids application.
 - Charging platform for all the chemical tanks along with required handrails, accessories etc. Permanent ladder (not rungs) for approaching the top of tanks, valves for All steel inserts plates with lugs, plates, bolts, nuts, sleeves, edge angles and all other embedding components etc as required to grout in civil works and to support/hold the equipment's for opening/maintenance purpose, shall be in bidder's scope.
 - Slings & Lifting lugs shall be provided in all equipment.
 - Preparation of drawings / document / P&ID's in 3D modelling software and providing soft copy of same to BHEL.
 - Pump suction valves, re-circulation valves and discharge valves shall be provided with required limit switches for interlock & control.
 - The starting of pumps (wherever applicable) which are provided with forced water lubrication shall be interlocked with the availability of lube water by means of starting of lubrication water pumps, availability of adequate flow, pressure etc. The standby lubrication pump shall be started automatically during inadequate pressure or while tripping of working pump(s).

15.0 PAINTING

(Bidder to also refer "Painting Schedule" in Annexure-X & Section IIA)

- a) All the equipments such as pumps, piping etc of this system shall be protected against external corrosion by providing suitable painting as mentioned below.
- b) All the metallic parts of equipments of Complete EFFLUENT TREATMENT PLANT which are embedded in concrete or in contact with water shall be painted with three coats of Bitumastic heavy duty paint over a coat of primer to prevent corrosion unless otherwise specified and total thickness shall be 400 microns. All other parts of the ETP plant shall be painted with one coat of primer and three coats of chlorination rubber paint and total thickness shall be 200 microns.
- c) Painting of vessels, tanks & piping shall be as specified elsewhere.
- d) The surfaces of stainless steel, Galvanised steel, Gunmetal, Brass, Bronze and non-metallic components shall not be applied with any painting.
- e) The steel surface to be applied with painting shall be thoroughly cleaned before applying painting by brushing, shot blasting etc. as per the agreed procedure.
- f) External Painting of surfaces of other equipments of EFFLUENT TREATMENT PLANT (such as pumps, valves etc) exposed to (outdoor installation) atmosphere, a coat of chlorinated rubber based zinc phosphate primer of minimum thickness DFT of 50 microns followed up with undercoat of chlorinated rubber paint of minimum DFT of 50 microns shall be applied. Then, intermediate coat consisting of one coat of chlorinated rubber based paint pigmented with Titanium di-oxide with minimum DFT of 50



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

microns and topcoat consisting of two coats of chlorinated rubber paint of approved shade and colour with glossy finish and DFT of 100 microns shall be provided. Total DFT of paint system shall not be less than 200 microns. For the steel surfaces inside the (indoor installation) building, a coat of red oxide primer of minimum thickness of 50 microns followed up with undercoat of synthetic enamel paint of minimum thickness of 50 microns shall be applied. The top coat shall consist of two coats each of minimum thickness of 50 microns of synthetic enamel paint and thus total thickness shall be minimum 200 microns.

16.0 PLANT OPERATION AND CONTROL

Effluent treatment plant shall be controlled from DDCMIS (DDCMIS is in BHEL scope).

In general, the operation of the EFFLUENT TREATMENT PLANT shall be Remote-manual from ETP OWS. The control & operation of EFFLUENT TREATMENT PLANT shall be semi-automatic and through water system DDCMIS. Remote Manual override facility from DDCMIS is also provided for all operations.

ON/OFF/TRIP status of all pumps, agitators and drive motors wherever required shall be displayed in OWS.

Bidder to also refer Control & Operational Philosophy for UF & RO System in Section II & to refer Control & instrumentation requirements given in Section IC.

The operation of all chemical dosing Pumps shall be operated remote, manually & as well as local manual (OWS).

The control philosophy of various systems is described below. However, for all the systems, following basic process related interlocks, alarms /pre-warning signals shall be implemented in the control system as per system requirement.

- a) Among the equipments, it shall be possible to select a specific pump or tank or sump for working/standby/maintenance etc through control system.
- b) Permissive & Interlocks:
 - (i) Starting & tripping of pumps with respect to liquid level in the respective sump/tanks or liquid pressure in the suction lines.
 - (ii) Starting & tripping of agitators with respect to liquid level in the respective sump/tanks.
 - (iii) Starting & tripping of pumps (which are provided with forced water lubrication) with respect to lubricating water flow (through low pressure/ low flow signal as the case may be).
 - (iv) Tripping of pumps when the discharge pressure is very high to avoid operation of the pump under shutoff head.
 - (v) Stopping/ tripping of equipments due to abnormal parameters related to safety of equipments like high vibration, very high bearing lubrication water (and /or oil) temperature to the drive/pumps, very high bearing temperature of the of pump/drive etc as applicable based on the recommendations of Equipment Supplier.
 - (vi) Automatic opening of the re-circulation valve to pre-set percentage, in case of failure of opening of pump(s) discharge valve to ensure minimum flow through the pump, as per the recommendation of manufacturer.
 - (vii) Automatic starting of standby pumps upon failure of starting of selected pump or tripping of running pump as the case may be.
 - (viii) Capacity of the metering pump shall be controllable from 10-100% continuously by adjusting the stroke length manually by a micro meter dial calibrated for 0–100% of pump capacity integral with the pump.
 - (ix) Various annunciations related to low level of the chemical tanks & sumps shall be provided.
- c) Alarms /Signals



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

- (i) Abnormal parameters such as low & high level in tanks/sumps, high pressure at pump discharge, low header pressure, low lubrication water flow to pumps (provided with forced water lubrication system) etc.
- (ii) Failure of starting of equipments such as pumps, blowers etc. upon start command.
- (iii) Tripping of equipments due to protection logic.

In addition, the control system shall facilitate the operator to know the status of various equipments (Whether equipment is running or stopped or tripped etc, whether the equipment is selected for operation/ standby duty /maintenance mode etc as the case may be).



TITLE: 3 X 800 MW PATRATU STPP STAGE - I
TECHNICAL SPECIFICATION FOR EFFLUENT TREATMENT PLANT

SPECIFICATION NO. PE-TS-434-164-A001	
REV. NO. 00	DATE : 29/05/2019

ANNEXURE I
QUALITY PLAN



TITLE:

3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

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

COMMON ITEMS:										LEGENDS: Applicable tests are identified by 'Y'. Y ^a : One per Heat / Heat Treatment batch / Lot. Y ^b : On machined surfaces only. Also 100% on Butt Welds & 10% on Fillet Welds. Y ^c : UT shall be done for shafts with Dia 50 mm or above & Plates of Thickness 25 mm or above. Y ^d :Dynamic Balancing per ISO: 1940, Grade 6.3 minimum shall be conducted for rotating assy. Y ¹ : As per Pump governing standard. Tolerences as per HIS, USA. Y ² :Random 10% RT to be conducted on butt welds for Thk ≥10 mm. Y ³ : Seat Leakage Test for actuator operated valves shall be done by operating the valve with job actuator. Y ⁴ : Tests on Rubber Diaphragms shall be conducted per batch of Rubber mix for Tensile, Elongation, Hardness, Thickness, Bleed Resistance. In addition, Type Test for 50,000 cycles for each type of diaphragm shall also be conducted.
1. Horizontal Centrifugal Pumps										
1.1. Casing	Y ^a		Y ^b		Y		Y ¹	Y		
1.2. Impeller	Y ^a		Y ^b		Y				Y ^d	
1.3. Shaft	Y ^a		Y		Y				Y ^c	
2. Vertical Pumps										
2.1. Casing	Y ^a		Y ^b		Y		Y ¹	Y		
2.2. Impeller	Y ^a		Y ^b		Y				Y ^d	
2.3. Shaft	Y ^a		Y		Y				Y ^c	
2.4. Fabricated Parts	Y ^a	Y	Y ^b		Y	Y ²	Y			
3. Dosing/ Metering Pumps										
4. Gate/ Globe/ Check Valves										
5. Dual Plate Check Valves										
6. Diaphragm Valves										
7. Butterfly Valves (Low Pr.)										



TITLE: 3 X 800 MW PATRATU STPP STAGE - I	SPECIFICATION NO. PE-TS-434-164-A001	
TECHNICAL SPECIFICATION FOR EFFLUENT TREATMENT PLANT		
	REV. NO. 00	DATE : 29/05/2019

7.1 Body & Disc (Cast	Y ^a		Y ^b		Y							Y⁶ : Blue Matching, Wear Travel for Gate Valves and reduced pressure test for check valves shall be conducted as per relevant standards. Y⁷ : Heat Treatment of the Tank/Vessel shall be done per fabrication code requirement. Welded dished ends shall be stress relieved. Dished ends manufactured by cold working shall also be stress relieved as per the requirement of code. Y⁸ : RT as per fabrication code requirements. However, dished ends welds, if manufactured by using welded plates shall be subjected to 100% RT. Y⁹ : Rubber Lining Mix shall be subjected to Bleed Resistance Test on mould sample. Adhesion Test, Spark Test and Hardness Test for the Rubber lined jobs shall also be conducted. Y¹⁰ : Gear Boxes shall be checked for smooth No Load Operation at shop to verify noise and vibration levels. Gear Ratio and Kerosene Leak Test shall also be conducted. Y¹¹ : One Fan of each type & size shall be routine performance tested as per corresponding code for air flow, static pressure, total pressure, speed, efficiency, power consumption, noise & temperature rise. Also all Fans shall be subjected to run test of 4 hours during which noise, vibration, temperature rise and current drawn shall be measured. Y¹² : Dry cycle test on valve spring for 1, 00,000 cycles shall be carried out as type test, if not carried out earlier, for the similar MOC, size and type of spring. Y¹³ : Test as per approved supplier practice. Y¹⁴ : Electronic leak test for condenser & evaporator unit. Note: 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.
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TITLE:

3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

Test/Check Items / Components											Remarks
	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	
7.2 Body and Disc (Fabricated)	Y ^a	Y	Y ^b		Y				Y	Y ²	
7.3 Shaft	Y ^a		Y ^b		Y					Y ^c	
8. Plug/ Ball Valves (Low Pr.)	Y ^a		Y ^b	Y	Y		Y	Y	Y	Y ³	
9. Blowers/ Compressors	Y ^a		Y ^b	Y	Y			Y	Y	Y ^c , Y ^d	
10. Tanks/ Pressure Vessels	Y ^a	Y	Y ^b	Y	Y	Y ⁸	Y		Y	Y ⁷	
11. Rubber Lining	Y ^a				Y				Y	Y ⁹	
12. Strainers	Y ^a	Y	Y ^b	Y	Y		Y		Y		
13. Pipe & Pipe Fittings	Y ^a	Y	Y		Y	Y ⁸	Y		Y		
14. Agitators /Flash Mixer/ Flocculator	Y ^a	Y	Y ^b	Y	Y			Y		Y ¹⁰	
15. Ventilation/Exhaust Fan	Y ^a		Y ^b	Y	Y			Y ¹¹ ₁	Y	Y ^c , Y ^d	
16. Hoists & Cranes	Y ^a	Y	Y ^b	Y	Y	Y ⁸		Y	Y		
17. Wrapping & Coatig Material	Y				Y				Y		
18. Package/ Split AC	Y							Y	Y	Y ¹⁴	

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



TITLE: 3 X 800 MW PATRATU STPP STAGE - I
TECHNICAL SPECIFICATION FOR EFFLUENT TREATMENT PLANT

SPECIFICATION NO. PE-TS-434-164-A001	
REV. NO. 00	DATE : 29/05/2019

QAP FOR LOW PRESSURE PIPING (LP PIPING)



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

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

	Tests/Check Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly / Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y ^a	Y ^b			Y ¹			Y			Y	
2	Diaphragm Valves	Y ^a				Y ⁵			Y		Y ⁶		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y ⁷		
	Body	Y ^a	Y ^b										
	Disc	Y ^a	Y ^b										
	Shaft	Y ^a	Y	Y ^c									
3B	Fabricated Butterfly Valves	REFER NOTE 14											
4	Gate/ Globe/Swing Check / Ball Valves	Y ^a	Y ^b	Y ^c		Y ⁸	Y	Y	Y	Y	Y ⁹		
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 ¹⁰		
12	Site Welding		Y ¹⁰		Y	Y							
NOTES (MEANING OF SUPERSSCRIPTS)													
a	One per heat/heat treatment batch/lot.												
b	On machined surfaces only for castings and on butt welds.												
c	For shaft/spindles > or = 50 mm												
1	100% Hydraulic test shall be carried out. Weld joints not subjected to hydraulic test shall be subjected to 100% RT												
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%											
	DPT on root run	100% for pipes up to 1200 mm diameter											



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

	DPT after back gauging	100% for pipes above 1200 mm diameter
	RT / UT by TIME OF FLIGHT DEFACTION (TOFD) 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'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 NTPC Engineering. 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 NTPC Engineering.	
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 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 Butter Fly valve being applicable for fabricated butterfly valves, following test shall be done for Fabricated Butter Fly Valve: a. UT as per ASTM A-435 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.	



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

SPECIFICATION NO. PE-TS-434-164-A001

REV. NO. 00

DATE : 29/05/2019

QAP FOR EOT CRANES AND HOISTS



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

Shop Test for EOT Cranes, Other Cranes & Hoist

1.0 HOOKS

- 1.01 ALL TESTS INCLUDING PROOF LOAD TEST AS PER RELEVANT IS/BS/DIN SHALL BE CARRIED OUT.
1.02 MPI/DPT SHALL BE CARRIED OUT AFTER PROOF LOAD TEST.

2.0 STEEL CASTING

- 2.01 DPT ON MACHINED SURFACE SHALL BE CARRIED OUT.

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

- 3.01 THE PLATES OF THICKNESS 25MM AND ABOVE SHALL BE ULTRASONICALLY TESTED.

- 3.02 NDT REQUIREMENTS ON WELDMENTS SHALL BE AS FOLLOWS:

- a) BUTT WELDS IN TENSION:- 100% RT AND 100% DPT
b) BUTT WELDS IN COMPRESSION:- 10% RT AND 100% DPT
c) BUTT WELDS IN ROPE DRUM:- 100% RT AND 100% DPT
d) FILLET WELDS:- RANDOM 10% DPT

4.0 FORGING (WHEEL, GEARS, PINIONS, AXLE, HOOKS & HOOK TRUNION)

- 4.01 ALL FORGINGS GREATER THAN OR EQUAL TO 50 MM DIAMETER OR THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TESTING.
4.02 DPT/MPI SHALL BE DONE AFTER HARDFACING AND MACHINING.

- 5.0 WIRE ROPE SHALL BE TESTED AS PER RELEVANT STANDARD.

- 6.0 REDUCTION GEARS SHALL BE TESTED FOR REDUCTION RATIO, BACKLASH & CONTACT PATTERN. GEAR BOX SHALL BE SUBJECTED TO NO-LOAD RUN TEST TO CHECK FOR OIL LEAKAGE, TEMPERATURE RISE, NOISE AND VIBRATION.

- 7.0 THE CRANES SHALL BE COMPLETELY ASSEMBLED AT SHOP FOR FINAL TESTING. ALL TESTS FOR DIMENSION, DEFLECTION, LOAD, OVERLOAD, HOISTING MOTION, CROSS TRAVEL ETC. AS PER IS-3177 SHALL BE CARRIED OUT AT SHOP.

- 8.0 ALL ELECTRIC HOISTS SHALL BE TESTED AS PER IS-3938 AND CHAIN PULLEY BLOCKS SHALL BE TESTED AS PER IS-3832.

9.0 LIFTING BEAM:

- 9.01 THE PLATES OF THICKNESS 25MM AND ABOVE SHALL BE ULTRASONICALLY TESTED.

- 9.02 NDT REQUIREMENTS ON WELDMENTS SHALL BE AS FOLLOWS:

- a) BUTT WELDS IN TENSION:- 100% RT AND 100% DPT
b) BUTT WELDS IN COMPRESSION:- 10% RT AND 100% DPT
c) FILLET WELDS:- RANDOM 10% DPT



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

SPECIFICATION NO. PE-TS-434-164-A001

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

REV. NO. 00

DATE : 29/05/2019

9.03

ALL FORGINGS GREATER THAN OR EQUAL TO 50 MM DIAMETER OR THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TESTING.

9.04

DPT/MPI SHALL BE DONE AFTER MACHINING.

9.05

Lifting Beam will be subjected to overload testing at @1.25 X SWL of Lifting Beam at manufacturer works.



