

CLAUSE NO.	TECHNICAL REQUIREMENTS				
	* 1.0 All cables to be supplied shall be of type tested quality. The Contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last Ten years from the date of bid opening. These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. 2.0 In case the Contractor is not able to submit report of the type test(s) conducted within last Ten years from the date of bid opening, or in case the type test report(s) are not found to be meeting the specification requirements, the Contractor shall conduct all such tests either in an independent laboratory or at manufacturer's works in presence of Owner's representative under this contract free of cost to the Owner and submit the reports for approval. **These tests shall be carried out as per VDE0207 Part 6 & ASTM D-2116 for TEFLON insulated & outer sheathed cables ***Applicable for armoured cables only				
9	DC Power Supply System (Applicable for each model and rating)				
	1)The Type Test reports for offered rectifier module and the controller module irrespective of the rectifier bank shall be acceptable				
	Surge Withstand Capability(SWC)	ANSI 37.90.1, No IEEE-472,EN 61000-4-12	No	Yes	
	Dry Heat Test	IEC-68-2-2 or	No equivalent	Yes	
	Damp Heat test	IEC-68-2-3 or	No equivalent	Yes	
	Vibration test	IEC68-2-6 or	No equivalent	Yes	
	Electrostatic discharge test	EN 61000-4-2 or	No equivalent	Yes	
	Radio frequency immunity test	EN-61000-4-3 or	No equivalent	Yes	
	Electromagnetic field immunity	EN 61000-4-3 or	No equivalent	Yes	
	Degree of Protection	IS-13947 or	No equivalent	Yes	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-10 TYPE TEST REQUIREMENTS	PAGE 6 OF 9

CLAUSE NO.	TECHNICAL REQUIREMENTS					
	10	Battery ^{##}	As per standard (col 4)	IS-10918 (Ni-Cd Batteries)	No	Yes
				IS-1652 (Lead Acid Plante Batteries)	No	Yes
	11	NOT APPLICABLE				
	12	UPS (Applicable for each model and rating)				
		1) Type Test reports of same series of UPS with similar PCB's cards and controllers as the target UPS system shall be acceptable.				
		2) For Dry heat, Damp heat and vibration, the tests conducted on individual PCB's shall be acceptable.				
		Surge Withstand Capability(SWC)	ANSI 37.90.1, IEEE-472,EN 61000-4-12	No	Yes	
		Dry Heat Test	IEC-68-2-2 or equivalent	No	Yes	
		Damp Heat test	IEC-68-2-3 or equivalent	No	Yes	
		Vibration test	IEC68-2-6 or equivalent	No	Yes	
		Electrostatic discharge test	EN 61000-4-2 or equivalent	No	Yes	
		Radio frequency immunity test	EN-61000-4-3 or equivalent	No	Yes	
		Electromagnetic field immunity	EN 61000-4-3 or equivalent	No	Yes	
		Degree of protection test	IS-13947	No	Yes	
		Fuse Clearing Capability	Approved procedure	No	Yes	
		Short Circuit current capability	IEC 60146-2	No	Yes	
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)			TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-10 TYPE TEST REQUIREMENTS	
					PAGE 7 OF 9	

CLAUSE NO.	TECHNICAL REQUIREMENTS						एनटीपीसी NTPC	
	13 Voltage Stabilisers	Over Load Test	Approved procedure	No	Yes			
		Temp rise test without redundant fans	Approved procedure	No	Yes			
	14 Public Address System							
	- Amplifiers	As per standard (col 4)	IS 9302, Part-II	No	Yes			
	Microphones	As per standard (col 4)	IS 9302, Part-III IS 15482:2004/ IEC 61842(2002)	No	Yes			
	Loudspeaker	As per standard (col 4)	IS 9302, Part-IV	No	Yes			
	15 LIE / LIR	Degree of protection test	IS-13947	No	Yes			
	16 Flue analyzers	gas Degree of protection test	IS-13947	No	Yes			
	17 Master Clock	Functional test	As per approved procedure	No	Yes			
	18 CJC Box	Degree Of protection test	IS-13947	No	Yes			
	19 Junction Box	Degree Of protection Test	IS-13947	No	Yes			
	20 OPC Access Data Server, Data Exchange & Server	OPC Compliance Testing		No	Yes (Self certification is also			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-10 TYPE TEST REQUIREMENTS		PAGE 8 OF 9		

CLAUSE NO.	TECHNICAL REQUIREMENTS 					
	Historical Data Access Server acceptable) 21 Conductivity Type Level Switch Degree of protection test of IS-2147 No No 22 Local Gauges Degree of protection test of IS-2147 No No 23 Process actuated Switches Degree of protection test of IS-2147 No No 24 Control Valves CV test ISA 75.02& 75.11 No Yes 25 PLCs As per standard (Col 4) IEC 1131 No No 26 Flow Nozzle Orifice plates Calibration ASME PTC BS 1042 No Yes ## The contractor shall submit for Employers approval the reports of all the type test as per latest IS-10918 carried out within last ten years from the date of Bid opening and the test(s) should have been either conducted at an independent laboratory or in presence / owners representative. The complete type test reports shall be for any rating of Battery in a particular group based on plate dimensions being manufactured by supplier. Note: Type Tests are to be conducted only for the items, which are being supplied as a part of this Package.					
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-10 TYPE TEST REQUIREMENTS	PAGE 9 OF 9		

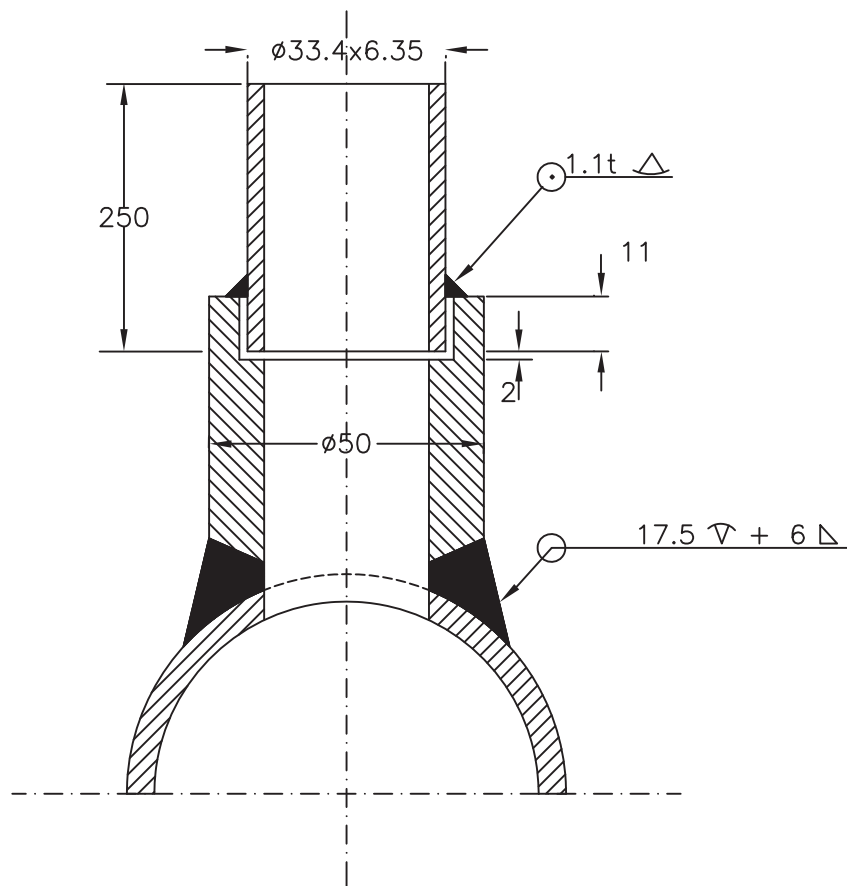


**NTPC 3X800 MW PVUNL PATRATU TPP
SEWAGE TREATMENT PLANT
SEWAGE TREATMENT PLANT**

SECTION: C
SUB SECTION: C&I

INSTRUMENT STUB DETAILS

|



NOTE :

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM TO ANSI B16.11.
2. THE LENGTH OF NIPPLE SHALL BE 250 MM.
3. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED
4. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY ($1/64''$ RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES
5. STUB LENGTH SHALL BE 64mm UPTO 250Nb PIPE, 45mm ABOVE 200Nb PIPE SIZE.