TITLE:
3 X 800 MW PATRATU STPP STAGE - I

**TECHNICAL SPECIFICATION FOR
EFFLUENT TREATMENT PLANT**

SPECIFICATION NO. PE-TS-434-164-A001

REV. NO. 00

DATE : 29/05/2019

ANNEXURE II

SUB VENDOR LIST

Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. :		
Package:		EPC							DATE: 05.04.2017	
Supplier:		BHEL								
Contract No.:		CS-9585-001-2				STEAM GENERATOR/RAW				
					SUB-SYS MATERIALS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission schedule	Remarks
1	SEAMLESS TUBES	\$				TUBOS REUNIDOS	SPAIN	A		CS,T-11,T-12,22,T-23,T-91
		\$				VALLOREC & MANNESMANN	GERMANY	A		T-92,T-91,T-23,T-22,T-11,T-12,CS
		\$				VALLOREC TUBES	FRANCE	A		T-92,T-91,T-23,T-22,T-11,T-12,CS
		\$				TENNARIS GLOBAL(NKK TUBES)	JAPAN	A		T-91,T-22,T-11,T-12,CS
		\$				HENGYANG VALIN STEEL TUBE CO.	CHINA	A		CS & AS UPTO T-22(with TPI INSPECTION) SUB TO CONDITIONS
		\$				TENNARIS GLOBAL(DALMIN ITALY)	ITALY	A		T-22,T-11,T-12,CS
		\$				JINAGSU CHENGDE STEEL TUBE	CHINA	A		T-92,T-91,T-22,T-11,T-12,CS SUB TO TPIA INSPECTION CONDITIONS
		\$				JEE(KAWASAKI)	JAPAN	A		T-92,T-91,T-22,T-11,T-12,CS
		\$				TENNARIS GLOBAL(SILCO, ROMANIA)	ROMANIA	A		CS,T-11,T-22,T-23,T-91,T-12,
		\$				CHANGZHOU CHANGBAO PRECISION	CHINA	A		CS
		\$				PRODUCTUS TUBLARES	SPAIN	A		T-91,T-22,T-11,T-12,CS
		\$				SUMITOMO METALS	JAPAN	A		T-92,T-91,T-23,T-22,T-11,T-12,CS
		\$				BENTLER	GERMANY	A		T-92,T-91,T-22,T-11,T-12,CS,SS
		\$				IBF	ITALY	A		T-91,T-22,T-11,T-12,CS
		\$				WAYMAN GORDAN	USA	A		T-91,T-22,T-11,T-12,CS,
		\$				BHEL SSTP	TRICHY	A		T-22,T-11,T-12,CS
		\$				JINDAL SAW LTD.	NASHIK	A		CS,T-11,T-22,T-12,SUB TO CONDITIONS
		\$				REMI	INDIA	A		CS,T-11,T-22,T-12,SUB TO CONDITIONS
		\$				ISMT	AHMEDANAGAR/BARAMATI	A		CS,T-11,T-22,T-12,SUB TO CONDITIONS
		\$				MSL	RAJGAD	A		CS SUB TO CONDITIONS
		\$				BAOSHAN IRON & STEEL CO. LTD.	CHINA	A		CS,T-11,T-22,T-12,(WITH TP1) SUBJECT TO CONDITIONS

Stamp: Bharat Heavy Electricals Limited, PS-MKTG, Delhi

Stamp: Patratu Vidyut Utpadan Nigam Ltd., C & M

Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. :	CS-9585-001-2	
Package:		EPC			AND SUB-SUPPLIER APPROVAL			REV. NO. :		
Supplier:		BHEL						DATE:	06.04.2017	
Contract No.:		CS-9585-001-2			STEAM GENERATOR/RAW SUB-SYS MATERIALS					
ITEM					Proposed sub-supplier			Suppliers approval status/ category	supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place			
		\$				HMT	GUJARAT	A		HOT FINISHED CS GRADE (UPTO 78.2 MM OD & 12 MM THK)
		\$				CHANGZHOU CHANGBAO PRECISION	CHINA	A		T-11,12
2	SEAMLESS TUBES(RIFLED)	\$				SALZGITTER MANESS/AMANN PRECISION	FRANCE	A		CS
		\$				CHANGHOU CHANGBAO PRECISION	CHINA	A		T-11,12
		\$				BAOSHAN STEEL	CHINA	DR		
		\$				TENNARIS GLOBAL(DALMINE)	ITALY	DR		
		\$				SUMITOMO	JAPAN	DR		
		\$				TUBOS REUNIDOS	SPAIN	DR		
3	SEAMLESS TUBES(SS)	\$				KOBE	JAPAN	A		SS 304,SS347H
		\$				POSCO SPL STEEL CO	KOREA	A		SS 304,347H,SUPER 304
		\$				TUBACEX	SPAIN	A		
		\$				SMST	ITALY	A		SS 304,347H, SUPER 304
	SEAMLESS TUBES(SS)UPTO DIA<76.1MM	\$				SUMITOMO METAL IND LTD.	JAPAN	A		SS 304,347H, SUPER 304
	SEAMLESS TUBES(SS) UPTO OD 159.0MM & WT-12.5MM	\$				HUADI STEEL GROUP	CHINA	A		SS 304, 304H,347H(WITH TPi) SUB TO CONDITIONS
	SEAMLESS TUBES(SS) UPTO OD 159.0MM & WT-12.5MM	\$				ZHEJIANG JIULI HI TECH	CHINA	A		SS 304, 304H,347H(WITH TPi) SUB TO CONDITIONS
						PRODUCTUS TUBLARES	SPAIN	DR		
4	SEAMLESS PIPES	\$				TUBACEX	SPAIN	A		SS PIPES
		\$				SUMITOMO METALS	JAPAN	A		P-92,P-91,P-22,P-11,P-12,CS
		\$				VALLOREC TUBES	FRANCE	A		P-92,P-91,P-22,P-11,P-12,CS

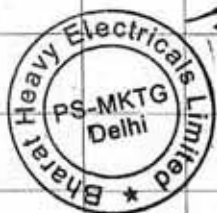


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06-04-2017

Project:		PATRAYU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. :		
Package:		EPC							DATE: 06.04.2017	
Supplier:		BHEL								
Contract No.:		CS-9585-001-2				STEAM GENERATOR/RAW				
					SUB-SYS MATERIALS					
ITEM						Proposed sub-supplier		Suppliers approval status/ category	supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place			
		\$				HENGYANG VALIN STEEL TUBE COL	CHINA	A		CS
		\$				BHEL SSTP	TRICHY	A		CS
		\$				TUBOS REUNIDOS	SPAIN	A		P-91,P-22,P-11,P-12,CS
		\$				VALCONVY TRUB	CZECH REP	A		CS,P-11,P-12,P-22
		\$				ACELOR MITTAL	ROMANIA	A		CS
		\$				WAYMAN GORDAN	USA	A		P-91,P-22,P-11,P-12,CS
		\$				TENNARIS GLOBAL(NKK TUBES)	JAPAN	A		P-91,P-22,P-11,P-12,CS
		\$				IBF SPA	ITALY	A		P-92,P-91,P-22,P-11P-12,CS
		\$				JFE(KAWASAKI)	JAPAN	A		P-92,P-91,P-22,P-11,P-12,CS
		\$				PRODUCTUS TUBLARES	SPAIN	A		P-91,P-22,P-11P-12,CS
		\$				VALLOREC & MANNESMANN	GERMANY	A		P-92,P-91,P-22,P-11,P-12,CS
		\$				TENNARIS GLOBAL(DALMINE)	ITALY	A		P-91,P-22,P-11,P-12,CS
		\$				JINDAL SAW LTD.	NASHIK	A		CS,P-11,P-22,P-12,SUB TO CONDITIONS
		\$				ISMT	AHMEDNAGAR/BARAMATI	A		CS,P-11,P-22,P-12, SUB TO CONDITIONS
		\$				YANGZHOU CHENGDE STEEL PIPE CO. LTD.	CHINA	A		P-92,P-91,P-22,P-11,P-12,CS SUB TO TPIA INSPECTION CONDITIONS
		\$				MSL	RAJGAD	A		CS SUB TO CONDITIONS
		\$				REMI	BHARUCH	A		CS,P-11,P-22,P-12,SUB TO CONDITIONS
		\$				RATNAMANI	MUMBAI	DR		CS
		\$				ZIZIANG GROSS	CHINA	DR		CS
		\$				PRODUCTUS TUBLARES	SPAIN	DR		FOR P92 GRADE
	SEAMLESS PIPES(DIA UPTO 159MM)	\$				TENNARIS GLOBAL SILCO TUBES)	ROMANIA	A		P-91,P-22,P-11,P-12,CS
	SEAMLESS PIPES(UPTO 160MM)	\$				BENTLER	GERMANY	A		P-92,P-91,P-22,P-11,P-12,CS
	SEAMLESS PIPES(UPTO 219.0MM)	\$				JIANGSU CHENGDE STEEL TUBE	CHINA	A		P-92,P-91,P-22,P-11,P-12,CS SUB TO TPIA INSPECTION CONDITIONS

Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. :		
Package:		EPC						DATE:	06.04.2017	
Supplier:		BHEL								
Contract No.:		CS-9585-001-2			STEAM GENERATOR/RAW SUB-SYS MATERIALS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission schedule	Remarks
	SEAMLESS PIPES(UPTO 68.9MM)	\$				BAOSHAN IRON & STEEL CO. LTD.	CHINA	A		CS SUBJECT TO CONDITION
	SEAMLESS PIPES(UPTO OD 914 X WT 102 MM)	\$				RINGMIL	ITALY	A		FORGED CS PIPE
5	PLATES & ROLLED SECTION(UPTO GRADE 91)	\$				INDUS STEEL	BELGIUM	A		CS-SA515 AS UP TO GR-91
		\$				ILSENBURGER GROBBLECH(SALZGITTER MANESSMANN)	GERMANY	A		CS-SA 299, SA515, BS EN 10025, IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-91
		\$				DILLINGER-GTSVENTES	GERMANY	A		CS-SA 299, SA515, BS EN 10025, A36, IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-91
		\$				ARCONI D.O.O.	SLOVENIA	A		CS- SA515, BS EN 10025, A36, IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-91
6	PLATES & ROLLED SECTION(UPTO GRADE 22)	\$				THYSEEN KRUPP	GERMANY	A		CS- SA515 BS EN 10025 A36 IS 2062 OTHER STRUCTURAL STEEL GRADES. AS UPTO GR.-22
		\$				INDUSTEEL LOIRE	FRANCE	A		CS-SA 299, SA515; AS UPTO GR.-22
		\$				ESSAR STEEL LTD.	HAZIRA	A		CS- SA515, BS EN 10025, A36, IS 2062, OTHER STRUCTURAL STEEL GRADES; AS GR.-12 & 22
		\$				VOESTALPINE GROBBLECH GMBH	AUSTRIA	A		CS- SA515 BS EN 10025 A36 IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-22
		\$				SAIL	BHILAI/SALEM	A		CS- SA515 BS EN 10025 A36 IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-22
		\$				NIPPON STEEL	JAPAN	A		CS- SA515 BS EN 10025 A36 IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-22
		\$				POSCO	KOREA	A		CS- SA515 BS EN 10025 A36 IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-22





Signature
06-04-2017

Project:		PATRAYU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. :		
Package:		EPC						DATE: 06.04.2017		
Supplier:		BHEL								
Contract No.:		CS-9585-001-2			STEAM GENERATOR/RAW					
					SUB-SYS MATERIALS					
ITEM						Proposed sub-supplier		Suppliers approval status/ category	supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place			
		\$				REINER BRACH GMBH & CO.	GERMANY	A		CS- SA 299 SA515 BS EN 10025 A35 IS 2062 OTHER STRUCTURAL STEEL GRADES; AS UPTO GR.-22.
		\$				JFE	JAPAN	DR		
		\$				CLABECO	BELGIUM	DR		
		\$				JSPL	INDIA	DR		
		\$				DUFERCO	GERMANY	DR		
		\$				GULDE	GERMANY	A		MEMBRANE FINS UPTO GR-22
		\$				ARCELLOR MITTAL	ROMANIA	DR		
		\$				METAL ONE	JAPAN	DR		MEMBRANE FINS UPTO GR-12
		\$				LLYODS STEEL INDUS LTD(UTTAM VALUE STEEL)	INDIA	A		UPTO GR.-22; SUBJECT TO CONDITION
7	PLATES & ROLLED SECTION(CS)	\$				ARCELLOR MITTAL GALATI	ROMANIA	A		CS PLATES UPTO 80 MM
		\$				JSW STEEL LTD.	INDIA	A		STRUCTURAL STEEL
		\$				RINL	INDIA	A		STRUCTURAL STEEL
		\$				ESSAR STEEL LTD.	INDIA	A		STRUCTURAL STEEL
		\$				TISCO	INDIA	A		STRUCTURAL STEEL
		\$				LLYODS STEEL INDUS LTD(UTTAM VALUE STEEL)	INDIA	A		STRUCTURAL STEEL
		\$				ISPAT INDUSTRIES LTD.	INDIA	A		STRUCTURAL STEEL
		\$				JSPL	INDIA	A		STRUCTURAL STEEL
		\$				SAIL	INDIA	A		STRUCTURAL STEEL
8	PLATES(SS)	\$				OUTOKUMPU	SWEDEN	A		SS PLATES UPTO 20 MM THK
		\$				INDUS STEEL	BELGIUM	A		GR-304,309,310,316



Signature
06-04-2017

Project:	PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN				DOC. NO. :	CS-9585-001-2	
Package:	EPC			AND SUB-SUPPLIER APPROVAL				REV. NO. :		
Supplier:	BHEL							DATE:	06.04.2017	
Contract No.:	CS-9585-001-2			STEAM GENERATOR/RAW MATERIALS						
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission schedule	Remarks
	\$					JSL STAINLESS	JAIPUR	A		LINER SS 304
	\$					INDUSTEEL LOIRE	FRANCE	A		GR-304,309,310,316
	\$					SAIL	BHILAI/SALEM	A		GR-304,309,310,317
	\$					COLUMBUS STAINLESS STEEL(ACRINOX)	SOUTH AFRICA	A		GR-304,309,310,318
	\$					NIPPON STEEL CORP.	JAPAN	DR		
	\$					THYSEEN KRUPP	GERMANY	DR		
	\$					SUMITOMO	JAPAN	DR		
	\$					ACRONI SLOVENIS	JAPAN	DR		
	\$					DKC	KOREA	DR		
	9 ALUMINIUM CLADDING	III				MAIN CONTRACTOR'S APPROVED SOURCES				
NOTE 1:	VENDORS UNDER A(Accepted Category) ARE APPROVED AND ACCEPTED BY NTPC IN PAST WITH OR WITHOUT CONDITIONS. SIMILAR CONDITIONS AS THE CASE MAY BE SHALL BE APPLICABLE FOR THIS PROJECT ALSO.									
NOTE 2:	VENDORS UNDER DR (DETAILS REQUIRED) CATEGORY SHALL BE REQUIRED TO SUBMIT THE DETAILS IN NTPC QUESTIONNAIRE.									
NOTE 3:	PRE DESPATCH 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.									



Signature
06-04-2017

Project:	PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL				DOC. NO. :	CS-9585-001-2	
Package:	Steam Generator Island Package							REV. NO. :	0	
Supplier:	BHEL				BHEL TRICHY			DATE:	04.04.2017	
Contract No.:	CS-9585-001-2				SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
1	SEPARATOR & STORAGE TANK	I				ALSTOM	USA	A		
						BHEL	TRICHY	A		
						ALSTOM	DURGAPUR	A		
						SHANGHAI BOILER WORKS	CHINA	DR		
						ALSTOM SURABHAYA	INDONESIA	DR		
						ALSTOM	WUHAN	DR		
2	HEADERS AND SUCTION MANIFOLDS	I				ALSTOM	USA	A		
						BHEL	TRICHY	A		
						ALSTOM	DURGAPUR	A		
						SHANGHAI BOILER WORKS	CHINA	DR		
						ALSTOM SURABHAYA	INDONESIA	DR		
3	TUBULAR PRODUCTS- ONLY SPIRAL WALLS	I				BHEL	TRICHY	A		
						ALSTOM	DURGAPUR	A		
						ALSTOM	USA	A		
						SHANGHAI BOILER WORKS	CHINA	DR		
						ALSTOM WUHAN	CHINA	DR		
						ALSTOM SURABHAYA	INDONESIA	DR		
4	TUBULAR PRODUCTS (COILS & PANELS) EXCLUDING SPIRAL WALL	I				ALSTOM	DURGAPUR	A		
						BHEL	TRICHY	A		
						ALSTOM	USA	A		

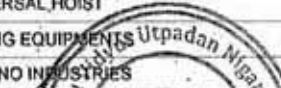


Attn
 (NITIN KUMAR)
 PS-M
 BHEL

Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. :	CS-9585-001-2	
					AND SUB-SUPPLIER APPROVAL			REV. NO. :	0	
Package:		Steam Generator Island Package						DATE:	04.04.2017	
Supplier:		BHEL			BHEL TRICHY					
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission	Remarks
5	CRITICAL PIPING / PCP (MS, CRH, HRH & FW) AND BOILER PIPING	I				BHEL	TRICHY	A		
		I				ALSTOM	DURGAPUR	A		
6	MISC HP PIPING EXCLUDING CRITICAL PIPING (CS, AS UPTO 91 GRADES)	I				BHEL	TRICHY	A		
		I				ALSTOM	DURGAPUR	A		
7	NON IBR PIPING / LP PIPING (Pr upto 10 Ksc)	III				MAIN CONTRACTOR'S APPROVED SOURCES				
8	FORMED FITTINGS(Gr91)	I				BHEL	TRICHY	A		
9	SPHERES	I				ALSTOM	DURGAPUR	A		
		I				BHEL	TRICHY	A		
		I				ALSTOM	USA	A		
10	GRAVIMETRIC COAL FEEDERS	I				REFER SUB OR LIST				
11	RAW COAL GATE ASSEMBLY FOR GRAVIMETRIC FEEDER	I				BHEL	TRICHY	A		
12	COAL BURNER ASSY & SOFA	I				ALSTOM	USA	A		
		I				BHEL	TRICHY	A		
13	AIR COOLED OIL GUN ASSEMBLY	I				BHEL	TRICHY	A		
14	OIL PREHEATER & PRESSURISING SKID ASSY.	III				MAIN CONTRACTOR'S APPROVED SOURCES				
15	HFO/LFO PUMPS	I				ALWEILER	GERMANY	A		
		I				BOURMANN	GERMANY	A		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2			
							REV. NO. : 0			
Package:		Steam Generator Island Package				DATE: 04.04.2017				
Supplier:		BHEL		BHEL TRICHY						
Contract No.:		CS-9585-001-2		SUB-SYST STEAM GENERATOR						
S.No.	ITEM	QP/Insp. CaL	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
						TUSHACO PUMPS	DAMAN	A		SCREW TO BE IMPORTED FROM ALLWEILLER GERMANY
						LEISTRITZ	GERMANY	A		
						BOURMANN	GERMANY	A		
						KRAL	AUSTRIA	A		
						ALEKTON	CHENNAI	A		
						UT PUMPS	FARIDABAD	A		SUBJECT TO CONDITIONS ,
16	SOOT BLOWERS(LRSB,WALL DESLAGGER, ROTARY BLOWER,TEMP. PROBE)					BHEL	TRICHY	A		
17	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE									Main BOIs eg. Hook, motors and C&I item from NTPC approved sources
						CONSOLIDATED HOISTS	SATARA	A		EOT CRANES UPTO 40 TONS & HOISTS UPTO 40 TONS.
						POWER BUILD P LTD	VV NAGAR	A		HOIST UPTO 10 TONS
						CONSOLIDATED HOISTS	PUNE	A		HOIST UPTO 20 TONS
						TRACTOR TRIFOR	FARIDABAD	A		HOIST UPTO 15 TONS
						HERCULES HOIST LTD.	MUMBAI	A		HOIST UPTO 30 TONS
						GRIP ENGINEERS	HYDERABAD	A		HOIST UPTO 40 TONS
						ANUPAM INDUSTRIES	VITHAL UDYOGNAGAR	A		EOT CRANES UPTO 50 TONS
						DYNAMECH CRANES	THANE,MUMBAI	A		UPTO 20 TONS
						ARMSEL MHE PVT. LTD.	BANGALORE	A		UPTO 20 TONS
						HERCULES HOIST LTD.	MUMBAI	A		HOIST UPTO 20 TONS
						UNIVERSAL HOIST	THANE,	A		HOIST UPTO 20 TONS
						LIFTING EQUIPMENTS	DELHI	DR		
						TECHNO INDUSTRIES	AHMEDABAD	DR		