TITLE : INSTRUMENT STUB DETAILS FOR PRESSURE MEASUREMENT

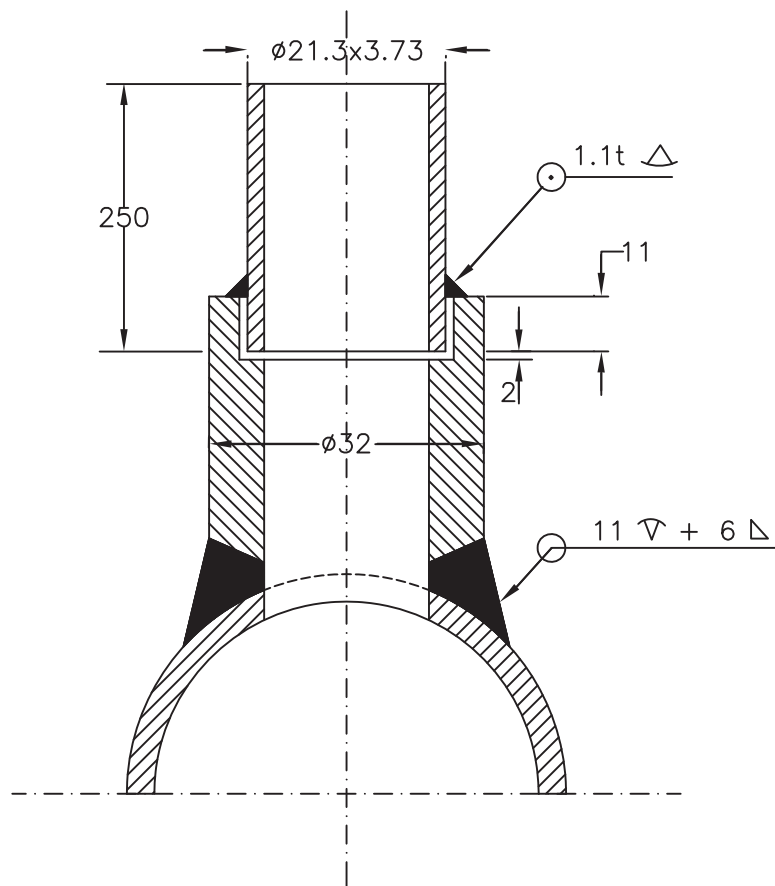
(APPLICABLE FOR TEMP< 500 DegC, CLASS 6000#)

DRG. NO.

PE-DG-434-145-I101

REV. 00

SH. 03 OF 08 SHS.



NOTE :

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM TO ANSI B16.11.
2. THE LENGTH OF NIPPLE SHALL BE 250 MM.
3. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED
4. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY (1/64" RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES
5. STUB LENGTH SHALL BE 64mm UPTO 250Nb PIPE, 45mm ABOVE 200Nb PIPE SIZE.



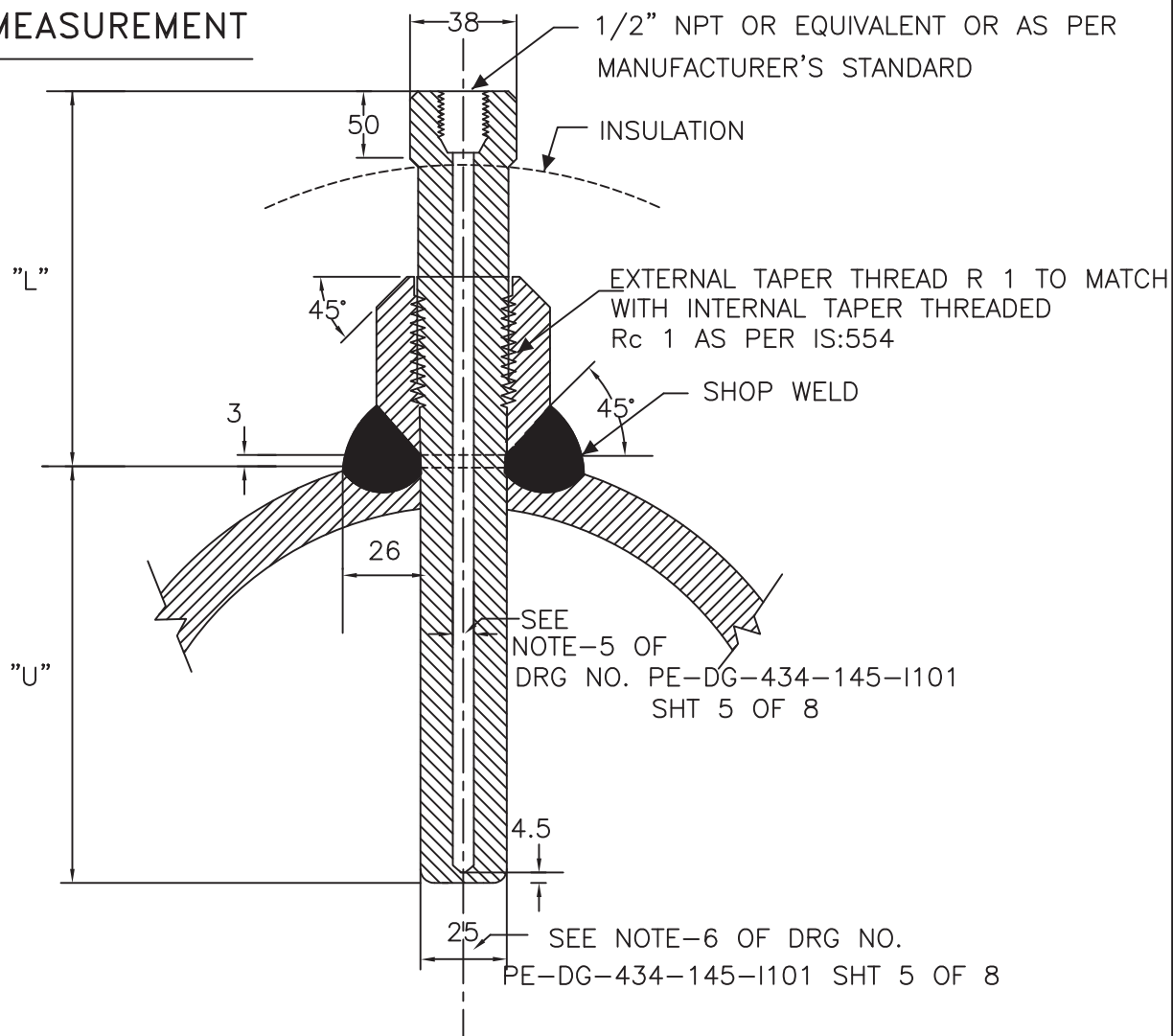
TITLE :
**INSTRUMENT STUB DETAILS
 FOR PRESSURE MEASUREMENT**

DRG. NO.
PE-DG-434-145-I101

REV. 00

(SYSTEM PRESS UPTO 40Kg/Cm², TEMP < 400 Deg C) SH. 04 OF 08 SHS.

TEMP. MEASUREMENT



NOTES :-

1. THIS TYPE OF TEMPERATURE BOSS IS APPLICABLE FOR THE PROCESS PRESS/ TEMP. BELOW 40 KG/CM²(g)/400°C.
2. SEE NOTES-2 TO 9 IN SHT. 5 OF 8 OF THIS DRG.
3. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.



TITLE :

INST. STUB DETAILS (TEMP)

(APPLICABLE FOR PIPE SIZE ABOVE 4")

[PROCESS PRESS < 40 Kg/Cm² (g), TEMP < 400 °C]

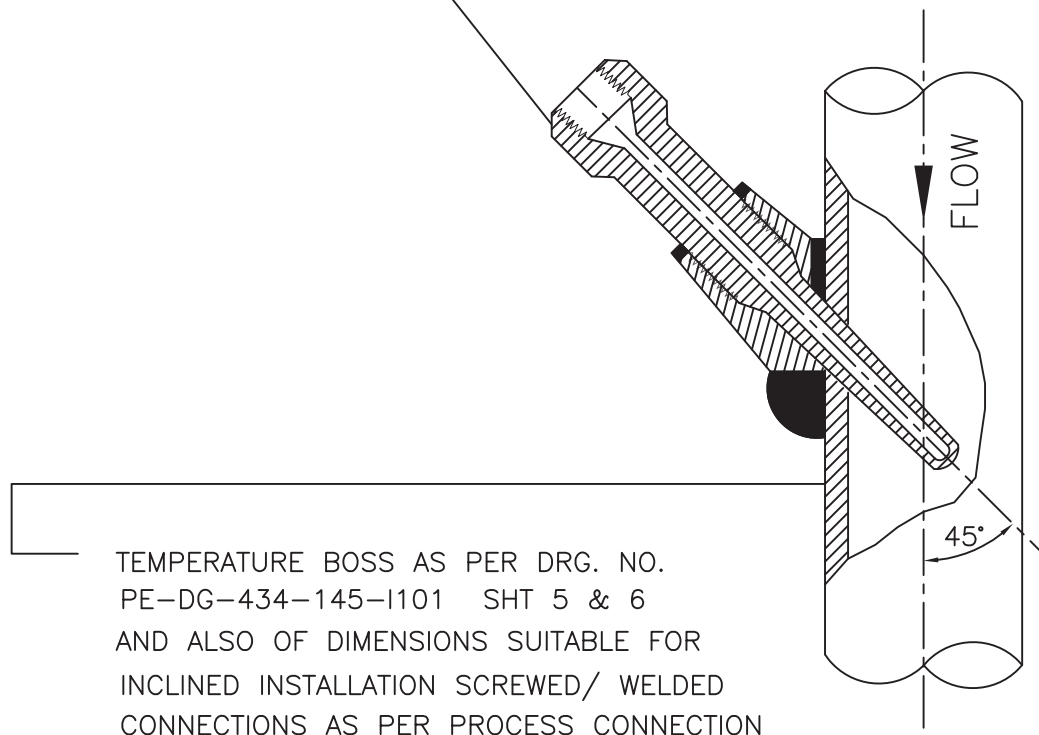
DRG. NO.

PE-DG-434-145-I101

REV. 00

SH. 06 OF 08 SHS.

THERMOWELL SUITABLE FOR THE BOSS
AS PER DRG. NO.
PE-DG-434-145-I101 SHT 5 & 6



NOTES :-

1. INCLINED INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MIN. 3" LINE SIZE.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF 3" SIZE OF MAIN PIPING SPECIFICATION SHALL BE USED.
3. THIS TYPE OF INSTALLATION IS APPLICABLE FOR HORIZONTAL AND VERTICAL PIPE SECTION.
4. FOR STEAM SERVICES EXPANDER SECTION MAY BE USED ONLY IN VERTICAL RUN.
5. THE EXPANDER SECTION SHALL BE OF ADEQUATE LENGTH (ATLEAST 3-4 TIMES DIA OF THE MAIN PROCESS PIPE AT BOTH SIDE OF INSTALLED THERMOWELL).



TITLE :

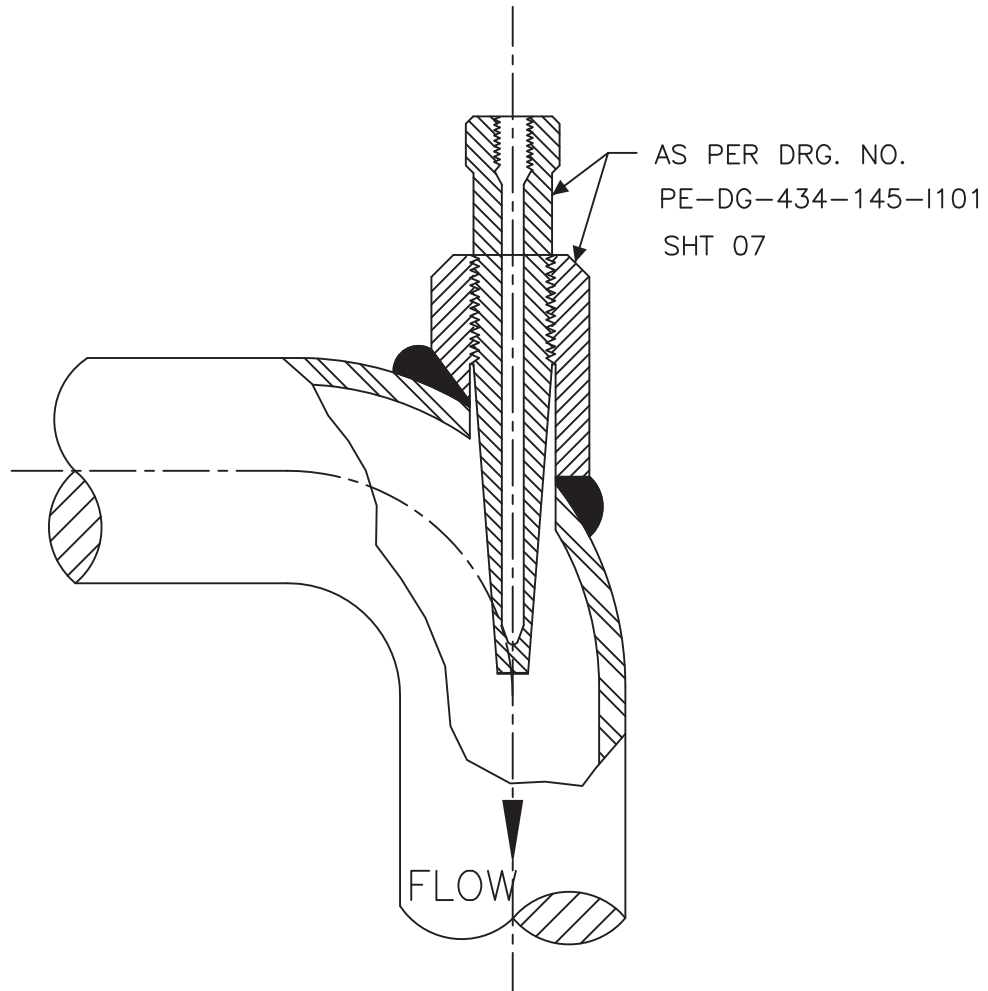
THERMOWELL INSTALLATION

DRG. NO.

PE-DG-434-145-I101

REV. 00

SH. 07 OF 08 SHS.