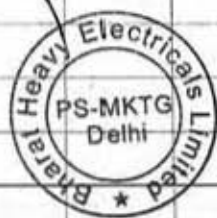




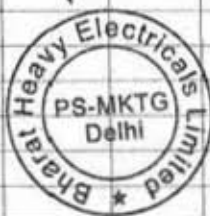
Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		Steam Generator Island Package						REV. NO. :	0	
Supplier:		BHEL			BHEL TRICHY			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
18	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE - CAPACITY UPTO 5 TONS					MAIN CONTRACTOR'S APPROVED SOURCES				
19	RECIRCULATION PUMP					REFER SUB OR ITEMS LIST				
20	LP CONDENSATE TRANSFER PUMP					ITT GOULD	USA	A		
						FLOW SERVE	USA	A		
						SULZER	NAVI MUMBAI	A		
21	AUXILIARY BOILER					REFER SUB OR ITEMS LIST				
22	SCANNER AIR FAN					ANDREW YLE	KOLKATA	A		
						ACCEL	AHMEDABAD	A		
						PATEL AIRTEMP(I) LTD.	AHMEDABAD	A		
						TLT INDIA	GUJARAT	A		
						BHEL_BAP	RANIPET	A		
						CB DOCTOR(I/M)	AHMEDABAD	A		
						AIROCHEN ENGG. CO.	KOLHAPUR	OR		
						AR CONTROL & CHEM ENGG. CO. LTD.	MUMBAI	OR		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2			
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Package:		Steam Generator Island Package					DATE:	04.04.2017		
Supplier:		BHEL			BHEL TRICHY					
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
23	SEAL AIR FAN	I				CB DOCTOR & CO.	AHMEDABAD	A		
		I				ACCEL	AHMEDABAD	A		
		I				TLT INDIA	AHMEDABAD	A		
		I				PATEL AIRTEMP(I) LTD.	AHMEDABAD	A		
		I				BHEL,BAP	RANIPET	A		
		I				ANDREW YLE	KOLKATA	A		
24	FURNACE MAINT. PLATFORM(SKY CLIMBER)	I				NV SKYMAN INT. SA	BELGIUM	A		
		I				NV SKCLIMBER EUROPE SA	BELGIUM	A		
		I				POWER CLIMBER	BELGIUM	DR		
		I				DAEO PRECISION	KOREA	A		
		I				HINGWING GONDOLA	HONGKONG	DR		
25	QUICK ERECT FURNACE SCAPPHOLDING	II								VENDORS TO BE PROPOSED LATER DURING PROJECT EXECUTION
26	METALLIC EXPANSION JOINT	I				BHEL	TRICHY	A		



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Supplier:		BHEL			BHEL TRICHY			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission	Remarks
27	DUCT ASSY, FLOWMETER WEIGHTING UPTO 10 TONS	III				MAIN CONTRACTOR'S APPROVED SOURCES				
28	DUCT ASSY TRANSITION PIECE, DUCT ASSY, FLOWMETERS WEIGHTING > 10 TONS	III				MAIN CONTRACTOR'S APPROVED SOURCES				Trial Assembly Audit Check by NTPC.
29	LIGHT BONDED MINERAL WOOL	I				MINWOOL ROCK FIBRES LTD.	RAJNANDAON, BHILAI	A		
		I				LAPINUS ROCKWOOL LTD.	GWALIOR	A		
		I				LLOYDS INSULATION, CHENNAI	BHILAI	A		
		I				PUNJSTAR INSULATION	BHILAI	A		
		I				GOENKA ROCK WOOL	RAIPUR	A		
		I				THERMOCARE ROCKWOOL PVT. LTD. ES. LTD.	RAJNANDAON	A		
		I				SHREERAM EQUITECH	DURG	A		
		I				MINWOOL ROCK FIBRES LTD.	RAJNANDAON, BHILAI	A		
		I				ROCKWOOL INDIA LTD.	MEDAK-AP	A		
		I				DHANBAD ROCKWOOL INSULATION PVT. LTD.	DHANBAD	A		
		I				MINSULATE MFG. CO.	JAMSHEDPUR	A		
		I				POLYBOND PROJECTS PVT. LTD.	DURG	A		
		I				HI-TECH ROCK FIBRE LTD.	RAJNANDGOAN	A		
		I				JAMSHEDPUR MINERAL WOOL	JAMSHEDPUR	A		
		I				ROCKWOOL INDUSTRIES	BHILAI	A		
30	CASTABLE REFRACTORY	III				MAIN CONTRACTOR'S APPROVED SOURCES				
31	POURABLE INSULATION	III				MAIN CONTRACTOR'S APPROVED SOURCES				
32	CLH & VLH	I				BHEL	TRICHY			other vendors as per BHEL PIPING CENTER LIST



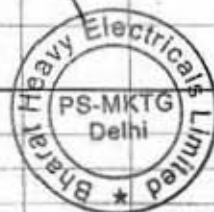
Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		Steam Generator Island Package						REV. NO. :	0	
Supplier:		BHEL						DATE:	04.04.2017	
Contract No.:		CS-9585-001-2								
		SUB-SYST STEAM GENERATOR								
S.No.	ITEM	QP/Insp. CaL	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
		I				BHEL HERP	VARANASI			
33	HANGER & SUPPORTS- (OTHER THAN CLH & VLH)	III				MAIN CONTRACTOR'S APPROVED SOURCES				
34	CONVENTIONAL VALVES(GATE,GLOBE & CHECK)									91/92 GRADE CASTINGS FOR CONVENTIONAL VALVES SHALL BE FROM MAIN CONTRACTOR'S APPROVED SOURCES WHICH ARE HAVING ELECTRIC ARC FURNACE, VOD AND LRF FACILITIES
		I				BHEL	TRICHY	A		CONVENTIONAL VALVES(GATE,GLOBE & CHECK) BHEL RANGE, 2/3 WAY VALVES
		I				VELAN	H4T1X8 MONTREAL CANADA	A		GATE/CHECK V/V UPTO 22"CI 2500
		I				LEADER VALVES	JALANDHAR	A		CCS GLOBE V/X 24" CI 600, GLOBE V/V 24"CI 300,CHECK V/V 24"CI 600
		I				CRESCENT VALVES	MUMBAI	A		UPTO NB 300 CL 600
		I				VELAN VALVE CORP	USA	A		GATE V/V 2-24"CI 900-4500,CAST STEEL GATE V/V 18-48"CI150-600
		I				VELAN	UK	A		1) GLOBE V/V 1/4"-2"CI4500 ,2) BONNETLESS GLOBE V/V 1/2-2.5"CI 150-600)
		I				VELAN	QUEBEC CANADA	A		GATE/GLOBE/CHECK V/V UPTO 3"CI 2680
		I				VELAN	COIMBATORE	A		1) CAST 2500 CI GATE(CS &AS) UPTO 20" & CHECK(CS&AS) UPTO 16"; 2) FORGED 4500 CI(CS&AS) GATE UPTO 1" & GLOBE/CHECK UPTO 2".



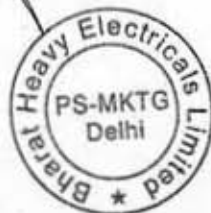
Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		Steam Generator Island Package						REV. NO. :	0	
Supplier:		BHEL			BHEL TRICHY			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
						BDK	HUBLI	A		UPTO NB 300 & CL 600, FORGED UPTO NB 50 CL 800
						FOURESS ENG. INDIA LTD.	MUMBAI	A		UPTO NB 200 CL 600, NB 250-600 CL 300
						NITTON VALVES	AURANGABAD	A		WCB/WCC (GATE VALVE UPTO 36" CI 600)
						SAMSHIN	SOUTH KOREA	A		2500 CL GATE/GLOBE/CHECK UPTO 24"; CL 3500 GATE UPTO 18" & GLOBE UPTO 6"; 4500 CL GATE UPTO 6" & GLOBE/CHECK/ANGLE UPTO 2"
						VELAN	H4T1G2 MONTREAL CANADA	A		GATE/GLOBE/CHECK UPTO 24" CI 4500
						VELAN	PORTUGAL	A		CAST STEEL GATE/GLOBE/CHECK 2- 12" CI 150-600
						ROCKWELL	USA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						CRIS	FRANCE	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						OKANO VALVES	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						RAIMONDI	ITALY	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						HP VALVES	NEITHERLANDS	A		TRIM VALVES; APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						FLOW SERVE	USA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						DRESSED MASSONEILAN	USA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER



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Supplier:		BHEL			BHEL TRICHY					
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission	Remarks
						OKANO VALVES	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						TOA	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						CRIS	FRANCE	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						TYCO SEMPELL	GERMANY	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						MIL CONTROLS	KERALA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						FOURESS ENG. INDIA LTD.	INDIA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						DEUTSCHE BABCOCK	GERMANY	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						KSB	COIMBATORE	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						SPX PROCESS EQUIPMENTS/COPES VULCAN	USA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						TOA/MEIWA	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						RAIMONDI	ITALY	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						BABCOCK BORSING	ESPANA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
						DEWARNCE	UK	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
35	SAFETY VALVE (SPRING TYPE)					DRESSER	USA	A		
						SEMPPELL AG	GERMANY	A		
						TYCO (PENTAIR VALVES & CONTROLS)	USA	A		
						FUKUI	JAPAN	A		
						RIENEKE GMBH	GERMANY	A		HYD TYPE



Project:		PATRATU		3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2		
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Package:		Steam Generator Island Package						DATE: 04.04.2017		
Supplier:		BHEL				BHEL TRICHY				
Contract No.:		CS-9585-001-2			SUB-SYST	STEAM GENERATOR				
ITEM						Proposed sub-supplier				
S.No.		QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule		Place	Suppliers approval status/ category	supplier Details submissio n	Remarks
		I				BOPP & REUTHER	GERMANY	A		HYD TYPE
		I				VALVE TECHNOLOGIES	USA	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
		I				MEIWA	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
		I				BHEL	TRICHY	A		
36	ERV	I				VALVE TECHNOLOGIES	USA	A		
		I				FUKUI	JAPAN	A		
		I				SEMPELL AG	GERMANY	A		
		I				DRESSER	USA	A		
		I				MEIWA CORP.	JAPAN	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
		I				RIENEKE GMBH	GERMANY	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
37	PLUG VALVE	I				FLOW SERVE INDIA CONTROLS	KANCHIPURAM	A		UPTO 150 NB CI 300,UPTO 400 NB CI 150
						HAWA VALVES	MUBAI	A		UPTO 8" SIZE AND CLASS 300
		I				3Z CORP.	KOREA	A		UPTO 10" SIZE AND CLASS 300
		I				BDK	HUBLI	A		APPROVAL RANGE AS PER NTPC APPROVAL LETTER
		I				ZED VALVES CO. PVT. LTD.	AHMEDABAD	DR		
38	SAFETY VALVE SILENCERS	III				MAIN CONTRACTOR'S APPROVED SOURCES				



10/14

Project:		PATRATU		3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2		
								REV. NO. : 0		
Package:		Steam Generator Island Package						DATE: 04.04.2017		
Supplier:		BHEL				BHEL TRICHY				
Contract No.:		CS-9585-001-2		SUB-SYST		STEAM GENERATOR				
ITEM						Proposed sub-supplier				
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place	Suppliers approval status/ category	supplier Details submission	Remarks
39	PRIMARY STRUCTURE - CEILING GIRDERS, MAIN COLUMNS, AUX COLUMNS, BUILT UP BEAMS, BOXES, BUCKSTAY, BRACINGS, MILL BAY STR, APH SUPPORT STR, TRANSFER TOWER	I				NTPC APPROVED VENDORS				PROJECT SPECIFIC APPROVAL OF EACH VENDOR TO BE TAKEN BY BHEL FROM NTPC; VENDOR TO MEET TECH. SPEC. REQUIREMENTS FOR STR. FABRICATION
40	BUCK STAY, BRACINGS MFD FROM ROLLED SECTIONS	III				MAIN CONTRACTOR'S APPROVED SOURCES				VENDOR TO MEET TECH. SPEC. REQUIREMENTS FOR STR. FABRICATION
41	SECONDARY STRUCTURE-PLATFORMS , GALLERIES , WALKWAY, STAIRCASE, LADDER, DUCT SUPPORT STRUCTURE, ANCHOR BOLTS ETC	III				MAIN CONTRACTOR'S APPROVED SOURCES				VENDOR TO MEET TECH. SPEC. REQUIREMENTS FOR STR. FABRICATION
42	ELECTROFORGED GRATINGS	II				INDIANA GRATINGS P. LTD.	PUNE	A		
		II				KARDE ANAND UDYOG	PUNE	A		
		II				PREMIER POWER PROJ.	HOWRAH	A		
		II				BHOLA RAM STEEL	PATNA	A		
		II				PINAX STEEL	PATNA	A		
		II				GREATWELD	PUNE	A		
		II				VIN FAB ENGG. PVT. LTD.	MUMBAI	A		
43	STRAINERS	III				MAIN CONTRACTOR'S APPROVED SOURCES				



Project:		PATRATU		3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2		
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Package:		Steam Generator Island Package						DATE:	04.04.2017	
Supplier:		BHEL				BHEL TRICHY				
Contract No.:		CS-9585-001-2		SUB-SYST		STEAM GENERATOR				
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission	Remarks
44	CERAMIC LINED COAL PIPES & BENDS	I				BHEL EDN	BANGALORE	A		
						BHEL	JAGDISHPUR	A		
45	COAL PIPES & BENDS(W/O CERAMIC LINES)	III				MAIN CONTRACTOR'S APPROVED SOURCES				
46	COAL BUNKER	I				NTPC APPROVED VENDORS				
47	SOOT BLOWER PRESSURE REDUCING VALVES & BLOCK					REFER C&I VENDOR LIST				
48	91/92 GRADE FITTINGS (NOTE 6)	I								
		I				PETROL RACCORD SPA	ITALY	A		P-91, P-92 FORMED/FORGED
		I				BOKOYOUNG METAL CO.	LOREA	A		P-91,FORGED
		I				TF TECH CO. LTD.	KOREA	A		P-91 FORGED
		I				FLASH FORGE	VIZAG	A		91 WITH SIZE/TYPE CONDITIONS AS PER NTPC APPROVAL LETTER
		I				BGH EDELSTAHL SIEGEN GMBH	GERMANY	A		P-91 FORGED
		I				ERNE FITTINGS GMBH	AUSTRIA	A		P-91 FORMED
		I				GAM RACCORD SPA	ITALY	A		P-91 FORMED



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Supplier:		BHEL			BHEL TRICHY			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST STEAM GENERATOR					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier Details submission	Remarks
		I				TECHNO FORGE SPA	ITALY	A		P-91, P-92 FORMED
		I				MEGA SPA	ITALY	A		P-91 FORGED/WELDED
		I				BASSI LUIGI SPA	ITALY	A		P-91 FORGED/WELDED
		I				IBF SPA	ITALY	A		P-91, P-92 FORMED/FORGED
		I				ALLIED INT. (TACTUBI RACCORDI SPA, VIA ROMA 150, 29027 PODENZANO)	ITALY	A		P-91, P-92 FORMED
		I				BRUCK STRASSE 16 ENSHEIM	GERMANY	A		P-91 FORGED/WELDED
		I				SUNGKWANG BEND CO. LTD.	KOREA	A		P-91/F-91 FORMED/FORGED/WELDED
		I				TK CORP. FORGITAL	KOREA	A		P-91 FORMED
		I				TIANJIN JINDING PIPING CO. LTD.	CHINA	A		91 FORMED (ELBOW, TEE, REDUCER)
		I				RINGMILL SPA	ITALY	A		FOR SEAMLESS AS (UPTO 91 GRADE) FORGED PIPE
		I				FORGITAL	ITALY	DR		
		I				DEE DEVELOPMENT	PALWAL	A		91 WITH SIZE/TYPE CONDITIONS AS PER NTPC APPROVAL LETTER
		I				CHW FORGE LTD.	GHAZIABAD	A		91 WITH SIZE/TYPE CONDITIONS AS PER NTPC APPROVAL LETTER
		I				FORGE MONCHIERI SPA	ITALY	A		91 FORGING- WITH SIZE/TYPE CONDITIONS AS PER NTPC APPROVAL LETTER
		I				VIAR SPA	ITALY	DR		91 FORGINGS
		I				TIANJINDING PIPING CO. LTD.	CHINA	DR		
		I				AFFLERBACH	GERMANY	DR		
49	FITTINGS(CS,SS & AS UPTO GR 22)	II				MAIN CONTRACTOR'S APPROVED SOURCES				
50	KNIFE EDGE GATE VALVES(Mill Outlet and Burner Inlet)	I				GALAXY CONTROLS PVT. LTD.	CHENNAI	A		Upto size 26"



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. : CS-9585-001-2			
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Supplier:		BHEL				DATE: 04.04.2017				
Contract No.:		CS-9585-001-2				SUB-SYST STEAM GENERATOR				
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	supplier details submission	Remarks
		I				ORBINOX INDIA PVT.LTD.	COIMBATORE	A		Upto size 30"
		I				BRAY CONTROLS (VAAS INDUSTRIES PVT.LTD.)	CHENNAI	A		Upto size 28"
		I				JASH ENGG. LTD.	INDORE	A		UP TO SIZE 30
		I				GENERAL ENGG.CONSORTIUM	BANGALORE	DR		
51	SCR SYSTEM	I								REFER SUB OR LIST; VENDORS FOR SCR SUB ITEMS TO BE TIED UP AFTER SUB OR CLEARANCE ; L2 VENDORS SHALL BE DISCUSSED AND TIED UP AFTER FINALISATION OF L1 VENDOR
NOTE 1:		VENDORS UNDER A (ACCEPTED CATEGORY) ARE APPROVED WITH OR WITHOUT CONDITIONS IN PAST. SIMILAR CONDITIONS AS THE CASE MAY BE FOR THE VENDORS SHALL BE APPLICABLE FOR THIS PROJECT AND TIED UP IN THE QUALITY PLAN.								
NOTE 2:		VENDORS UNDER DR (DETAILS REQUIRED) CATEGORY SHALL BE REQUIRED TO SUBMIT THE DETAILS IN NTPC QUESTIONNAIRE.								
NOTE 3:		FOR EQUIPMENTS LIKE AUXILIARY BOILERS/HOISTS/GATES DAMPERS/LUB OIL SYSTEM,DOSING SSKID, G.FEEDERS THE MAJOR BOI SHALL BE AS PER NTPC APPD. LIST.								
NOTE 4:		ALL MOTORS REQUIRED FOR PUMP-MOTOR/FAN-MOTOR ASSY,APH,GRAVIMETRIC FEEDER,PULVERISER SHALL BE FROM NTPC APPD. VENDOR LIST.								
NOTE 5:		FOR MOTORISED/PNEUMATIC ACTUATED VALVES THE SUBSUPPLIERS FOR ACTUATORS SHALL BE AS PER NTPC APPD. LIST. REFER NTPC CAI LIST.								
NOTE 6:		RAW MATERIAL FOR 91 AND ABOVE GRADE MATERIAL FITTINGS TO BE FROM NTPC APPROVED SOURCES AS PER RAW MATERIAL VENDOR LIST.								