NOTES :-

1. FLOW INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MINIMUM 3" LINE SIZE. THIS DETAIL IS APPLICABLE FOR THERMOWELL INSTALLATION IN BEND PIPES.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF ELBOW FORM (AS SHOWN) OF 3" SIZE SHALL BE USED.
3. ELBOW EXPANDER SECTION IN HORIZONTAL PLANE TO BE USED FOR LIQUID SERVICE. FOR STEAM SERVICES EXPANDER SECTION TO BE USED IN VERTICAL PLANE.



TITLE :

THERMOWELL INSTALLATION
(IN BEND PIPES)

DRG. NO.

PE-DG-434-145-I101

REV. 00

SH. 08 OF 08 SHS.

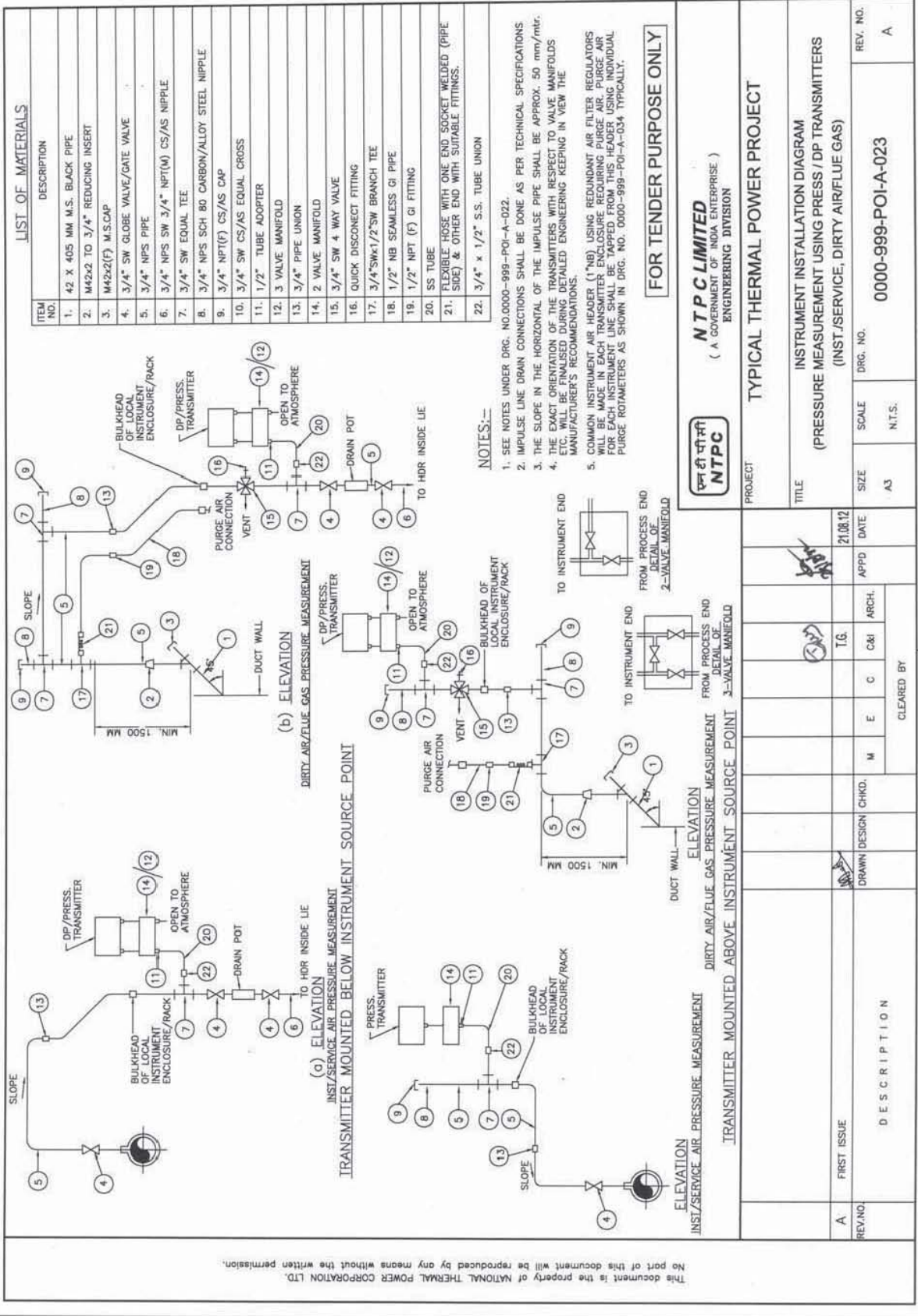


**NTPC 3X800 MW PVUNL PATRATU TPP
C&I SPECIFICATION FOR
SEWAGE TREATMENT PLANT**

SECTION: C
SUB SECTION: C&I

INSTRUMENT INSTALLATION DRAWING

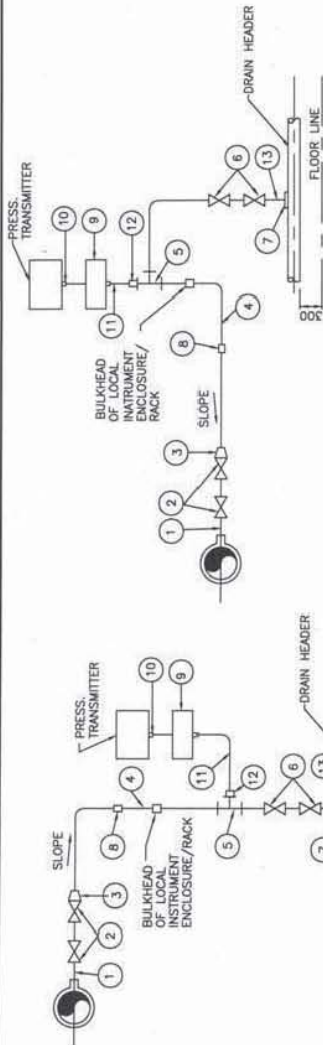
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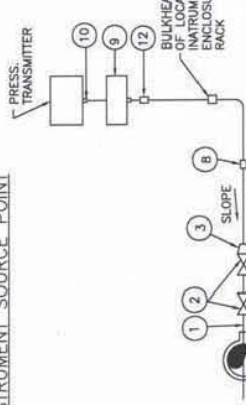
LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	1/2" / 3/4" NPS SCH. 80/160 XXS/P91 NIPPLE OF MATERIAL SAME AS THAT OF MAIN PIPE.
2.	3/4" / 1" SW GLOBE VALVE.
3.	3/4" / 1" TO 1/2" REDUCING INSERT
4.	1/2" NPS PIPE
5.	1/2" SW EQUAL TEE
6.	1/2" SW GLOBE VALVE
7.	1/2" NPS SCH. 80/160 SW1/2" CS/AS COUPLER
8.	1/2" PIPE UNION
9.	2/3 VALVE MANIFOLD (FOR DETAIL SEE DRAWING NO.0000-102-POI-A-023.
10.	SUITABLE ADAPTER
11.	SS TUBE
12.	1/2" PIPE x 1/2" TUBE UNION
13.	1/2" NPS SCH. 80/160 SW1/2" NPT(M) CS/AS NIPPLE



ELEVATION
TRANSMITTER MOUNTED BELOW INSTRUMENT SOURCE POINT
LIQUID PRESSURE MEASUREMENT

FOR TENDER PURPOSE ONLY



ELEVATION
TRANSMITTER MOUNTED ABOVE INSTRUMENT SOURCE POINT
VACUUM PRESSURE MEASUREMENT

NOTES:-

1. SAME NOTES UNDER DRG. NO. 0000-999-POI-A-023.
2. FOR VACUUM APPLICATION OTHER PORT OF TRANSMITTER SHALL BE KEPT OPEN TO ATMOSPHERE.