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. :	CS-9585-001-2	
					AND SUB-SUPPLIER APPROVAL			REV. NO. :	0	
Package:		EPC (SG SCOPE)						DATE:	05.04.2017	
Supplier:		BHEL			BHEL, HYDERABAD					
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
1	MILL					REFER SUB QR LIST				FORMAL ACCEPTANCE AFTER SUB QR CLERANCE
2	PLANETARY GEAR BOX					BHEL	HYDERABAD	A		SUBJECT TO CONDITIONS
						SIEMENS	GERMANY	A		
3	GRINDING ROLL					AIA ENGG.	NAGPUR	A		SUBJECT TO SIZE CONDITIONS
						AIA ENGG.	AHMEDABAD	A		
						MEGOTTEAUX	RAJKOT	A		
						SHREE BALAJI INDUSTRIAL PRODUCTS	JAIPUR	DR		
4	BULL RING SEGMENTS					AIA ENGG.	AHMEDABAD	A		
						MEGOTTEAUX	RAJKOT	A		
5	MILL HANDLING									MAIN BOIs eg. Hook, motors and C&I item from NTPC approved sources
						POWER BUILT	V V NAGAR	A		Upto 10 Tons
						UNIVERSAL HOIST FABRIK	THANE/ MUMBAI	A		upto 20T Conditions
						DYNAMECH CRANES	THANE MUMBAI	A		upto 20T Conditions
						ANUPAM INDUSTRIES	V V NAGAR	A		EOT Cranes upto 50 Tons

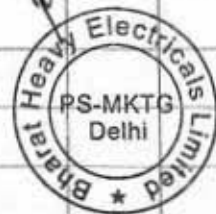


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(Chittaranjan Samal,
BHEL)

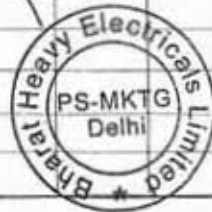
Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC (SG SCOPE)						REV. NO. :	0	
Supplier:		BHEL			BHEL, HYDERABAD			DATE:	05.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
ITEM						Proposed sub-supplier				
S.No.		QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule		Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
						GRIP ENGINEERS	HYDERABAD	A		Electrical hoist with trolley, under slung crane up to 40 Ton
						ARESEL MHE PVT LTD	BANGALROE	A		upto 20T
						CONSOLIDATED HOIST	PUNE	A		upto 20T Conditions
						CONSOLIDATED HOIST	SATARA	A		EOT CRANES UPTO 40 TONS & HOISTS ABOVE 15 TONS
						CENTURY CRANES	PALWAL	A		UPRO 30 MT EOT CRANES
						REVA INDUSTRIES	FARIDABAD	A		Upto 25MT/Elec. Hoist
						GLOBAL TECHNOLOGY	HYDERABAD	DR		
						LIFTING EQUIPMENTS PVT. LTD.	DELHI	DR		
						SHIVAPRA CRANES	HYDERABAD	DR		
6	DYNAMIC CLASSIFIER					BHEL	HYDERABAD	DR		
7	LUB OIL SYSTEM					LINCOLN HELIOS	BANGALORE	A		
						T A HYDRAULICS	HYDERABAD	A		
						CENLUB INDUSTRIES	FARIDABAD	A		
						UNIQUE ENGINEERING ENTERPRISE P LTD	HYDERABAD	A		
						SOUTHERN LUB	BANGALORE	A		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. :	CS-9585-001-2	
					AND SUB-SUPPLIER APPROVAL			REV. NO. :	0	
Package:		EPC (SG SCOPE)						DATE:	05.04.2017	
Supplier:		BHEL			BHEL, HYDERABAD					
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
ITEM					Proposed sub-supplier			Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place			
		I				HYDAC	MUMBAI	DR		
		I				BHEL -HPEP	HYDERABAD	A		
8	RTD AND THERMOCOUPLE SOLENOID VALVE									DURING QP FINALISATION FROM C&VELECT LIST
9										DURING QP FINALISATION FROM C&VELECT LIST
11	LIMIT SWITCH									DURING QP FINALISATION FROM C&VELECT LIST
12	SEPARATOR BODY	I				KCP	CHENNAI	A		
		I				SIMPLEX	BHILAI	A		
		I				NS ENGG.	HYDERABAD	A		
		I				ALSTOM PROJECTS INDIA LTD.	SHAHABAD	A		
		I				PREMIER ENGG. INDUSTRIES	JEEDIMETLA	A		
		I				SAI SARANG ENGINEERS	JEEDIMETLA	A		
		I				SWATHI INDUSTRIES	HYDERABAD	A		
		I				BHEL HPVP	VISAKHAPATNAM	A		
		I				GODREJ	MUMBAI	DR		
		I				BHEL CFU	JAGDISHPUR	DR		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC (SG SCOPE)						REV. NO. :	0	
Supplier:		BHEL			BHEL, HYDERABAD			DATE:	05.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
		I				ISGEC	YAMUNANAGAR	DR		
13	PGB HOUSING	I				KCP	CHENNAI	A		
		I				SIMPLEX	BHILAI	A		
		I				NS ENGG.	HYDERABAD	A		
		I				GODREJ	MUMBAI	DR		
		I				ISGEC	MUMBAI	DR		
		I				BROWN'S HITECH STRUCTURES BHEL ANC.	HYDERABAD	A		
		I				SRI SRI ENGINEERING WORKS	HYDERABAD	A		
		I				TRIOMECH ENGINEERING	HYDERABAD	A		
		I				SWATHI INDUSTRIES	HYDERABAD	A		
		I				ALSTOM PROJECTS INDIA LTD.	SHAHABAD	DR		
		I				BHEL-HPVP	VISAKHAPATNAM	DR		
		I				BHEL-CSU	JAGDISHPUR	DR		
14	AIR INLET HOUSING	I				ALSTOM PROJECTS INDIA LTD.	SHAHABAD	A		
		I				KCP	CHENNAI	A		
		I				NS ENGG.	HYDERABAD	A		
		I				SIMPLEX	BHILAI	A		
		I				SWATHI INDUSTRIES	HYDERABAD	A		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC (SG SCOPE)						REV. NO. :	0	
Supplier:		BHEL			BHEL, HYDERABAD			DATE:	05.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
		I				PREMIER ENGG. INDUSTRIES	JEEDIMETLA	A		
		I				SAI SARANG ENGINEERS	JEEDIMETLA	A		
		I				BHEL-HPVP	VISHAKHAPATNA M	A		
		I				HYDERABAD METCHAM	HYDERABAD	DR		
						GODREJ	MUMBAI	DR		
		I				BHEL CFU	JAGDISHPUR	DR		
		I				ISGEC	MUMBAI	DR		
15	SEPARATOR TOP	I				ALSTOM PROJECTS INDIA LTD.	SHAHABAD	A		
		I				KCP	CHENNAI	A		
		I				NS ENGG.	HYDERABAD	A		
		I				SIMPLEX	BHILAI	A		
		I				YOGASREE	BANGALORE	A		
		I				PREMIER ENGG. INDUSTRIES	JEEDIMETLA	A		
		I				SAI SARANG ENGINEERS	JEEDIMETLA	A		
		I				BHEL-HPVP	VISHAKHAPATNA M	A		
		I				GODREJ	MUMBAI	DR		
		I				BHEL CFU	JAGDISHPUR	DR		
		I				HYDERABAD METCHAM	HYDERABAD	DR		
16	MILL DISCHARGE VALVE (FABRICATED BODY & MPO) CERAMIC LINED	I				BHEL EPD	BANGALORE	A		



	Project:	PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
								REV. NO. :	0	
	Package:	EPC (SG SCOPE)						DATE:	05.04.2017	
	Supplier:	BHEL				BHEL, HYDERABAD				
	Contract No.:	CS-9585-001-2				SUB-SYST MILLS				
	ITEM					Proposed sub-supplier		Suppliers approval status/ category	Sub-supplier Details submission schedule	
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule		Place			Remarks
17	MILL COUPLING	II				SIEMENS	GERMANY	A		
		II				WELLMAN WACOMA LTD.	KOLKATA	DR		
		II				RATHI TRANSPower	PUNE	DR		
18	KNIFE EDGE GATE VALVES	I				GALAXY CONTROLS PVT. LTD.	CHENNAI	A		UP TO SIZE 26".
		I				ORBINOX INDIA PVT. LTD.	COIMBATORE	A		UP TO SIZE 30".
		I				BRAY CONTROLS (EARLIER-VAAS INDUSTRIES PVT. LTD.)	CHENNAI	A		UP TO SIZE 26".
		I				JASH ENGG. LTD.	INDORE	A		UP TO SIZE 30
		I				GENERAL ENGG. CONSORTIUM	BANGALORE	DR		

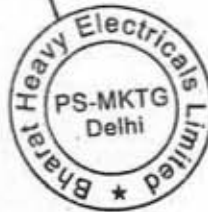
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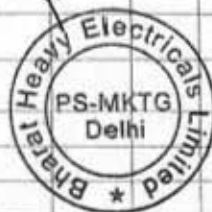


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Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL		DOC. NO. :	CS-9585-001-2		
Package:		EPC (SG SCOPE)					REV. NO. :	0		
Supplier:		BHEL			BHEL, HYDERABAD		DATE:	05.04.2017		
Contract No.:		CS-9585-001-2			SUB-SYST MILLS					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
LEGENDS	AS PER BHEL TRICHY VENDOR LIST									
NOTES : AS GIVEN IN BHEL TRICHY VENDOR LIST										

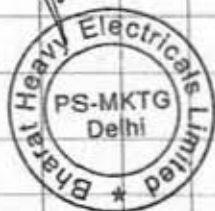


Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. : 0		
Package:		EPC						DATE: 04.04.2017		
Supplier:		BHEL			BHEL RANIPET					
Contract No.:		CS-9585-001-2		SUB-SYST		BOILER AUXILIARIES & ESP				
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
1	AFH	I				REFER SUB QR LIST				VENDORS FOR MAIN STATIC AND ROTATING COMPONENTS SHALL BE TIED UP IN EXECUTION PLAN
2	STEAM COIL AIR PRE HEATER	III				MAIN CONTRACTOR'S APPROVED SOURCES				
3	AIR RECEIVER TANK	III				MAIN CONTRACTOR'S APPROVED SOURCES				
4	FD FAN	I				REFER SUB QR LIST				VENDORS FOR MAIN STATIC, ROTATING COMPONENTS, BLADES SHALL BE TIED UP IN EXECUTION PLAN
5	PA FAN	I				REFER SUB QR LIST				VENDORS FOR MAIN STATIC, ROTATING COMPONENTS, BLADES SHALL BE TIED UP IN EXECUTION PLAN
6	ID FAN	I				REFER SUB QR LIST				VENDORS FOR MAIN STATIC, ROTATING COMPONENTS, BLADES SHALL BE TIED UP IN EXECUTION PLAN
7	SEAL AIR FAN	I				CB DOCTOR & CO.	AHMEDABAD	A		
		I				BHEL	RANIPET	A		
		I				TLT INDIA	GUJARAT	A		
		I				ADREW YULE	KOLKATA	A		
		I				PATEL AIR TEMP	AHMEDABAD	A		
		I				ACCEL	AHMEDABAD	A		
		I				NADI TECHNOLOGIES PVT LTD	CHENNAI	DR		
		I				VACUNAIR ENGG. CO. PVT LTD	AHMEDABAD	DR		



R. A. 14/17.
R. ARUMACHARIAM
BHEL Ranipet

Project:	PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL				DOC. NO. :	CS-9585-001-2	
Package:	EPC							REV. NO. :	0	
Supplier:	BHEL							DATE:	04.04.2017	
Contract No.:	CS-9585-001-2			SUB-SYST	BOILER AUXILIARIES & ESP					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Sched ule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
8	LUB OIL SYSTEM FOR FANS(D,FD & PA)	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		
		I				SPRAYING SYSTEM INDIA PVT. LTD.	BANGALORE	DR		
9	RIGIFLEX COUPLING FOR AXIAL FANS	III				MAIN CONTRACTOR'S APPROVED SOURCES				
10	COOLER FOR FAN LOS	III				MAIN CONTRACTOR'S APPROVED SOURCES				
11	SCREW PUMP FOR LOS	III				LEISSTRITZ	GERMANY	A		
		III				ALEKTON	CHENNAI	A		
		III				KRAL	AUSTRIA	A		
		III				TUSHACO(DELTA)	DAMAN	A		SUB. TO CONDITIONS
		III				DELTA PD PUMPS PVT. LTD.	MUMBAI	DR		
		III				UT PUMPS	FARIDABAD	DR		
12	EMITTING ELECTRODES FOR ESP	I				SIVA SPRINGS	MADRAS	A		



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC						REV. NO. :	0	
Supplier:		BHEL			BHEL RANIPET			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST BOILER AUXILIARIES & ESP					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Sched. ule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
		I				VENKATESWARA STEEL & SPRINGS(INDIA) PVT. LTD.	COIMBATORE	A		
		I				NAGAPPASPRINGS	RANIPET	A		
		I				KWALITY COILS	MADURAI	A		
		I				BEST COILS	RANIPET	A		
		I				VISHNU WIRE FORMS (P) LTD.	MADURAI	A		
13	COLLECTING ELECTRODE FOR ESP	I				BHEL	RANIPET	A		
14	ESP SUPPORT STRUCTURE (COLUMNS & ROOF BEAMS)	I				NTPC APPD SUBCONTRACTORS OF BHEL WITH BHEL MATERIAL				PROJECT SPECIFIC APPROVAL TO BE TAKEN BY BHEL FROM NTPC; VENDOR TO MEET TECH. SPEC. REQUIREMENTS FOR STR. FABRICATION
15	ESP SUPPORT STRUCTURE (COLUMNS & ROOF BEAMS MANUFACTURED FROM ROLLED SECTIONS), CASING	III				BHEL APPD SUBCONTRACTORS WITH BHEL MATERIAL				VENDOR TO MEET TECH. SPEC. REQUIREMENTS FOR STR. FABRICATION
16	COLLECTING/EMITTING ELECTRODE SUSPENSION ASSY.	III				BHEL APPD SUBCONTRACTORS WITH BHEL MATERIAL				



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC						REV. NO. :	0	
Supplier:		BHEL			BHEL RANIPET			DATE:	04.04.2017	
Contract No.:		CS-9585-001-2			SUB-SYST	BOILER AUXILIARIES & ESP				
	ITEM			QP Sub-Sched ule	QP approval schedule	Proposed sub-supplier		Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.				Place			
17	CE AND DE RAPPING MECHANISM	III				MAIN CONTRACTOR'S APPROVED SOURCES				
18	ELECTRICALLY OPERATED HOIST FOR ESP- UPTO 3 TON CAPACITY	III				MAIN CONTRACTOR'S APPROVED SOURCES				
19	GATES	I				NTPC APPD SUBCONTRACTORS OF BHEL WITH BHEL MATERIAL	RANIPET	A		
20	DAMPERS	I				NTPC APPD SUBCONTRACTORS OF BHEL WITH BHEL MATERIAL	RANIPET	A		
21	LRB MATERIALS	I				MINWOOL ROCK FIBRES LTD.	RAJNANDAON, BHILAI	A		
		I				LAPINUS ROCKWOOL LTD.	GWALIOR	A		
		I				LLOYDS INSULATION, CHENNAI	BHILAI	A		
		I				PUNJSTAR INSULATION	BHILAI	A		
		I				GOENKA ROCK WOOL	RAIPUR	A		
		I				THERMOCARE ROCKWOOL PVT. LTD. ES. LTD.	RAJNANDAON	A		
		I				SHREERAM EQUITECH	DURG	A		
		I				MINWOOL ROCK FIBRES LTD.	RAJNANDAON, BHILAI	A		
		I				ROCKWOOL INDIA LTD.	MEDAK-AP	A		
		I				DHANBAD ROCKWOOL INSULATION PVT. LTD.	DHANBAD	A		
		I				MINSULATE MFG. CO.	DAMSHEDPUR	A		
		I				POLYBOND PROJECTS PVT. LTD.	DURG	A		

PS-MKTG
Delhi

Bharat Heavy Electricals Limited

INDIYUJ OIPATTAN NIGAM



Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
					AND SUB-SUPPLIER APPROVAL			REV. NO. : 0		
Package:		EPC						DATE: 04.04.2017		
Supplier:		BHEL			BHEL RANIPET					
Contract No.:		CS-9585-001-2			SUB-SYST BOILER AUXILIARIES & ESP					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Sched ule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
		I				HI-TECH ROCK FIBRE LTD.	RAJNANDGOAN	A		
		I				ROCKWOOL INDUSTRIES	BHILAI	A		
22	VIS FOR FANS	I				GERB	BANGALORE	A		
NOTE 1:		VENDORS UNDER A (ACCEPTED CATEGORY) ARE APPROVED WITH OR WITHOUT CONDITIONS IN PAST. SIMILAR CONDITIONS AS THE CASE MAY BE FOR THE VENDORS SHALL BE APPLICABLE FOR THIS PROJECT AND TIED UP IN THE QUALITY.								
NOTE 2:		VENDORS UNDER DR (DETAILS REQUIRED) CATEGORY SHALL BE REQUIRED TO SUBMIT THE DETAILS IN NTPC QUESTIONNAIRE.								