FOR TENDER PURPOSE ONLY

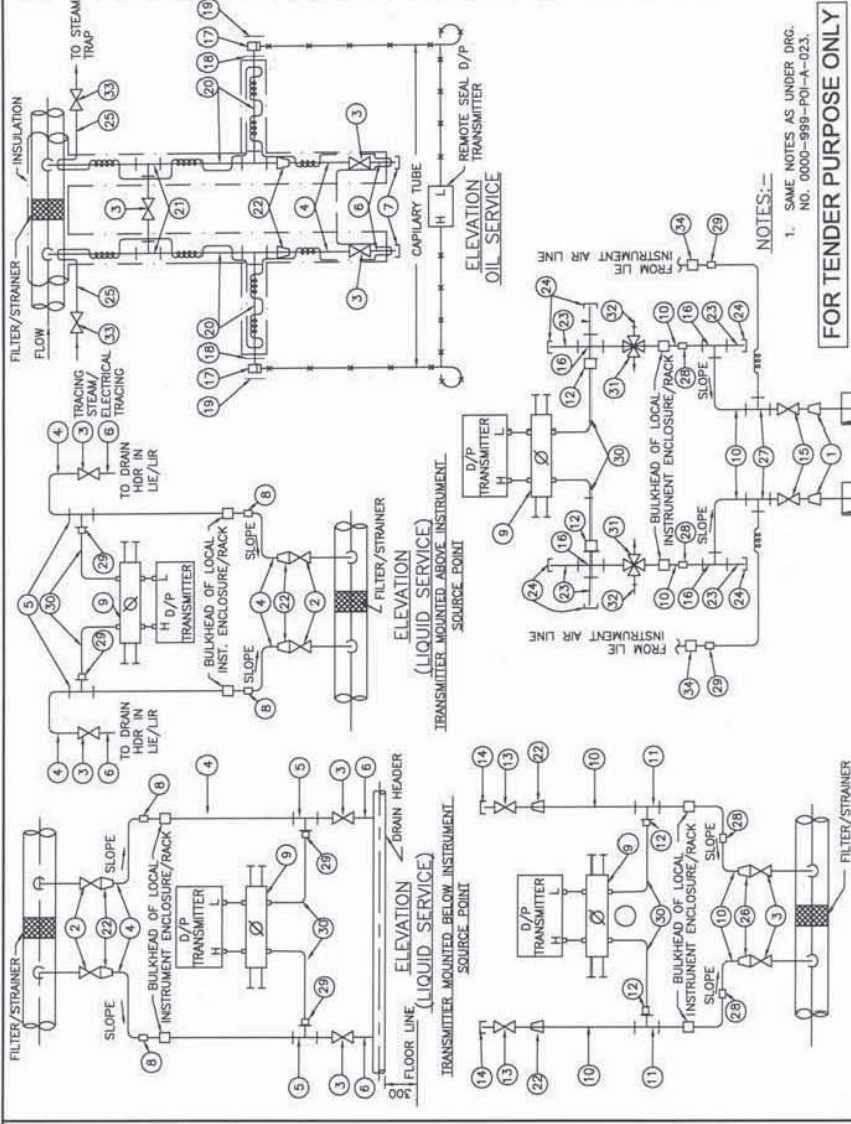


NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT										TYPICAL THERMAL POWER PROJECT											
TITLE										INSTRUMENT INSTALLATION DIAGRAM (PRESSURE MEASUREMENT USING PRESS /DP TRANSMITTERS STEAM/LIQUID VACUUM)											
REV. NO.										SCALE		DRG. NO.		REV. NO.		0000-999-POI-A-025 A					
A										A3		N.T.S.									
DESCRIPTION										DRAWN		DESIGN		CHKD.		APPD		DATE			
FIRST ISSUE										21.08.12		T.G.		C&I		ARCH.					

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ITEM NO.	DESCRIPTION
1.	42x2 TO 3/4" SW REDUCING INSERT.
2.	3/4" SW GLOBE VALVE.
3.	1/2" SW GLOBE VALVE FOR LIQUID APPLICATION & 3/4" x 1" IN GAS/AIR APPLICATION.
4.	1/2" NPS 40/80/160 (AS PER PROCESS REQUIREMENT) CARBON/ALLOY STEEL PIPE.
5.	1/2" SW EQUAL TEE.
6.	1/2" NPS SW x 1/2" NPT (M) NIPPLE.
7.	1/2" NPT (F) CAP.
8.	1/2" PIPE x 1/2" PIPE UNION.
9.	5 VALVE MANIFOLD (FOR DETAIL REFER DRAWING NO.0000-999-POI-A-026).
10.	3/4" SCH 80 CARBON/ALLOY STEEL PIPE.
11.	3/4" x 1/2" SW EQUAL TEE.
12.	3/4" x 1/2" TUBE UNION.
13.	1/2" SCREWED GLOBE VALVE.
14.	1/2" NPT (M) PLUG.
15.	3/4" SW GATE VALVE.
16.	3/4" SW EQUAL CROSS.
17.	WATER ELEMENT FOR USE WITH 3" ANSI R.F. VALVE.
18.	3" BLIND 3000# R.F. WELD NECK FLANGE DRILLED FOR 1" SCH. 40/80 PIPE.
19.	3" BLIND FLANGE.
20.	1" NPS SCH. 40/80 (AS PER PROCESS REQUIREMENT) CS PIPE.
21.	1" SW EQUAL TEE.
22.	3/4" x 1/2" SW REDUCING INSERT.
23.	3/4" SW x 3/4" NPT (M) CS/AS NIPPLE.
24.	3/4" NPT (F) CS/AS CAP.
25.	1/4" NPS ALLOY STEEL PIPE.
26.	1" x 3/4" SW REDUCING INSERT.
27.	3/4" SW x 1/2" PSW BRANCH TEE.
28.	3/4" PIPE UNION.
29.	1/2" CLAMP UNION (THREADED) SUITABLE FOR FLEXIBLE CONNECTION OF NYLON REINFORCED PVC TUBE.
30.	SS TUBE
31.	3/4" SW 4 WAY VALVE.
32.	QUICK DISCONNECT FITTINGS.
33.	1/4" SW ISOLATION VALVE 316SS
34.	1/2" x 1/2" SS PIPE UNION.



FOR TENDER PURPOSE ONLY

NOTES:-
1. SAME NOTES AS UNDER DRG. NO. 0000-999-POI-A-023.

DIFF. PRESS.MEASUREMENT (LIQUID, OIL, AIR/GAS SERVICE)

0000-999-POI-A-030

REV. NO. A

SCALE A3

DATE 21.08.12

APPD T.G.

ARCH C&I

CHKD M

DESIGN E

CLEARED BY

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DESCRIPTION

LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	3/4" x 1" NPS SCH 40/80/160/P81 (AS PER PROCESS REQUIREMENT) CARBON /ALLOY STEEL PIPE.
2.	3/4" SW GLOBE VALVE.
3.	3/4" SW UNION.
4.	3/4" NPT GLOBE VALVE.
5.	3/4" NPT (M) CAP.
6.	3/4" NPT (F) UNION CONNECTION.
7.	1" SW EQUAL UNION.
8.	1" x 1/2" SW REDUCING INSERT.
9.	1" SW EQUAL TEE.
10.	1/2" SW GLOBE VALVE.
11.	1/2" NPS SW 1/2" NPT(M) CS/AS NIPPLE.
12.	1/2" NPT (F) CAP
13.	3/4" x 1/2" NPS SCH 40/80 CS/AS PIPE.
14.	1/2" NPS SCH 80/160 CS/AS NIPPLE.
15.	1" SW GLOBE VALVE.

LOCAL LEVEL INDICATION USING GAUGE GLASS

LOCAL LEVEL INDICATION USING MULTIPLE GAUGES.
FOR INCREASED RANGE, NOT COVERED IN A SINGLE UNIT

FLOAT OR DISPLACER OPERATED EXTERNAL CAGE TYPE LEVEL SWITCH INSTALLATION

NOTES:--

- FOR LEVEL GAUGE 3/4" AND FOR LEVEL SWITCH 1" PROCESS CONNECTION SHALL BE PROVIDED.
- NOTES UNDER DRG. NO. 0000-999-POI-A-023 (WHICHEVER ARE RELEVANT).

FOR TENDER PURPOSE ONLY

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ENGINEERING DIVISION

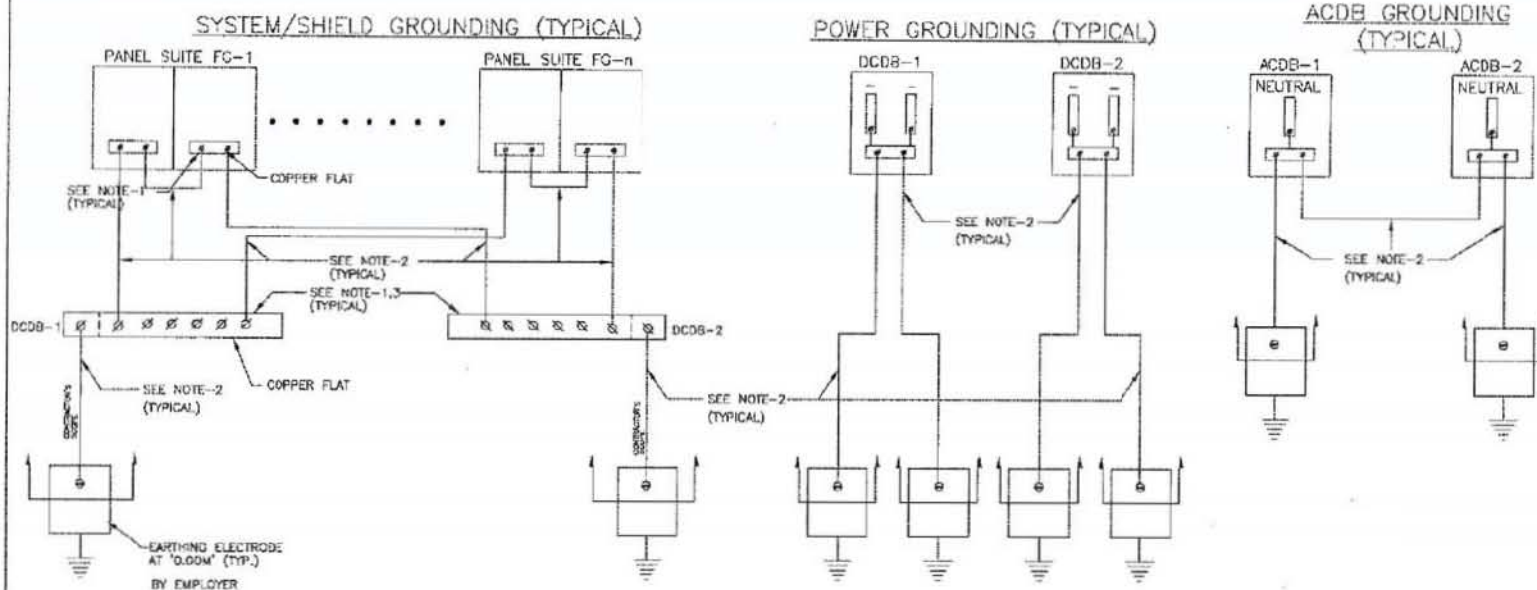
PROJECT TYPICAL THERMAL POWER PROJECT

TITLE INSTRUMENT INSTALLATION DIAGRAM (LEVEL GAUGE & SWITCHES)

REV. NO.	SCALE	DRG. NO.	REV. NO.
A3	N.T.S.	0000-999-POI-A-031	A

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NOTES:-

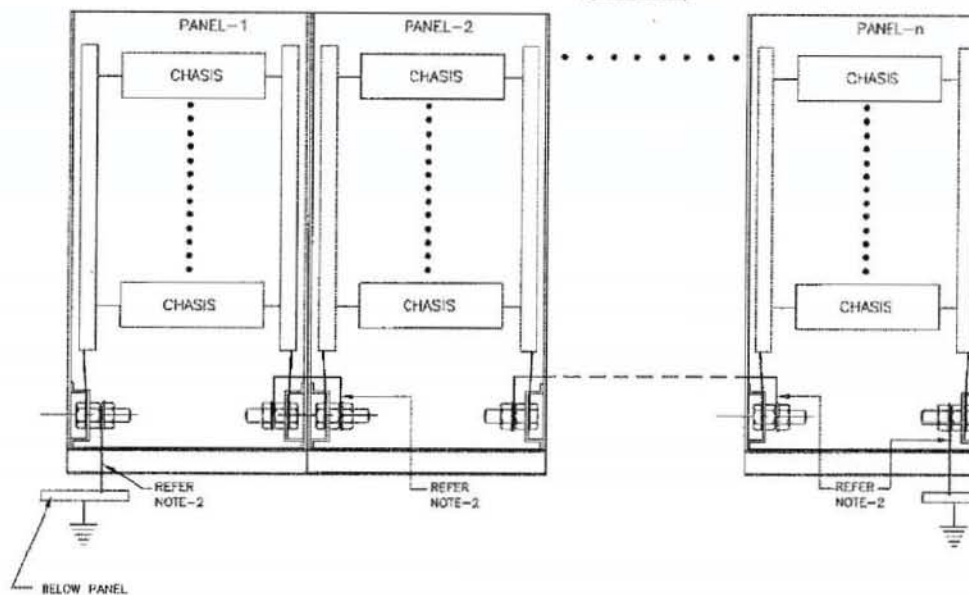
1. SUPPLY, ERECTION, TERMINATION OF CABLES, FLATS ETC. REQUIRED FOR PROPER GROUNDING OF CONTRACTOR'S CONTROL SYSTEM, SYSTEM CABINETS, POWER SUPPLY CABINETS ETC. ARE IN THE SCOPE OF CONTRACTOR.
2. CABLE IN CONTRACTOR'S SCOPE.
3. TO BE LOCATED IN DCDB.
4. EXACT LOCATION, ARRANGEMENTS OF FLATS ETC. SHALL BE AS FINALISED WITH CONTRACTOR DURING DETAILED ENGINEERING.
5. CABINET BODY, CABINET BOTTOM PLATE, CABINET DOORS ARE TO BE CONNECTED TO PANEL EARTH FLAT COPPER CABLE BY CONTRACTOR.