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Project:		PATRAY U	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		Steam Generator Island Package						REV. NO. :	0	
Supplier:		BHEL						DATE:	05.04.2017	
Contract No.:		CS-9585-001-2			SG & AUX.-FQP & ERECTION SUB-SYSTEM AGENCIES & ESP ERECTION AGENCIES					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
1	BOILER & AUX (PRESSURE PARTS, STRUCTURES, ROTATING EQUIPMENT)					DOWEL ERECTORS PVT. LTD.	CHENNAI	A		NOTE-1
						POWER MECH PROJECTS PVT. LTD.	VIJAYWADA	A		NOTE-1
						BRIDGE & ROOF	KOLKATA	A		NOTE-1
						KARPARA PROJECTS ENGG. PVT. LTD.	SURAT	A		NOTE-1
						IOTEP	MUMBAI	A		NOTE-1
						SUNIL HI-TECH ENGG.	NAGPUR	A		NOTE-1
						TATA PROJECTS LIMITED	HYDERABAD	A		NOTE-1
						TEXCEL ENGINEERS	CHENNAI	A		NOTE-1
						PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE-1
						INDWELL CONSTN. LTD.	VIJAYWADA	A		NOTE-1
						EDAC ENGG. LTD.	CHENNAI	A		NOTE-1
						LARSEN & TUBRO LTD.	MUMBAI	A		NOTE-1
						BHAWANI ERECTORS	KARUNAGAPAL LY	A		NOTE-1
						ESSAR PROJECTS (I) LTD.	MUMBAI	A		NOTE-1
						GOLDEN EDGE ENGG. PVT. LTD.	NEW DELHI	A		NOTE-1
						BROTHER ENGINEER	CENNAI	DR		NOTE-1
						ICS ENGG.	CHENNAI	DR		NOTE-1
						POWER MAX	KOLKATA	DR		NOTE-1
						SWAMINA INTERNATIONALS PVT. LTD.	NEW DELHI	DR		NOTE-1
2	POWER CYCLE PIPING					INDWELL CONSTN. LTD.	VIJAYWADA	A		NOTE-1



G.V. Ramesh .. 12/04/17.
Page 78 of 1005

Project:		PATRAY U	3x800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2		
								REV. NO. :	0		
Package:		Steam Generator Island Package						DATE:	05.04.2017		
Supplier:		BHEL									
Contract No.:					SG & AUX.-FQP & ERECTION						
		CS-9585-001-2			SUB-SYST AGENCIES&ESP ERECTION AGENCIES						
ITEM						Proposed sub-supplier		Suppliers approval status/ category	Sub-supplier Details submission schedule		
S.No.		QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule		Place			Remarks	
						POWER MECH PROJECTS PVT. LTD	VIJAYWADA	A		NOTE-1	
						TEXCEL ENGINEERS	CHENNAI	A		NOTE-1	
						BRIDGE & ROOF	KOLKATA	A		NOTE-1	
						KARPARA PROJECTS ENGG. PVT. LTD.	SURAT	A		NOTE-1	
						SUNIL HI-TECH ENGG.	NAGPUR	A		NOTE-1	
						IOTEP	MUMBAI	A		NOTE-1	
						PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE-1	
						LARSEN & TUBRO LTD.	MUMBAI	A		NOTE-1	
						EDAC ENGG. LTD.	CHENNAI	A		NOTE-1	
						TATA PROJECTS LTD.	HYDERABAD	A		NOTE-1	
						BHAWANI ERECTORS	KERALA	A		NOTE-1	
						U B ENGG.	PUNE	DR		NOTE-1	
						DOWEL ERECTORS	CHENNAI	A		NOTE-1	
						GOLDEN EDGE ENGG.	NEW DELHI	A		NOTE-1	
3	LP PIPING					NOTE-2					
4	HT MOTORS					NOTE-2					
5	COMPRESSED AIR SYSTEM					NOTE-2					
6	MILL REJECT HANDLING SYSTEM					NOTE-2					
7	PASSENGER CUM GOODS ELEVATOR					NOTE-2					



G.V. Patra 12/04/17

Project:		PATRATU	3x800	MW	LIST OF ITEMS REQUIRING FIELD QUALITY PLAN AND ERECTION SUBCONTRACTOR APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		Steam Generator Island Package						REV. NO. :	0	
Supplier:		BHEL						DATE:	05.04.17	
Contractor No.:		CS-9585-001-2			SUB-SYSTEM ESP ERECTION AGENCY					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
1	ESP					BROTHERS ENGG. & ERECTORS	VIJAYAWADA	A		NOTE 1
						POWER MECH PROJECTS	VIJAYAWADA	A		NOTE 1
						BRIDGE & ROOF	KOLKATA	A		NOTE 1
						BHAVANI ERECTORS PVT. LTD.	KERLA	A		NOTE 1
						L&T LTD.	MUMBAI	A		NOTE 1
						PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE 1
						SUNIL HI-TECH	NAGPUR	A		NOTE 1
						DOWEL ERECTORS PVT. LTD.	CHENNAI	A		NOTE 1
						INDWELL CONSTR. LTD.	VIJAYAWADA	A		NOTE 1
						KARPARA PROJECTS ENGG.	SURAT	A		NOTE 1
						TEXCEL ENGINEERS PVT. LTD.	CHENNAI	A		NOTE 1
						TATA PROJECTS LTD.	HYDERABAD	A		NOTE 1
						IOTEP	MUMBAI	A		NOTE 1
						EDAC	CHENNAI	A		NOTE 1
						ZILLION	NEW DELHI	A		NOTE 1
						GOLDEN EDGE ENGG. PVT.LTD.	DELHI	A		NOTE-1
						P E ERECTORS	KOLKATA	A		NOTE-1
				UB ENGG.	PUNE	DR		NOTE-1		
LEGENDS										
1	SYSTEM SUPPLIER / SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)									
A -	For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list alongwith the condition of approval, if any. The same conditions shall be applicable here as well.									
DR -	For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list.									
2	Notes									
Note - 1	Additional vendors may be considered as per MOM provision, organizational, financial & technical aspects will be taken care by BHEL before award of the jobs to the sub contractors. Mobilisation of manpower, tools, tackles to suit the requirements of job schedule shall be tied up by BHEL in consultation with NTPC site before award for which the details of sub contractors shall be forwarded to respective GM /C (NTPC-SITE). I. M/s BHEL to ensure that the requirements of NTPC regarding the deployment of erection Agency in connection with the work schedule for the subject project and package is met.									
Note - 2	BHEL approved sub contractors for erection - would mean NTPC approval is not required									
NOTE 3:	BHEL WILL FOLLOW THEIR STANDARD PROCEDURE, CORPORATE GUIDELINES AND SHALL COMPLY WITH CIRCULARS INSTRUCTIONS ETC. ISSUED BY GOVT./RELEVANT STATUTORY BODIES WHILE TENDERING. HOWEVER FOR NEW VENDOR, BHEL SHALL TAKE APPROVAL FROM NTPC PRIOR TO ORDER PLACEMENT.									



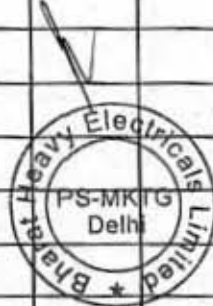
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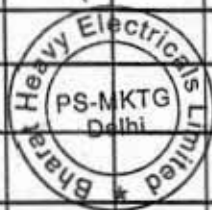
G.V. Ramesh 12/04/17
(G.V. RAJASEKHAR)
1 BHEL-13-20

Project:		PATRAY U	3X800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO.:	CS-9585-001-2	
Package:		EPC/SG						REV. NO.:	0	
Supplier:		BHEL						DATE:	12.05.2015	
Contract No.:		CS-9585-001-2			SUB-SYST BHEL PIPING CENTRE, CHENNAI					
S.No.	ITEM	QPA Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
NOTE: FABRICATION OFFLOADING SHALL BE AS PER AGREED LIST BETWEEN NTPC & BHEL										
1	AUX PRDS UNIT (INCLUDING CONTROL VALVE)									VENDORS TIED UP BHEL PEM VENDOR LIST
2	LIGHTLY BONDED WOOL MATTRESS CONVENTIONAL									VENDORS AS PER BHEL TRICHY BOILER LIST
3	CONVENTIONAL VALVES OTHER THAN BHEL									VENDORS AS PER BHEL TRICHY BOILER LIST
4	HANGERS & SUPPORTS WITH SPRING ARRANGEMENT (INCLUDING CLH/VLH)					PIPE SUPPORTS	UK	A		
						LISEGA	GERMANY, CHINA	A		Lisege, China approval conditions as per NTPC approval letter
						CARPENTER & PATTERSON	UK	A		
						MANNESMANN	GERMANY	A		
						SANWA TAKI	JAPAN	A		
						BROWICK	UK	A		
						GILLARDINI	ITALY	A		
						ITT	GERMANY	A		
						MH	SPAIN	A		



Ali:
(NITIN KUMAR)
PS-M
BHEL

	Project:	PATRAY U	3X800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
								REV. NO. :	0	
	Package:	EPC/SG						DATE:	12.05.2015	
	Supplier:	BHEL								
	Contract No.:	CS-9585-001-2		SUB-SYST BHEL PIPING CENTRE, CHENNAI						
	ITEM					Proposed sub-supplier		Suppliers approval status/ category	Sub-supplier Details submission schedule	
S.No.		QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule		Place			Remarks
5	HANGERS & SUPPORTS (RIGID TYPE) WITHOUT SPRING ARRANGEMENT	III				MAIN CONTRACT APPROVED VENDORS				
6	PIPING FABRICATION-P91 MATERIAL	I				BHEL	TRICHY	A		
7	PIPING FABRICATION (IBR)	I				BHEL	CHENNAI	A		
8	PIPING FABRICATION (NON-IBR)	I				BHEL	CHENNAI	A		
9	BUILT UP BEAMS/FABRICATED BEAMS-AUTO WELDING	I				AS PER BHEL-TRICHY LIST				
10	CONSTANT/VARIABLE LOAD HANGERS (BHEL MAKE)	I				BHEL	TRICHY	A		
11	TANKS AND VESSELS	I				BHEL CHENNAI	CHENNAI	A		
12	NON IBR PIPING / LP PIPING - PR. BELOW 10 MPa	III				BHEL APPROVED SOURCES				
13	STRUCTURE FABRICATION (ROLLED SECTION)	III				BHEL	CHENNAI	A		
14	DEAD WEIGHT CLH	III				BHEL	CHENNAI	A		
15	SHOP MANUFACTURED FITTINGS OF 91 GR.MATL	I				BHEL	TRICHY	A		
16	FLOW ELEMENTS - OTHER THAN BHEL	I								Refer BHEL, Trichy C&I list for Sub-vendors
17	AIR TRAPS	III								BHEL Approved Vendors
18	BEARINGS	III								BHEL Approved Vendors



Project:		PATRA	3X800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. :	CS-9585-001-2	
		U			AND SUB-SUPPLIER APPROVAL			REV. NO. :	0	
Package:		EPC/SG						DATE:	12.05.2015	
Supplier:		BHEL								
Contract No.:		CS-9585-001-2			SUB-SYST BHEL PIPING CENTRE, CHENNAI					
ITEM					Proposed sub-supplier			Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
S.No.		QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Place				
19	CHEMICAL DOSING TANK (HP/LP)	III								BHEL Approved Vendors
20	COOLING WATER VALVES	III								BHEL Approved Vendors
21	FITTINGS-P91/92	I				VENDORS AS PER BHEL TRICHY VENDORS LIST				
22	FITTINGS (CS, SS & AS UPTO GR22)	II								PROCUREMENT FROM BHEL APPROVED VENDORS
23	FIXING COMPONENTS, SEALING COMPOUND FOR INSULATION	III								BHEL Approved Vendors
24	HANGER CONNECT COMP. (CLEVIS, EYENUT, TURNBUCKLE, TIEROD, WELD ON BRACKET ETC)	III								BHEL Approved Vendors
25	INSULATION CLAMPS	III								BHEL Approved Vendors
26	LEVEL GAUGE GLASS (FOR CBD, IBD, FLASH CHEM. DOSING TANKS	III								BHEL Approved Vendors
27	PLUG & BALL VALVES (COOLING WATER AND AIR LINES)	III								BHEL Approved Vendors
28	SIGHT FLOW INDICATORS	III								BHEL Approved Vendors
29	SNUBERS (IMPORTED)	III								BHEL Approved Vendors
30	STEAM TRAPS	III								BHEL Approved Vendors



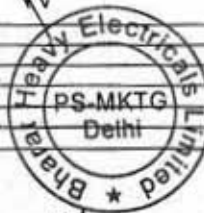
Project:		PATRAY U	3X800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL			DOC. NO. :	CS-9585-001-2	
Package:		EPC/SG						REV. NO. :	0	
Supplier:		BHEL						DATE:	12.05.2015	
Contract No.:		CS-9585-001-2			SUB-SYST BHEL PIPING CENTRE, CHENNAI					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub- Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
31	STEAM TRAPS THERMODYNAMIC TYPE	III								BHEL Approved Vendors
32	STRAINERS	III								BHEL Approved Vendors
33	COOLING WATER PUMP	III				SULZER INDIA	NAVI MUMBAI	A		
		III				KSB	PUNE	A		
		III				KIRLOSKAR	WADI	A		
		III				MATHER AND PLATT	PUNE	A		
		III				BECON WEIR	CHENNAI	A		
		III				SAM PUMPS	COIMBATORE	A		
		III				JYOTI	BARODA	A		
34	LP CHEMICAL DOSING SYSTEM	II				Power Piping	Trichy	A		
		II				V.K.Pumps	Mumbai	A		
		II				Milton Roy	Chennai	A		
		II				Techno Consultants	Mumbai	A		
		II				Positive Metering System	Nasik	A		
		II				PSI Engg System	Chennai	A		
		II				Matz Pump	Ahmedabad	DR		
		II				DEE DEVELOPMENT	HARYANA	DR		
35	LP CONDENSATE TRANSFER PUMP	I				ITT GOULD		A		
		I				FLOWSERVE		A		



Project:		PATRAY	3X800	MW	LIST OF ITEMS REQUIRING QUALITY PLAN			DOC. NO. : CS-9585-001-2		
		U			AND SUB-SUPPLIER APPROVAL			REV. NO. : 0		
Package:		EPC/SG						DATE: 12.05.2015		
Supplier:		BHEL								
Contract No.:		CS-9585-001-2			SUB-SYST BHEL PIPING CENTRE, CHENNAI					
S.No.	ITEM	QP/Insp. Cat.	QP No.	QP Sub-Schedule	QP approval schedule	Proposed sub-supplier	Place	Suppliers approval status/ category	Sub-supplier Details submission schedule	Remarks
						CLYDE PUMPS	GHAZIABAD	A		
						SULZER	NAVI MUMBAI	A		
36	BUTTERFLY VALVES (upto 1400NB-PN10 & upto 300NB-PN15)					R&D Multiple	Valsad	A		
						Fouress Engg.	Bangalore	A		
						Weir BDK	Hubli	A		UPTO 1050NB PN-15
						IL	Palghat	A		
						Intervale	Pune	A		
						KBL	Kondhapuri	A		
						PENTAIR	Kondhapuri	A		UPTO 900NB PN-16
						FLOSERVE	Coimbatore	A		
						L&T		DR		
37	BOILER FEED PUMP(AUX. BOILER)	III								BHEL Approved Vendors
NOTES : A - APPROVED, DR - DETAIL REQUIRED, N - NOTED. REFER TRICHY BOILER LIST FOR OTHER NOTES.										