FOR TENDER PURPOSE ONLY

										NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION						
PROJECT										TYPICAL THERMAL POWER PROJECT						
TITLE										INSTRUMENTATION CABLING DIAGRAM GROUNDING SCHEME FOR CABINETS / PANELS / POWER SUPPLY						
A	FIRST ISSUE									21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-019A	REV. NO.	A
REV. NO.	DESCRIPTION		DRAWN	DESIGN	CHKD.	M	E	C	CM	ARCH.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
													A3	N.T.S.		
CLEARED BY										SH-1 OF 2						

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GROUNDING FOR EACH ROW OF PANELS (TYPICAL)



NOTES:-

1. SUPPLY, ERECTION, TERMINATION OF CABLES, FLATS ETC. REQUIRED FOR PROPER GROUNDING OF CONTRACTOR'S CONTROL SYSTEM, SYSTEM CABINETS, POWER SUPPLY CABINETS ETC. ARE IN THE SCOPE OF CONTRACTOR.
2. CABLE IN CONTRACTOR'S SCOPE.
3. TO BE LOCATED IN DCDB.
4. EXACT LOCATION, ARRANGEMENTS OF FLATS ETC. SHALL BE AS FINALISED WITH CONTRACTOR. DURING DETAILED ENGINEERING.
5. CABINET BODY, CABINET BOTTOM PLATE, CABINET DOORS ARE TO BE CONNECTED TO PANEL EARTH FLAT COPPER CABLE BY CONTRACTOR.

FOR TENDER PURPOSE ONLY



NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

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SUB-SECTION – IIIC - 06

PROCESS CONNECTION AND PIPING

EPC PACKAGE FOR
PATRATU SUPER THERMAL POWER STATION EXPANSION
PHASE –I (3X 800MW)

TECHNICAL SPECIFICATION
SECTION-VI
BID DOC. NO.: CS:9585-001-2

CLAUSE NO.	TECHNICAL REQUIREMENTS											
	PROCESS CONNECTION AND PIPING											
1.00.00	PROCESS CONNECTION PIPING											
1.01.00	The Contractor shall provide, install and test all required material for completeness of Impulse Piping System and Air Piping System as per the requirements of this Sub-Section on as required basis for the connection of all instruments and control equipments of entire plant.											
1.01.01	IMPULSE PIPING, TUBING, FITTINGS, VALVES AND VALVE MANIFOLDS											
1.01.02	All impulse pipes shall be of seamless type conforming to ANSI B36.10 for schedule numbers. The size of impulse pipe shall be ½” for Steam & Water Application and ¾” for Air & Flue Gas applications. The rating of material of impulse pipes, tubes, fittings, valves and their installation thereof shall conform to the latest edition of standards as per following table: <table><tr><td>Impulse Pipes, Tubes (Material, Rating)</td><td>ANSI B31.1, ANSI B31.1a, ANSI/ISA 77.70</td></tr><tr><td>Valves (Material, Pr. Class, Size)</td><td>ASTM A182/ASTM A105 as per ASME 16.34</td></tr><tr><td>Fittings (Size, Rating, Material)</td><td>ANSI B31.1, ANSI B31.1a, ASME B16.11-2009</td></tr><tr><td>Installation Schemes</td><td>BS 6739-2009, ANSI/ISA 77.70</td></tr></table> Stainless steel tube shall be provided inside enclosures & racks from tee connection to valve manifold and then to instrument. The source shut-off (primary process root valve) and blow down valve shall be of 1/2 inch size globe valve type for all applications except for air and flue gas service wherein no source shut-off valves are to be provided. Two root valves are to be used wherever pressure is more than 40 Kg/cm² or Temp>280 °C. The end connections of valves shall be of socket welded type. Typical installation scheme of DP Transmitter (inside LIE/LIR) mounted below instrument source point is indicated in Drg. No. 0000-999-POI-A-036. Same scheme with necessary changes shall be applied for other instruments.				Impulse Pipes, Tubes (Material, Rating)	ANSI B31.1, ANSI B31.1a, ANSI/ISA 77.70	Valves (Material, Pr. Class, Size)	ASTM A182/ASTM A105 as per ASME 16.34	Fittings (Size, Rating, Material)	ANSI B31.1, ANSI B31.1a, ASME B16.11-2009	Installation Schemes	BS 6739-2009, ANSI/ISA 77.70
Impulse Pipes, Tubes (Material, Rating)	ANSI B31.1, ANSI B31.1a, ANSI/ISA 77.70											
Valves (Material, Pr. Class, Size)	ASTM A182/ASTM A105 as per ASME 16.34											
Fittings (Size, Rating, Material)	ANSI B31.1, ANSI B31.1a, ASME B16.11-2009											
Installation Schemes	BS 6739-2009, ANSI/ISA 77.70											
1.01.03	The valve manifolds of 316 SS with pressure rating suitable for intended application shall be provided as given below: <table><tr><th>Manifold</th><th>Application/Masurement</th></tr><tr><td>2 Valve</td><td>Pressure measurements using pressure transmitters/pressure switches</td></tr><tr><td>3 Valve</td><td>Pressure measurements using differential pressure transmitter/ switches</td></tr><tr><td>5 Valve</td><td>Differential Pressure, Flow and Level Measurements</td></tr></table> For Pr./D.P gauges, two-way globe/gate valve shall be provided on each impulse line to the instrument in Fluid/Air & Flue Gas applications respectively .				Manifold	Application/Masurement	2 Valve	Pressure measurements using pressure transmitters/pressure switches	3 Valve	Pressure measurements using differential pressure transmitter/ switches	5 Valve	Differential Pressure, Flow and Level Measurements
Manifold	Application/Masurement											
2 Valve	Pressure measurements using pressure transmitters/pressure switches											
3 Valve	Pressure measurements using differential pressure transmitter/ switches											
5 Valve	Differential Pressure, Flow and Level Measurements											
2.00.00	AIR SUPPLY PIPING											
2.01.01	All pneumatic piping, fittings, valves, air filter cum regulator, purge rotameter and other accessories required for instrument air for the various pneumatic devices/ instruments shall be provided. This will include as a minimum air supply to pneumatically operated control valves, actuators, instruments, continuous and intermittent purging requirements etc.											
2.02.00	Instrument air and Service air supply shall be provided for continuous and intermittent purging respectively for all transmitters of mill, dirty air and flue gas applications. Purging Scheme shall be as per Drg. No. 0000-999-POI-A-036.											
2.03.00	The Contractor shall also provide SS Tubing and associated fittings (screwed type) of suitable sizes for all pneumatic equipments/actuators (including supply air, signal air and output to actuators) conforming to ANSI 31.1 and 31.3 standard. All other air supply lines shall be of mild steel hot dipped galvanized inside and outside as per IS-1239, heavy duty											
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2	SUB-SECTION-IIIC-06 PROCESS CONNECTION AND PIPING	PAGE 1 OF 3								