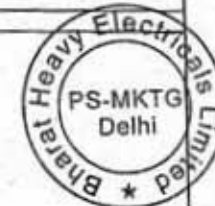


NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-9685-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Sub mission SCH	QP Approval SCH	Proposed Sub Supplier	Place	SS Approval Status	SS Data II Sub. SCH	SS Approval SCH	Remark
1	Slurry re-circulation Pumps	I									Refer Sub.QR List
2	Oxidation Blowers	I									Refer Sub.QR List
3	Wet Limestone Grinding Mill	I									Refer Sub.QR List
4	Slurry Pumps	I									Refer Sub.QR List
5	Agitators	I									Refer Sub.QR List
6	Vacuum Belt Filters	I									Refer Sub.QR List
9	Bucket Elevator	I				Indiana Conveyors Pvt.Ltd. Bevcon Wayors Pvt.Ltd	Jejori, Pune HYDERABAD	A DR			
10	Absorber Tank	I				BHEL	Ranipet	DR			
11	Atmospheric Tanks	III				Main Contractor approved sub contractor					
12	Structural Items(Columns, Beams & Bracings) Built up section.					BHEL	Ranipet	DR			
		I				Jindal	Ghaziabad	A			UP TO 350NB (Black & GI)
		III				TATA STEEL	Jamshedpur	A			UP TO 150 NB (Black & GI)
		III				SAIL	Rourkela	A			
		I				Surya Roshni	Bahadurgarh	A			UP TO 400NB (Black & GI)
		I				Welspun	Anjar	A			UP TO 400NB (Black)



BHEL
SASHI KUMAR
(SASHI KUMAR)

NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : C5-5533-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Sub missi on SCH	QP Appr oval SCH	Proposed Sub Supplier	Place	SS Approv al Status	SS Detail Sub. SCH	SS Approval SCH	Remark
13	MS Pipes (ERW)	I				MSL	Rajgad	A			200 to 500 NB (Black)
		I				Indus Tube	G. B. Nagar	A			UP TO 300 NB (Black & GI)
		I				Jindal Industries	Hisar	A			UP TO 300 NB (Black & GI)
		I				AFL Apollo	Sikandrabad	A			UP TO 300NB (Black)
		I				Dado Pipes	Sikandrabad	A			UP TO 300 NB (Black)
		I				ISMT	Ahmedabad	A			
14	Super welded pipe	I				Rainamani	Anjar / Chalmal	A			
		I				JCO Gas Pipes	Chindwara	A			
		I				SAIL	Raurkela	A			
		I				Surya Global	Kutch	A			
15	LRB Insulation	I				Lloyd Insulation	Chennai	A			
		I				Rockwool Industries	Bhilai / Medak	A			
		I				Minwool Rock Fibres Ltd.	Rajnandgaon	A			
		I				Lapinus Rockwool Ltd.	Qwailor	A			
		I				Punistar(PIFCO)	Bhilai	A			
		I				Goenka Rockwool	Raipur	A			
		I				Rockwool India Ltd.	Medak-AP	A			
		I				Thermocare Rockwool Pvt.Ltd.	Rajnandgaon	A			
		I				Minsulate Mfg.Co	Jamshedpur	A			
		I				Dhanbad Rockwool	Dhanbad	A			
16	Gates & Dampers	I				Indra Damper	Ranipet	A			
		I				Bachmann	Faridabad	A			
		I				Fouress	Bengaluru	A			
		I				BHEL	Ranipet	A			
		I				Clyde Burgmann Bachmann	USA	A			
17	Valves for FGD applications#	I				BHEL	Trichy	A			As per approval (Type/Class/Rating & Material)
		I				Bankim Valves	Howrah	A			CI Gate/Check/Globe upto 600NB,PN16.
		I				H.Sarkar & Co	Howrah	A			CI Gate/Check/Globe upto 700NB,PN16



BHEL
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NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-8885-201-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Submissi on SCH	QP Appr oval SCH	Proposed Sub Supplier	Place	SS Approv al Status	SS Data II Sub, SCH	SS Approval SCH	Remark
		I				Leader	Jalandhar	A		CI Gate/Check/Globe upto 300NB,PN10,SS upto 300NB & CS upto 300NB,Class 150, GM Valve upto 150NB	
		I				Weir BDK	Hubli	A		Gate/Globe/Check Valves upto300NB,Class300 for SS,CI&CS	
		I				KBL	Kondapuri	A		Globe/Check/Check Valve upto 300NB,Class 150	
		I				A.V Valves	Agra	A		CI Gate/Globe/Check Valves upto 300NB,PN10	
		I				Tyco Valves / Pentair Valves	Halol(Gujarat)	A		For CS,CI&SS Butterfly Valve	
		I				L&T	Coimbatore	A		CS&AS-Low Pr. Valves-Gate/Globe/Check Valves upto 26",class600, High Pr. Upto20", 2500class Forged Steel upto 1" 4500 class.	
		I				Weir BDK	Hubli	A		CS Ball Valves(upto 350NB-class150)	
		I				Leader	Jalandhar	A		Valve(upto350NB,class150)	
		I				Leader	Jalandhar	A		Forged Steel(CS) upto300NB,class150.	
		I				Fouress Engineering	Thane,Aurangabad	A		Forged Steel(CS)upto 300NB,Class150)	
		I				Weir BDK	Hubli	A		Diaphragm Valves	
		I				Advance Valve	Noida	A		CI Butterfly valves 1400 NB, PN 10; 300 NB PN16	
		I				Fouress Engineering	Bangalore	A		Knife Gate valves	
		I				Micro Finish	Hubli	A		Ball Valve 350 NB Class 150, upto 50 NB Class 800	
		I				Inter Valves	Pune	A		CI Butterfly valves 1400 NB, PN 10; 300 NB PN16	
		I				Xomos Sammar	Pune / Chennai	A		Forged Steel Gate globe check valve upto 50 NB Class 800	
		I				Dembia	Pune	A		CI Butterfly valves 1400 NB, PN 10; 300 NB PN16	

PS-MKTG
Delhi

Patratu Valvut Utpadan Nigam Ltd
C & M



BHEL
Daul Singh

NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-5583-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Place	SS Approval Status	SS Data II Sub. SCH	SS Approval SCH	Remark
		I				Hawa Engineers	Ahmedabad	A			Forged Steel Gate globe check valve upto 50 NB Class 800
		I									
		I									
		I									
18	Flap Gate, R&P Gate,										
		I				TKIL	Pune	A			
		I				Mining&Material Handling	Kolkata	A			
		I				United Technomac	Pune	A			
		I				MBE	Kumardhubi	A			
		I				Prepec	Howrah	A			
		I				HMTIC	Kolkata	A			
		I				Elecon	VV Nagar	A			
		I				Indiana Conveyor	Jejori, Pune	A			
		I						DR			
		I						DR			
		I						DR			
		I									
19	Water Pumps(process water)	I				Kirloskar Brothers	Pune	A			
		I				Sam Turbo	Coimbatore	A			
		I				Mather & Platt	Pune	A			
		I				KSB	Pune	A			
		I				Weir Minerals	Bangalore	A			
		I				WPIL	Kolkata/Gaziabad	A			
		I				Kishore	Pune	A			
		I				Flow More	Ghaziabad	A			
		I									
20	Metallic Expansion Joints	I				Lonestar Industries	Chennai	A			
		I				Mechwell	Nasik	A			
		I				BHEL	Ranipet	A			
		I									
21	Non-Metallic Expansion Joints for Ducts	I				Keld Ellentoff	Chennai	A			
		I				Eagle Burgmann	Chennai / Denmark	A			
		I				HKR	Korea	A			
		I				Safetech	Spain	A			
		I				Bachmann Industries(India) Ltd.	New Delhi	DR			
		I				Elastomeric Engineers	Salem	DR			
		I				Urja Products Pvt.Ltd.	Ahmedabad	DR			



62

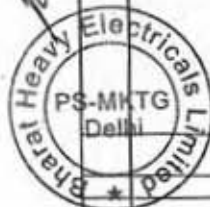
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BHEL
Sub. Insp.

NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-5585-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Sub mission SCH	QP Appr oval SCH	Proposed Sub Supplier	Place	SS Approv al Status	SS Data II Sub. SCH	SS Approval SCH	Remark
22	Electrical Hoist	I				Hercules Hoist Ltd.	Mumbai	A		Electric Hoist upto 15MT	CAT - III upto 5 T capacity Hoist,
		I				Reva Industries	Faridabad	A		Upto 40MT	
		I				Consolidated Hoist	Satara / Pune	A		EOT Cranes upto 40MT and Hoists above 15MT	
		I				Lifting Equipment and Accessories	New Delhi	A		Hoists upto 5MT	
		I				Grip Engineering Pvt.Ltd	Faridabad	A		EOT upto 5MT & Hoist upto 20MT	
		I				Brady & Morris	Ahmedabad	A		Upto 10 Tons	
		I				Consolidated Hoist	Pune	A		Upto 35 Tons at Satara & Upto 15 Tons at Pune works	
		I				Tuobro Furguson India Pvt. Ltd	Kolkata	A		Upto 5 Tons	
		I				Grip Engineers	Faridabad	A		Upto 20 Tons	
		I				Tractel Tirfor India Pvt. Ltd	Patwal	A		Upto 15 Tons	
		I				Universal Hoist Fabrik	Thane	A		Upto 20 Tons	
		I				Mangla Hoist	Greater Noida	A		Upto 10 Tons	
		I				Reva Industries	Faridabad	A		Upto 25 Tons	
		I				Eddy Cranes	Pune	A		Upto 14 Tons	
		I				Alpha Services	Bhiwadi	A		Upto 15 Tons	
		I				Century Crane Engineers	Ballaahgarh	A		Upto 25 Tons	
		I				Grip Engineers	Hyderabad	A		Upto 40 Tons	
		I				Amstel MHE Pvt.Ltd.	Bangalore	A		Hoist upto 15MT,EOT upto 10MT	
		I				Century Crane Engineers	Ballaahgarh	A		Upto 15 Tons	
		I				Tractel Tirfor India Pvt. Ltd	Kalyani	A		Upto 20 Tons	



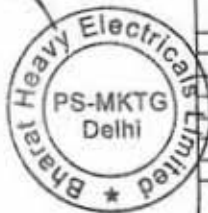
BHEL
Gauri. Singh

NTPC		PROJECT : PATRATU PACKAGE : EPC (FGD) Package MAIN CONTRACTOR : M/s BHEL CONTRACT NO : CS-5585-001-2				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY			REF. NO : REVISION NO : 00 DATE : 16-05-17		
No.	Major Equipment	QP Inspec tion Cate gory	QP No.	QP Sub missi on SCH	QP Appr oval SCH	Proposed Sub Supplier	Place	SS Approv al Status	SS Data II Sub. SCH	SS Approval SCH	Remark
23	Hydro Cyclone	I				FL Smidth	Chennai	DR			
		I				Weir Minerals	Bangalore	A			
		I				Multo Tech	S.Africa	A			
		I				McNally Bharat	Bangalore	DR			
24	Rubber Lining of Pipes	I				Jasmino Polymertech	Taloja	A			
		I				CORI Engineers	Chennai	A			
		I				Western Rubber	Mumbai	A			
		I				Elastomer Lining	Ambemath	A			
		I				Emkay Rubber	Mumbai	A			
		I				Rishi	Bahadgarh	A			
		I				Poly Rubber	Mumbai	A			
		I				Temsec Rubber	Kolkata	A			
		I				Presidency Rubber	Howrah	A			
		I				Anil Rubber Pvt.Ltd	Hosur	A			
		I				Industrial Moulders	Vadodara	A			
		I				MILL Industries	Chennai	DR			
		I				Lebracs rubber	Pondicherry	DR			
25	FRP PIPE with fittings	III				Main contractor approved source		A		upto 3"	
26	Rubber Lining for Tank and absorber	III				MIL Industries	Chennai	A			
		III				TIP TOP	Germany	A			
		III				Steeluser	Germany	A			
		III				Anil Rubber	Hosur	A			
		III				Temsec Rubber	Kolkata	A			
						Lebracs Rubber	Pondicherry	DR			
						CORI Engineers	Chennai	DR			
27	Ventilation Fans	I				Patel Air	Ahmedabad	A			
		I				Marathan Electric	Kolkata	A			
		I				Howden	Kolkata / Chennai	A			
		I				SK System	Sonepat	A			
		I				Andrew Yule	Gurgaon	A			



BHEL
Anil Raut

NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FOD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-5583-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Sub mission SCH	QP Approval SCH	Proposed Sub Supplier	Place	SS Approval Status	SS Detail Sub. SCH	SS Approval SCH	Remark
28	Air receiver					Abacus Heat Transfer	Faridabad	A			
						KBL	Konchapur	A			
						Diamond Fabricators	Pune	A			
						Integrated Engineers	Mumbai	A			
						United Engineering Works	Nasik	A			
						Parkaire	Delhi	A			
						Temasme Vesselex	Noida	A			
						GEM	Coimbatore	A			
						Vee Sons	Trichy	DR			
						Patel Air temp Ltd	Ahmedabad	DR			
						G B Industries	Trichy	DR			
						Par Energy Infra Pvt Ltd	Hyderabad	DR			
						Janta Engineering & Company	Faridabad	DR			
						Sri Rang Industries	Coimbatore	DR			
						C Doctor	Ahmedabad	DR			
29	Structural Steel Rolled /Plate Sections(CS)	I				SAIL		A			
						Ispat Industries		A			
						Lloyds Steel		A			
						JSW		A			
						RINL		A			
30	Structural Steel - Pipes IS 1161	III				Main Contractor approved sources					
31	SS plates	I				JSL Stainless	Chennai	A			Upto 20 mm thick
						Indussteel Loire	France	A			Liner SS 304
						Indussteel Belgium	Belgium	A			GR -304,309,310,316
						Columbus Steel (Acrinox)	Spain	A			GR -304,309,310,316
						SAIL	Bhilai/Salem	A			GR -304,309,310,316



BHEL
Patratu

NTPC		PROJECT : PATRATU				LIST OF ITEMS REQUIRING QP			REF. NO :		
		PACKAGE : EPC (FGD) Package				APPROVAL & ACCEPTABLE			REVISION NO : 00		
		MAIN CONTRACTOR : M/s BHEL				VENDOR AS APPROVED BY			DATE : 16-05-17		
		CONTRACT NO : CS-3585-001-2									
No.	Major Equipment	QP Inspection Category	QP No.	QP Submittal on SCH	QP Approval SCH	Proposed Sub Supplier	Place	SS Approval Status	SS Detail Sub. SCH	SS Approval SCH	Remark
32	Insulation Cladding	III				Nalco	India	A			
		III				Hindalco	India	A			
		III				Jindal	India	A			
LEGENDS											
SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)											
A - For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list alongwith the condition of approval, if any.											
DR - For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list.											
* For the items not appearing in the precaward list, bidder and NTPC will mutually discussed in future.											
QP/ANSPN CATEGORY:											
CAT-I : For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC.											
CAT-II : For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP.											
CAT-III : For these items Main Supplier approves the Quality Plans. The final acceptance by NTPC shall be on the basis certificate of conformance by the main supplier.											
UNITS/ WORKS : Place of manufacturing Place of Main Supplier of multi units/works.											
* - Engr. clearance is also required being a Sub-QP 5- Review of Mill TC for RAW Material to be done by NTPC and shall be included in the QP of corresponding equipment.											



BHEL
Gail Group

PROJECT: PATRATU 3X800 MW		LIST OF ITEMS REQUIRING QUALITY PLAN AND				REF NO. :	
NTPC	PACKAGE: TG	SUBCONTRACTOR APPROVAL SUB SYSTEM: ST& AUX				REV NO.:	
	CONTRACTOR: BHEL HARIDWAR CONTRACT NO.:					DATE: 05.04.2017	
Sl No.	Item	QP Insp. Cat.	NTPC QP No. QVE-Q	Vendor/ Manufacturer Name	Place	SC_AP PL_ST ATUS	Remarks
1	HP OUTER CASING CASTING (EXHAUST)	I	QVM-Q-	JAPAN CASTING AND FORGING	JAPAN	A	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				LITOSTROJ STEEL LTD.	SLOWENIA	DR	
				STAR WIRE (INDIA) LTD.	INDIA	DR	
				ACCIAIERIA FONDERIA CIVIDALE	ITALY	A	
				VOESTALPINE GIESSEREI LINZ	AUSTRIA	A	
				SANDE STAHLGUSS GMBH	GERMANY	A	
				CFFP, BHEL	Haridwar	A	
				HANWA CO. LTD. (MANUFACTURER: UBE STEELS, JAPAN)	JAPAN	DR	
				LUCCHINI RS S.P.A.	ITALY	DR	
2	HP OUTER CASING CASTING (INLET)	I	QVM-Q-	ACCIAIERIA FONDERIA CIVIDALE	ITALY	A*	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP) A* as per approval conditions
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	
				VOESTALPINE GIESSEREI LINZ	AUSTRIA	A	
				CFFP, BHEL	Haridwar	DR	
3	EXHAUST HP OUTER CASING M/C	I	QVM-Q-	HEEP	Haridwar	A	
4	INLET HP OUTER CASING M/C	I		Rossi And Duso	Italy	A	
				MCE (New name BILFINGER MASCHINENBAU GMBH)	Austria	A	
				Bruno Presezzi	Italy	A	
				Nugo Romano	Italy	A	
5	HP INNER CASING CASTING	I	QVM-Q-	VOESTALPINE GIESSEREI LINZ	AUSTRIA	A	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP) A* Approved for wt. upto 20.5T
				ACCIAIERIA FONDERIA CIVIDALE	ITALY	A*	
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	
				HANWA CO. LTD. (MANUFACTURER: UBE STEELS, JAPAN)	JAPAN	DR	
				SANDE STAHLGUSS GMBH	GERMANY	A*	
				SIEMENS AG	GERMANY	DR	
				ISGEC HEAVY ENGINEERING LTD	MUZAFFANAGAR	DR	
				LITOSTROJ STEEL LTD.	SLOVENIA	DR	
				STAR WIRE (INDIA) LTD.	Ballabgarh	DR	
				CFFP, BHEL	Haridwar	A	
6	HP INNER CASING M/C	I	QVM-Q-	HEEP, BHEL	Haridwar	A	



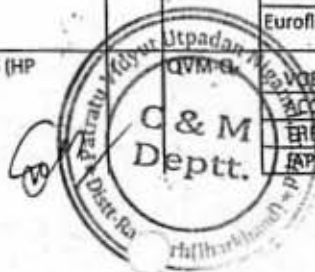
05.04.17

 (SK Chaudhary)

 BHEL Haridwar

 Page 95 of 1005

				Rossi And Duso	Italy	A	
				MCE (New name BILFINGER MASCHINENBAU GMBH)	Austria	A	
				Bruno Presezi	Italy	A	
				Nugo Romano	Italy	A	
7	HP TURBINE SHAFT FORGING 9-10% Cr	II	QVM-Q-	SAARSCHMIEDE GMBH	Germany	A	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
				SCHMIEDEWERKE GRODITZ GMBH	Germany	DR	
				JAPAN CASTING AND FORGING	Japan	A	
				THE JAPAN STEEL WORKS LTD.	Japan	A	
				SDF, Terhi	ITALY	A	
				BOHLER EDELSTAHL GMBH & CO. KG	AUSTRIA	DR	
				UMP TRADING S.A. (SUPPLY THRU ENERGO MASH, UKRAINE)	SWITZERLAND	DR	
8	HP TURBINE SHAFT M/C	I	QVM-Q-	- HEEP	Hardwar	A	
				- Rossi And Duso	Italy	A	
				- Bruno Presezi	Italy	A	
				- Nugo Romano	Italy	A	
				- Siemens AG	Germany	A	
9	HP TURBINE ROTOR	I	QVM-Q-	HEEP	Hardwar	A	
10	HP STATIONARY & MOVING BLADES BAR STOCK	II	QVM-Q-	Böhler	Austria	A	NO SEPARATE VENDOR QP A*: ONLY FOR HW10687 & HW10785
				Walzwerke	Germany	A	
				Metal Ravne	Slovenia	A	
				Starwire	Ballabgarh	A	
				Kalyani Carpenter	Pune	A*	
				BGH	GERMANY	A	
11	HP STATIONARY & MOVING BLADES (M/C)	II	QVM-Q-	Leistriz	Germany	A	
				EnergietechnikEinsal	Germany	A	
				Wuxi Turbine Blade	China	A	
				Officine Meccaniche Zema	Italy	A	
				Wiromet	Poland	A	
				CMSNC DI Menegazzi	Italy	DR	
				HEEP	Hardwar	A	
				Praewest Praezisionswerkstaett	Germany	DR	
				Siemens Ltd	India	DR	
				Euroflex Transmissions (India) Pvt. Ltd.	Hyderabad	DR	
12	ESV & CV CASING CASTING (HP VALVES) MAT 9-10% Cr		QVM-Q-	ALPINE GIESSEREI LINZ	AUSTRIA	A	QP APPROVAL REQD. FOR STARWIRE, ISGEC and CFFP ONLY
				ACCIAIERIA FONDERIA CIVIDALE	ITALY	A	
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	



				HANWA CO. LTD. (MANUFACTURER: UBE STEELS, JAPAN)	JAPAN	DR	
				SANDE STAHLGUSS GMBH	GERMANY	A	
				LITOSTROJ STEEL LTD.	SLOWENIA	DR	
				STAR WIRE (INDIA) LTD.	BALLABHAGARH	A	
				CFFP, BHEL	Haridwar	A	
13	ESV & CV CASING (HP VALVES) M/C	I	QVM-Q-	-HEEP + NTPC approved sub-vendors	Haridwar	A	
				-Energy Machines	Ahemdabad	A	
14	CASTING FOR DIFFUSER / HP VALVE COVER / OVERLOAD VALVE CASING	II	QVM-Q-	INOSSMAN FONDERIE ACCIAIO MANI	ITALY	A	(QP APPROVAL REQD. FOR STARWIRE, ISGEC and CFFP ONLY)
				VOESTALPINE GIESSEREI TRAISEN	AUSTRIA	A	
				EMIRATES TECHNO CASTING FZE	SHARJAH	DR	
				LUCCHINI RS S.P.A.	ITALY	DR	
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	
				SCHMOLZ + BICKENBACH GUSS GMBH	GERMANY	DR	
				STAHLGUSS SAAR GMBH	GERMANY	DR	
				GOODWIN STEEL CASTINGS LTD.	UK	DR	
				PEEKAY STEEL CASTINGS PVT LTD	CALICUT	DR	
				ISGEC HEAVY ENGINEERING LTD	MUZZAFANAGAR	A	
				LITOSTROJ STEEL LTD.	SLOWENIA	A	
				STAR WIRE (INDIA) LTD.	BALLABHAGARH	A	
				CFFP, BHEL	Haridwar	A	
15	HP VALVE ASSEMBLY	I	QVM-Q-	- HEEP	Haridwar	A	
16	HP JOINT BOLTS	I	QVM-Q-	- HEEP + NTPC approved sub-vendors #	Haridwar	A	#REFER NOTE 3
17	HP TURBINE ASSLY	I	QVM-Q-	- HEEP	Haridwar	A	
18	STEAM INLET / BREECH BLOCK / INLET CONNECTION / OVERLOAD CONNECTION / VALVE COVER / ALL RINGS & FORGINGS MAT 9-10%Cr	II	QVM-Q-	STARWIRE	Ballabhgarh	A	QP APPROVAL REQD. FOR CFFP ONLY AND FOR OTHERS BHEL APPROVED QAP TO BE FOLLOWED
				KISAAN STEEL	GHAZIABAD	DR	
				CHW FORGE	GHAZIABAD	A	
				GOODLUCK ENGINEERING	GHAZIABAD	DR	
				CFFP, BHEL	Haridwar	A	
				MIDHANI	HYDERABAD	A	
				BAY FORGE	Chennai	A	
				FORGITAL	ITALY	A	
				BOHLER	AUSTRIA	A	
19	FORGING FOR THREADED RING / SHAFT SEAL RING / RING / EXTRACTION INSERT / FLANGE MAT 1Cr 1Mo	II	QVM-Q-	MACKEL ISPAT AND FORGINGS LTD	INDIA	DR	QP APPROVAL REQD. FOR CFFP ONLY AND FOR OTHERS BHEL APPROVED QAP TO BE FOLLOWED
				STAR WIRE (INDIA) LTD.	Ballabhgarh	A	
				KISAAN STEELS (PVT.) LTD.	GHAZIABAD	A	
				CHW FORGE (P) LTD	GHAZIABAD	A	
				GOOD LUCK ENGINEERING CO.	GHAZIABAD	A	
				GHAZIABAD FORGINGS PVT LTD	GHAZIABAD	DR	
				R. D. FORGE	GHAZIABAD	DR	
				CFFP, BHEL	Haridwar	A	



				VISHNU FORGE	Bangalore	A	
				RING FORGINGS PVT LTD	Bangalore	DR	
				GHAZIABAD ISPAT UDYOG LTD.	GHAZIABAD	DR	
				VIKRANT FORGE LIMITED	KOLKATA	DR	
				BAY-FORGE LIMITED	Chennai	A	
				FORGITAL ITALY S.P.A.	ITALY	A	
20	IP OUTER CASING CASTING (NODULAR CASTING)	II	QVM-Q-	HANWA CO. LTD. (MANUFACTURER: UBE STEELS, JAPAN)	JAPAN	DR	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
	BEARING PEDESTAL WITH COVER (NODULAR CASTING)	I		FRIEDRICH WILHELM-HUETTE EISEN(BUDERGUSS)	GERMANY	A	
				ERGOCAST GUSS GMBH	GERMANY	A	
				SPEZIALGUSS WETZLAR GMBH	GERMANY	A	
				ACCIAIERIA FONDERIA CIVIDALE	ITALY	A	
				DALIAN HUARUI HEAVY INDUSTRY	CHINA	A	VENDOR QP REQUIRED ONLY FOR M/s ISGEC
				ISGEC HEAVY ENGINEERING LTD	Mujaffarnagar	DR	
				KOCEL MACHINERY CO. LTD	CHINA	DR	
21	IP OUTER CASING M/C	I	QVM-Q-	- HEEP	Hardwar	A	
				- Rossi And Duso	Italy	A	
				-MCE (New name BILFINGER MASCHINENBAU GMBH)	Austria	A	
				-Bruno Presezzl	Italy	A	
				-Nugo Romano	Italy	A	
22	IP INNER CASING CASTING (9% Cr)	I	QVM-Q-	ACCIAIERIA FONDERIA CIVIDALE	ITALY	DR	NO SEPARATE VENDOR QP EXCEPT FOR CFFP
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	
				SIEMENS AG	GERMANY	DR	
				VOESTALPINE GIESSEREI LINZ	AUSTRIA	A	
				ISGEC HEAVY ENGINEERING LTD	MUJAFFARNAGAR	DR	
				CFFP,BHEL	Hardwar	A	
23	IP INNER CASING M/C	I	QVM-Q-	HEEP	Hardwar	A	
				Rossi And Duso	Italy	A	
				MCE (New name: BILFINGER MASCHINENBAU GMBH)	Austria	A	
				Bruno Presezzl	Italy	A	
				Nugo Romano	Italy	A	
24	IP ROTOR FORGING 9-10% Cr	II	QVM-Q-	SDF .TERNI	Germany	A	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
				JAPAN CASTING AND FORGING JAPAN	Italy	A	
				SAARSCHMIEDE GMBH, GERMANY	Japan	A	
				THE JAPAN STEEL WORKS LTD.,	JAPAN	A	
25	IP TURBINE SHAFT M/C	I	QVM-Q-	- HEEP	Hardwar	A	
				- Rossi And Duso	Italy	A	
				-Bruno Presezzl	Italy	A	
				-Nugo Romano	Italy	A	
				-Siemens AG	Germany	A	
26	IP TURBINE ROTOR		QVM-Q-	Siemens AG Energy Sector	GERMANY	A	
				HEEP	Haridwar	A	



27	IP STATIONARY & MOVING BLADES BAR STOCK	II	QVM-Q-	Böhler	Austria	A	NO SEPARATE VENDOR QP A*: ONLY FOR HW10687 & HW10786
				Walzwerke	Germany	A	
				Metal Ravne	Slovenia	A	
				Starwire	Balabharh	A	
				Kalyani Carpenter	Pune	A*	
				BGH	GERMANY	A	
28	IP STATIONARY & MOVING BLADES (M/C)	II	QVM-Q-	Leibnitz-Nürnberg	Germany	A	
				EnergietechnikEinsal	Germany	A	
				Wuxi Turbine Blade	China	A	
				Officine Meccaniche Zema	Italy	A	
				Wiromet	Poland	A	
				CMSNC Di Menegazzi	Italy	DR	
				Praewest Präzisionswerkstaett	Germany	DR	
				HEEP	Hardwar	A	
				Siemens Ltd	India	DR	
				Euroflex Transmissions (India) Pvt. Ltd.	Hyderabad	DR	
29	IV CV VALVE CASING (MAT) 9-10 %Cr	I	QVM-Q-	VOESTALPINE GIESSEREI LINZ	AUSTRIA	A	QP APPROVAL REQD. FOR STARWIRE, CFFP, ISGEC
				ACCIAIERIA FONDERIA CIVIDALE	ITALY	A	
				LUCCHINI RS S.P.A.	ITALY	DR	
				THE JAPAN STEEL WORKS LTD.	JAPAN	A	
				JAPAN CASTING AND FORGING	JAPAN	A	
				HANWA CO. LTD. (MANUFACTURER: UBE STEELS, JAPAN)	JAPAN	DR	
				SCHMOLZ + BICKENBACH GUSS GMBH	GERMANY	DR	
				STAHLGUSS SAAR GMBH	GERMANY	DR	
				ISGEC HEAVY ENGINEERING LTD	MUJIAFFARNAGAR	A	
				LITOSTROJ STEEL LTD.	Slovenia	DR	
				STAR WIRE (INDIA) LTD.	Balabharh	A	
				CFFP, BHEL	Haridwar	A	
30	IV CV CASING M/C	I	QVM-Q-	- HEEP	Haridwar	A	
				- Energy Machines	Ahemdabad	A	
				- Siemens AG Energy Sector	Germany	A	
31	IV CV VALVE ASSEMBLY	I	QVM-Q-	- HEEP	Hardwar	A	
32	IP JOINT BOLTS	I	QVM-Q-	- HEEP + NTPC approved sub-vendors #	Hardwar	A	# REFER NOTE 3
33	IP TURBINE ASSLY	I	QVM-Q-	- Siemens AG Energy Sector	Germany	A	
				HEEP	HARIDWAR	A	
34	IP SHAFT SEALING RING			- HEEP + NTPC approved sub-vendors #	Hardwar	A	# REFER NOTE 3
35	LP TURBINE SHAFT FORGING	II	QVM-Q-	UMP TRADING S.A. (SUPPLY THRU ENERGO MASH, UKRAINE)	SWITZERLAND	DR	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
				SDF TERNI	Italy	A	
				THE JAPAN STEEL WORKS LTD., JAPAN	Japan	A	
				JAPAN CASTING AND FORGING, JAPAN	Japan	A	
				SAARSCHMIEDE GMBH, GERMANY	GERMANY	A	
				CHINA FIRST HEAVY INDUSTRIES, CHINA	CHINA	DR	
				SC DOOSAN IMGB SA, ROMANIA	ROMANIA	DR	



				CHINA NATIONAL ERZHONG GROUP, CHINA	CHINA	DR	
				SHANGHAI HEAVY MACHINERY PLANT, CHINA	CHINA	DR	
36	LP TURBINE SHAFT M/C	I	QVM-Q-	- HEEP	Hardwar	A	
				- Rossi And Duso	Italy	A	
				- Nugo Romano	Italy	A	
				- Siemens AG	Germany	A	
37	LP TURBINE ROTOR	I	QVM-Q-	HEEP	Haridwar	A	
38	LP INNER CASING FABRICATION	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Haridwar	A	# REFER NOTE 3
39	LP INNER CASING M/C	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Haridwar	A	# REFER NOTE 3
40	LP INNER CASING ASSLY	I	QVM-Q-	- HEEP	Haridwar	A	
41	CASING UPPER PART, CASING SIDE WALL (L&R), FRONT WALL (TS&GS)	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Haridwar	A	# REFER NOTE 3
42	GUIDE BLADE CARRIER (1L & 1R)	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Hardwar	A	# REFER NOTE 3
43	LPT COMPENSATORS	I	QVM-Q-	BOA Bellows and expansion joints	Germany	A	
				Flexatherm expanlow Pvt.Ltd.	VADODRA	A	
				SHANGHAI YONGXIN CORRUGATE PIPE CO LTD	CHINA	A	
				Lonestar Industries	Chennai	A	
				NANTONG SHUGUANG EXPANSION JOINT	CHINA	DR	
				Belman A/S	Denmark	DR	
				Siemens Limited	India	DR	
44	COMPENSATOR PIPING (LP CROSS OVER PIPE, LP EXTRACTION PIPING A1, A2, A3, LP SHAFT SEAL COMPENSATOR, LPT COMPENSATOR FOR CASING)	I	QVM-Q-	HATEC HAAG- TECHNISCHER HANDEL	Germany	A	
				LONESTAR INDUSTRIES	India	A	
				SHANGHAI YONGXIN CORRUGATE PIPE CO LTD	CHINA	A	
				UNITECH MACHINES LTD	India	DR	
45	LP STATIONARY/ MOVING BLADE BARS	II	QVM-Q-	- Böhler	Austria	A	NO SEPARATE VENDOR QP
				- Walzwerke	Germany	A	A*: ONLY FOR HW10687 & HW10786
				- Metal Ravne	Slovenia	A	
				- Starwire	Ballabgarh	A	
				- Kalyani Carpenter	Pune	A*	
				BGH	GERMANY	A	
46	LP ROTOR & CASINGS BLADES FROM BAR (M/C)	I	QVM-Q-	- Leistriz-Nürnberg	Germany	A	
				- Energietechnik Einsal	Germany	A	
				- Wuxi Turbine Blade	China	A	
				- Officine Meccaniche Zema	Italy	A	
				- Wiromet	Poland	A	
				- OMNC Di Menegazzi	Italy	DR	
				HEEP	Hardwar	A	
47	LP CAST BLADES (CASTED)	I	QVM-Q-	- Consolidated Precision Product	Belgium	A	



45.04.17

				- PTC	Mehsana	A	
				- IPCL	Bhavnagar	A	
				- PCI Ltd	India	DR	
48	LP BLADES (HOLLOW)	I	QVM-Q-	- Binder	Switzerland	A	
				- Cave	Italy	DR	
				- Wuxi Turbine Blade	China	A	
				- Prime Hitech Engineering Ltd	India	A	
				- VRK Industries	India	DR	
49	LP FORGED BLADES (DROP)	II	QVM-Q-	- Wuxi	China	A	NO SEPARATE VENDOR QP (ALREADY COVERED IN NTPC APPROVED BHEL MQP)
				- C Blade	Italy	A	
				- Pietro Rosa	Italy	A	
				- Siemens Ltd	Gurgaon	DR	
				- Bohler	Austria	A	
50	LP FORGED BLADES (DROP) M/c	II	QVM-Q-	- Pietro Rosa	Italy	A	
				- Wuxi Turbine Blade	China	A	
				- C Blade	Italy	A	
				- Bohler	Austria	A	
				- Siemens Ltd	Gurgaon	DR	
51	LP ASSEMBLY	I	QVM-Q-	- BHEL	Hardwar	A	
52	COUPLING BOLTS & NUTS (HP/IP/LP)	I	QVM-Q-	- HECP + NTPC approved sub-vendors #	Hardwar	A	# REFER NOTE 3
53	BRG. SHELL FOR JOURNAL BRG (Forging)	II	QVM-Q-	MACKEIL ISPAT AND FORGINGS LTD	KOLKATA	DR	NO SEPARATE VENDOR QP EXCEPT FOR CFFP
				STAR WIRE (INDIA) LTD.	Ballabgarh	A	
				KISAAN STEELS (PVT.) LTD.	GHAZIABAD	A	
				CHW FORGE (P) LTD	GHAZIABAD	A	
				GOOD LUCK ENGINEERING CO.	GHAZIABAD	A	
				GHAZIABAD FORGINGS PVT LTD	GHAZIABAD	DR	
				R. D. FORGE	GHAZIABAD	DR	
					HARIDWAR	DR	
				CFFP, BHEL			
				VISHNU FORGE INDUSTRIES LTD.	Bangalore	A	
				RING FORGINGS PVT LTD	Bangalore	DR	
				GHAZIABAD ISPAT UDYOG LTD.	GHAZIABAD	DR	
				VIKRANT FORGE LIMITED	KOLKATA	DR	
				BAY-FORGE LIMITED	TAMIL NADU	A	
54	JOURNAL BEARING	II	QVM-Q-	DAEDONG METAL INDUSTRY CO. LTD	South Korea	DR	
				EURO BEARINGS SRL	Italy	A	
				GFM S.R.L. (SOCIO UNICO)	Italy	DR	
				JOHN CRANE BEARING TECHNOLOGY	Germany	A	
				OMEGA INDUSTRIES (P) LTD	Bhopal	A	
				SHENKE SLIDE BEARING CORPORATI	China	DR	
				SIEMENS LIMITED	India	DR	(Main supplier ; Siemens Germany)
				HEEP	HARIDWAR	A	
				TURBOLINK CO.LTD	Korea	DR	



55	BEARING PEDESTAL WITH COVER (M/C)	I		- HEEP + NTPC approved sub-vendors	Hardwar	A	
56	EHA FOR TURBINE VALVES	II	QVM-Q-	- Bosch Rexroth AG	Germany	A	
				- Horst Thiele Maschinenbau	Germany	DR	
57	HPSU FOR EHA	II	QVM-Q-	- Bosch Rexroth	Germany*	A	*Supply from Bosch Rexroth Sanand Gujrat
				- Hydac	Germany	A	
				- Reineke Mess-und Regeltechnik	Germany	DR	
				- Keicher Engg	Germany	DR	
				- Hydac	India	DR	
58	NON RETURN VALVE-CRH	I	QVM-Q-	- Sempell	Germany	A	
				- BHEL	Tiruchi	A	
59	AIR COOLED CONDENSOR (Sub-QR Item)	I	QVM-Q-	SPX, Dry Cooling	BELGIUM	A	
				Shuanliang Eco-Energy System Co. Ltd. Jiangsu	CHINA	A	
				Harbin Air Conditioning Co. Ltd	CHINA	A	
				Enxio Germany GmbH	GERMANY	A	
				Beijing Shouhang Resources Saving Co. Ltd	CHINA	A	
				SPIG SPA	ITALY	DR	
				Enxio Cooling Tower Technologies(India) Pvt Ltd	INDIA	DR	
				Paharpur Cooling Tower	INDIA	DR	
				Innospin AG	Switzerland	DR	
				Beijing Longyuan Cooling Technologies	CHINA	DR	
				Hamon Shriram Cottrell	INDIA	DR	
				Hamon Cooling System (Tianjin) Co., Ltd.	CHINA	DR	
				Luoyang LONGHUA Heat Transfer & Energy saving conser	CHINA	DR	
				HHI, China	CHINA	DR	
60	CONDENSOR AIR EVACUATION PACKAGE	I	QVM-Q-	Gardner Denver Nash Machinery	CHINA	A	
				Edwards Ltd	UK	A	
				Guangdong Foshan Pump Factory, Guangdong	CHINA	A	
61	LP HEATER TUBES	I	QVM-Q-	- Apex Tubes Pvt Ltd	India	A	
				- Karamani	Ahmedabad & Kutch	A	
				- NEOTIS LTD (OLD NAME: Vallourec Heat Exchanger Tubes Limited)	Hyderabad	A	
				- Renli	Mumbai	A	



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				- Ratandeep	Ahmedabad	A	
				MAXIM TUBES CO. LTD	GUJRAT	DR	
				- Heavy Metals	Ahmedabad	DR	
62	GSC TUBES	I	QVM-Q-	- Ratnamani	Ahmedabad & Kutch	A	
				NEOTISS LTD (OLD NAME: Vallourec Heat Exchanger Tubes Limited)	Hyderabad	A	
				- Remi	Mumbai	A	
				- Ratandeep	Ahmedabad	A	
				- Heavy Metals & Tubes	Ahmedabad	DR	
				- Apex Tubes Pvt Ltd	BEHROR	A	
				- Quality Stainless	HISAR	DR	
				- Bhandari Foils & Tubes	DEWAS, MP	DR	
				- Prakash Steelage	Mumbai	DR	
65	GLAND STEAM CONDENSER	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Hardwar	A	# Refer Note 3
66	LP HEATER	I	QVM-Q-	- HEEP + NTPC approved sub-vendors#	Hardwar	A	# Refer Note 3
67	TURBINE INTEGRAL PIPING	I	QVM-Q-	BHEL Piping Centre	Chennai	A	A* means as per approval conditions
				Unitech	Saharanpur	A	
				Bend Joints	Bhopal	A	
				Pal Engg.	Yamunanagar	A	
				Dee Development	Faridabad	A	
				Flash Forge Pvt Ltd	Vishakhapatnam	DR	
				BABY ENGINEERING PVT LTD	TRICHY	DR	
				S & G ENGINEERS PVT LTD	Faridabad	DR	
				GUJRAT INFRA PIPES	BARODA	A*	
				Steel Craft Industries	Yamunanagar	DR	
68	OIL MODULE	II	QVM-Q-	Kelag	Switzerland	A	
				VDL Delmas	Germany	A	
				BARIC	UK	A	
				Hydac India Pvt Ltd	Navi Mumbai	DR	
				AEL	Germany	A	
				Flenco	Italy	A	
				Hydac	Germany	A	
				King Dynamics	Switzerland	A	
69	OIL PURIFICATION SYSTEM	I	QVM-Q-	GEA Westfalia Separator	Bangalore	A	
				Alfa Laval (India)	Pune	A	
70	HANGERS & SUPPORT (Fabricated Type)	I	QVM-Q-	Pal Engg.	Yamunanagar	A	
				Darshan	Yamunanagar	A	
				Shree Engg.	Haridwar	A	
				Bend Joints	Bhopal	A	

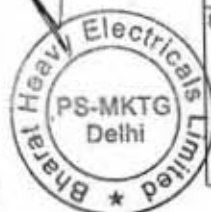


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				Shape Engrg.	Haridwar	A	
				Bend Joints	Bhopal	A	
				Spring Supports Mfg.co.	HOWRAH	DR	
				Pipe Supports Co.	Hyderabad	DR	
				Hesterberg GmbH & Co. Kg	Germany	DR	
				Fast Tech Engineers Pvt. Ltd.	India	DR	
				Bergen Pipe Supports India Pvt Ltd	Chittor, AP	A	
				AAA SUPPORTS PVT LTD	VADODRA	DR	
				Unison Etech	Korea	DR	
71	LP BYPASS SYSTEM	II	QVM-Q-	- CONTROL COMPONENT INDIA PRIVATE LTD.	SRI CITY, AP INDIA	A	SUB QR ITEM
				- Bomafa	Germany	A	
				- Welland & Tuxhorn	Germany	A	
				- Parcol S.P.A	Italy	DR	
72	THERMAL INSULATION MATERIAL FOR TURBINE	III	QVM-Q-	Heinrich Tapp GmbH	Germany	A	
		III		Eugen Arnold GmbH	Germany	A	
		I		Lloyds Insulations (India) Ltd	India	DR	
73	THERMAL INSULATION MATERIAL FOR TIP	I	QVM-Q-	Lloyds Insulation	India	A	
		I		SHREE ENGINEERS	INDORE	DR	
		I		Indo Bell Insulation (Applicator)	India	DR	
74	VARIABLE LOAD SPRING CAGES	I	QVM-Q-	- Spring Support	Kolkata	A	
		III		- Lisega	Germany	A	
		II		- Dee Development	India	DR	
		II		- Pipe Supports Co	Hyderabad	DR	
		I		- Bergen Pipe Supports India Pvt Ltd	Chittor, AP	A	
		II		AAA SUPPORTS PVT LTD	VADODRA	DR	
		II		-Unison Etech	Korea	DR	
75	GLAND STEAM EXHAUSTER WITH MOTOR	I	QVM-Q-	Air MOVEMNET AND CONTROL SYSTEMS	India	DR	
				SK System PVT LTD	India	A	
				DUSTECH ENGINEERS PVT LTD		DR	
				CB Doctor	India	A	
79	HP U-SEAL (NIMONIC) RING FORGING	III	QVM-Q-	SMT EXPORT (M/S FRISA FORJADOS, MEXICO)	INDIA	DR	
				MIDHANI	INDIA	A	
				WARTON IMPORT (M/S SHANGHAI TENGHUI, CHINA)	China	DR	
				FORGITAL	Italy	A	
80	STELUTED/COATED FINISH MACHINED VALVE SEAT / VALVE CONE / VALVE SPINDLE / DIFFUSER	I	QVM-Q-	Sal Surface coating	India	A	QP APPROVAL REQD. FOR INDIAN VENDORS ONLY
		III		Kennametal Stellite GMBH	Germany	A	
		III		Stellba AG	Germany	A	
		I		ATS Techno Pvt. Ltd.	Ahmedabad	A	
		I		Associated Plasmatron Pvt.Ltd.,	THANE	A	
		I		ASM Thermal spray,	Medak, Telangana	DR	

NOTE 1: IN ADDITION TO ABOVE SOURCES BHEL MAY PROCURE ITEMS FROM SIEMENS, SIEMENS APPROVED SOURCES. BHEL TO SUBMIT DOCUMENTS IN SUPPORT OF SIEMENS APPROVED SOURCE.

NOTE 2: QP/INSPECTION CAT-I QP APPROVAL AND INSPECTION BY NTPC; QP/INSPECTION CAT-II QP APPROVAL BY NTPC, NO PHYSICAL INSPECTION BY NTPC, ACCEPTANCE BASED ON REVIEW OF CONTRACTOR INSPECTION REPORT/ TC. : QP/INSPECTION CAT-III NO QP APL AND INSPECTION BY NTPC, ACCEPTANCE



BASED ON REVIEW OF COC BY BHEL.

NOTE 3: MQP APPROVED FOR BHEL HARIDWAR SHALL BE USED ON SUB-VENDOR'S WORKS. FABRICATION AND MACHINING VENDORS FOR BHEL TURBINE COMPONENTS AS PER ANNEXURE XXX



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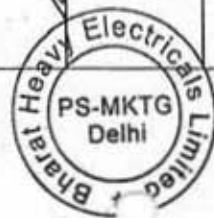
SIEMENS**BHEL / NTPC Limited****Patratu Stage I, 3x800 MW, SST5-6000 USC, India**

Technical Offer				
Ref. No.	Section	Title	Rev. No.	Date
IN1141; Var.A.2.3.4; PG SU PRO EUS, CW.	15.1.0	Sub-Supplier-Steam-Turbine	00	Oct.2016
The information given in this section is not subject to verification and non fulfillment of it or incorrectness/incompleteness of such information is not subject to any kind of rights or remedies of the Customer whatsoever.				

15.1 Sub Suppliers Steam Turbine**Items and their potential Sub Supplier's**

SI No.	Item	Inspection Category	Siemens QP No.	Sub Supplier Name	Place	Remarks
1	HP OUTER CASING CASTING EXHAUST	II	111130	Voestalpine Giesserei Lucchini Sande Stahlguss GmbH Gröditz Stahlguss Schmolz und Bickenbach	www.voestalpine.com/foundry_linz Austria Italy Germany Germany Germany	A A* A A A*
2	HP OUTER CASING CASTING INLET	II	111122	Voestalpine Giesserei Sande Stahlguss GmbH	www.voestalpine.com/foundry_linz Austria Germany	A DR
3	HP OUTER CASING EXHAUST M/C	I	111360	Siemens AG EnergySector MCE Voest Horst Jung Leipert Ludwig Lehner Hans Richter GmbH	Germany Austria Germany Germany Germany Germany	A A A* A A* A*
4	HP OUTER CASING INLET M/C	I	111355	Siemens AG EnergySector MCE Voest Horst Jung Leipert	Germany Austria Germany Germany	A A A* A
5	HP INNER CASING CASTING	II	115112	Voestalpine Giesserei Sande Stahlguss GmbH Lucchini Schmolz & Bickenbach	www.voestalpine.com/foundry_linz Austria Germany Italy Germany	A A DR DR

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SK Chandra
Bharat Heavy Electricals
Page: 1 of 13

SIEMENS**BHEL / NTPC Limited**
Patratu Stage I, 3x800 MW, SST5-6000 USC, India

Technical Offer				
Ref. No.	Section	Title	Rev. No.	Date
IN1141; Var.A.2.3.4; PG SU PRO EUS, CW.	15.1.0	Sub-Supplier-Steam-Turbine	00	Oct.2016
The information given in this section is not subject to verification and non fulfillment of it or incorrectness/incompleteness of such information is not subject to any kind of rights or remedies of the Customer whatsoever.				

Sl No.	Item	Inspection Category	Siemens QP No.	Sub Supplier Name		Place	Remarks
6	HP INNER CASING M/C LP stationary casings only	I	115310	Siemens AG Energy Sector Siemens AG Energy Sector MCE Voest Horst Jung Leipert Hans Richter GmbH		GermanyUS A Austria Germany Germany Germany	A DR A A* A A*
7	HP TURBINE SHAFT FORGING	II	121101	Saarschmiede S.d.F.Terni JSW (Japan steel works JCFC (Japan Casting&Forging Corp.) Schmiedewerke Gröditz	www.saarschmiede.com www.fucineterni.it www.jsw.co.jp www.jcfc.jp www.stahl-groeditz.de	Germany Italy Japan Japan Germany	A A A A A*
8	HP TURBINE SHAFT M/C	II I	121390	Siemens AG Energy Sector Siemens AG Energy Sector		Germany USA	A DR
9	HP TURBINE ROTOR	I	121390	Siemens AG Energy Sector Siemens AG Energy Sector		Germany USA	A DR
10	HP/ IP STATIONARY & MOVING BLADES BAR STOCK	II	131100	Böhler Einsal Metalravne		Austria Germany Slovenia	A A A*

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Page: 2 of 13

SIEMENS**BHEL / NTPC Limited****Patratu Stage I, 3x800 MW, SST5-6000 USC, India****Technical Offer**

Ref. No.	Section	Title	Rev. No.	Date
IN1141; Var.A.2.3.4; PG SU PRO EUS, CW.	15.1.0	Sub-Supplier-Steam-Turbine	00	Oct.2016
The information given in this section is not subject to verification and non fulfillment of it or incorrectness/incompleteness of such information is not subject to any kind of rights or remedies of the Customer whatsoever.				

SI No.	Item	Inspection Category	Siemens QP No.	Sub Supplier Name	Place	Remarks
11	HP/ IP STATIONARY & MOVING BLADES (M/C)	II	131300	SET Leistritz-Nürnberg Energietechnik Einsal	Hungary Germany Germany	A A A
		I			www.turblade.com	
12	ESV & CV CASING (HP VALVES) MAT IVCV (IP VALVES) Casing	II	141111	Sande Stahlguss Voestalpine Glesserei	Germany Austria	A A
	ESV & CV CASING (HP VALVES) M/C IVCV Casing (IP VALVES) M/c	I	141340	Siemens Energy Sector	Germany	A
13	HP VALVE ASSEMBLY IVCV Valve Assembly	I	145401	Siemens AG Energy Sector	Germany	A
14	HP JOINT BOLTS	I	165220	Stahlberg GmbH	Germany	A
15	HP TURBINE ASSLY	I	199420	Siemens AG Energy Sector	Germany	A
15A	HP U SEAL	II	148353	Siemens AG Energy Sector Rosswag Kind & Co Deloro Metall Ravne	Germany Germany Germany Slovenia	N (for all)
					www.edelstahl-rosswag.de www.kind-o.de/kc_2010/index.html www.stellite.de	

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Page: 3 of 13

Page 108 of 1005

SIEMENS**BHEL / NTPC Limited**
Patratu Stage I, 3x800 MW, SST5-6000 USC, India

Technical Offer				
Ref. No.	Section	Title	Rev. No.	Date
IN1141; Var.A.2.3.4; PG SU PRO EUS, CW.	15.1.0	Sub-Supplier-Steam-Turbine	00	Oct.2016
The information given in this section is not subject to verification and non fulfillment of it or incorrectness/incompleteness of such information is not subject to any kind of rights or remedies of the Customer whatsoever.				

SI No.	Item	Inspection Category	Siemens QP No.	Sub Supplier Name	Place	Remarks
15B	BREACH NUT	III	188300	Siemens AG Energy Sector Rosswag Kind & Co KST Stellba Deloro Metal Ravne	Germany Germany Germany Germany Switzerland Germany Slovenia	N (for all)
15C	HP SUPPORT & THRUST RING	III	188300	Siemens AG Energy Sector Rosswag Kind & Co KST Stellba Deloro Metal Ravne	Germany Germany Germany Germany Switzerland Germany Slovenia	N (for all)
15D	HP INLET INSERT CASTING & HP EXHAUST FLANGE	II	188300	Siemens AG Energy Sector Rosswag Kind & Co KST Stellba Deloro Metal Ravne	Germany Germany Germany Germany Switzerland German Slovenia	N (for all)
15E	SEALING RING	III	162302	Siemens AG Energy Sector Rosswag Kind & Co KST Stellba Deloro Metal Ravne	Germany Germany Germany Germany Switzerland Germany Slovenia	N (for all)

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Page: 4 of 13