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC	
	with threaded ends. Fittings for air supply line shall be of forged carbon steel A234 Gr. WPB galvanized inside and outside, screwed as per ASA B2.1. Dimensions of fittings shall be as per ASA B16.11 of rating 3000 lbs. Air supply piping shall be adequately sloped to prevent accumulation of condensed water within the pipe. The air supply headers, sub-headers and branch pipes shall be supported properly by clamps or supports.		
2.04.00	The instrument/service air supply to each equipment/devices requiring air supply shall be provided by a well designed air distribution scheme comprising of 2" GI Pipe Header feeding 1" GI Pipe sub-header feeding ½" pipe at each equipment/device. Instrument air filters cum regulator set with mounting accessories shall be provided for each pneumatic device requiring air supply except for Ash Handling System wherein it shall be provided on instrument air header at each location.		
2.05.00	All the isolation valves in the air supply line shall be gate valves as per ASTM B62 inside screw rising stem, screwed female ends as per ASA B2.1. Valve bonnet shall be union type & trim material shall be stainless steel, body rating 150 pounds ASA. The valve sizes shall be ½ inch to 2 inch.		
2.06.00	Instrument air filters cum regulator set with mounting accessories shall be provided for pneumatic device requiring air supply. The filter regulators shall be suitable for 10-kg/ sq.cm max. Inlet pressure. The filter shall be of size 5 microns and of material sintered bronze. The air set shall have 2-inch size pressure gauge and built in filter housing blowdown valve. The end connection shall be as per the requirement to be finalized during detailed engineering.		
3.00.00	INSTALLATION AND ROUTING		
3.01.01	All instrument piping, tubing and its accessories shall be supported in a safe manner to prevent excessive vibrations and anchored sufficiently to prevent undue strain on connected equipment. Impulse piping shall be supported at an interval not exceeding 1.5 meters. The slope of the impulse pipe from the process connection to the instrument shall be as per ANSI/ISA 77.70 latest edition and BS 6739-2009. All impulse piping shall be installed to permit free movement due to thermal expansion. Wherever required expansion loops shall be provided. Condensate pots shall be provided for all level measurements in steam and water services, all flow measurement in steam services and for flow measurements in water services above 120 Deg. C. Colour coding of all impulse pipes shall be done by the Contractor in line with the colour coding being followed for the parent pipes.		
4.00.00	SHOP AND SITE TESTS		
4.01.01	The equipment and work performed as per this Sub-section shall be subject to shop and site test as per requirements of Sub-section-IIIE-04 (Quality Assurance & Inspection) other applicable clauses of this Sub-section and Employer approved quality assurance plan.		
4.01.02	Hydrostatic and Pneumatic leakage tests shall be performed on all pipes, tubing and systems and shall conform to ANSI B31.1.		
5.00.00	LOCAL INSTRUMENT ENCLOSURE AND RACKS All transmitters, switches etc. in Boiler Turbine Generator measurements (except for all fuel oil applications) shall be suitably grouped together and mounted inside (i) local instruments enclosures in case of open areas of the plant like boiler area, etc. and (ii) In local instrument racks in case of covered areas like Turbine/Generator area. The GA of LIE with purging indicated in the Drg. No. 0000-999-POI-A-036 is to be followed by contractor. The GA of LIR shall be similar to LIE except for front/rear doors and side panels.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2	SUB-SECTION-IIIC-06 PROCESS CONNECTION AND PIPING
			PAGE 2 OF 3

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
5.01.00	The internal layout shall be such that the impulse piping/ blow down lines are accessible from back side of the enclosure / rack and the transmitters etc. are accessible from front side for easy maintenance. Bulkheads, especially designed to provide isolation from process line vibration shall be installed on instrument enclosures/racks to meet the process sensing line connection requirement. Vibration dampeners shall be installed for each enclosure / rack. The Degree of Protection of LIE and JB of LIE/LIR shall be IP-55. The instrument racks shall be free standing type constructed of suitable 3 mm thick channel frame of steel and shall be provided with a canopy to protect the equipment mounted in racks from falling objects, water etc. The canopy shall not be less than 3 mm thick steel, and extended beyond the ends of the rack. Enclosures/Racks shall be reinforced as required to ensure true surface and to provide adequate support for instruments and equipment mounted therein. Centre posts or any member which would reduce access shall not be provided. Contractor shall provide not more than three variants for LIE/LIR with respect to max. no. transmitters mounted in each LIE/LIR. ENCLOSURE / RACKS FOR DUAL I/P TEMPERATURE TRANSMITTERS All Dual Input temperature transmitters in Boiler Turbine Generator measurements shall be suitably grouped together and mounted inside (i) Enclosures in case of open areas of the plant like boiler area, etc. and (ii) Racks in case of covered areas like Turbine/Generator area. Integral JB shall be provided with each Enclosure and Rack. The internal layout shall be such that the transmitters are accessible from both front and back side of the enclosure / rack for easy maintenance. Enclosure/ Racks shall be of robust and rugged design. Vibration dampeners shall be installed for each enclosure / rack. The Degree of Protection of Enclosure and JB shall be IP-55. Enclosure and Racks shall be free standing type. Enclosures/Racks shall be reinforced as required to ensure true surface and to provide adequate support for instruments and equipment mounted therein. Contractor shall provide not more than five variants for Enclosure/ Rack with respect to max. no. transmitters mounted in each Enclosure/ Rack. However, the maximum number of Transmitters that can be grouped in one Enclosure/ Rack shall be decided during detail Engineering.			
6.00.00	INSTALLATION OF OTHER INSTRUMENTS: For installation and routing of other field mounted instruments which are not covered in Cl. No. 5.00.00, please refer Cl. No 52.04.00(f) of Section-VI, Part-D, Erection Conditions of Contract (ECC) of Technical Specifications.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2	SUB-SECTION-IIIC-06 PROCESS CONNECTION AND PIPING	PAGE 3 OF 3



**NTPC 3X800 MW PVUNL PATRATU TPP
C&I SPECIFICATION FOR
SEWAGE TREATMENT PLANT**

SECTION: C
SUB SECTION: C&I

SUB VENDOR LIST



PROJECT : Patratu STPS Phase-I (3 X100MW)												
PACKAGE : EPC PACKAGE												
CONTRACTOR : BHEL Ltd												
CONTRACT NO : CS-9545-001-2												
LIST OF ITEMS REQUIRING QP												
APPROVAL & ACCEPTABLE												
VENDOR AS APPROVED BY												
REVISION NO : 00												
DATE : 25.04.2017												
No.	Major Equipment	QP Inspect Category	QP No. 8555- 001-QV	QP Submittal SCH	QP Approval val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub OR	Remark
		Y				Forbes And	Pune	A				Approved up to 4" and 300 Class. "DR" for Higher rating and Size.
		II				Daima Regd Machine GmbH	Germany	DR				M/s BHEL will forward only three proposals after details review of NTPC Technical specification requirements.
		*				Metso Singapore PTE Ltd.	South Korea	DR				
		*				Siemens GBC	China	DR				
		*				Six Corporation	USA	DR				
		*				Rinnip Vahdas SL	Spain	DR				
		*				Valvula SPA	Italy	DR				
		*				R K Controls	Thailand	DR				
		*				Circoor (Leslie)	Colombia	DR				
		*				Spa Flow Technologies	USA	DR				
		*				Circoor (Leslie)	Colombia	DR				
		*				Schenck valve co. Ltd.	China	DR				
		*				Spa Flow Technologies	Afghanistan	DR				
		*				WEIR Valves and Controls	UK	DR				
		*				WALDEMAR PHUSS	Germany	DR				
		*				ARMATURENFABRIK GMBH						
		*				BOMABA Special valve solutions	Ahmedabad	DR				
		*				Pvt. Ltd.						
		*				Suzhou delan energy science and technology co. Ltd.	China	DR				
		III				EMERSON	U.S.A/Pakistan / Singapore	A			Sub OR	Final testing at M/S YIL Bangalore is also acceptable
		III				Yokogawa	Japan	A				
		III				Moore	USA	A				
		III				M System	JAPAN	A				
		III				ABB	GERMANY/ Bangalore	A				
		III				ENDRESS & HOUSER	Aurangabad	A				
		*				Khrona	DR	DR				
		*				Tokyo Koto	Japan	DR				
		*				Honeywell	Pune	DR				
		*				INDOR	Sweden	DR				
		*				P & F	Bangalore	DR				
		*				Siemens	JAPAN	DR				
		*				Yamatoka	JAPAN	DR				
		*				Yaman	JAPAN	DR				
		*				Fosberg	DR	DR				
		III				Refer Electrical List						
		III				EMERSON (Rosemount)	USA/Pakistan	A			Sub OR	M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		III				FUJI ELECTRIC	France	A				
		III				YOKOGAWA	JAPAN	A				
22	Temperature Transmitter (Single and Dual Input)											
23	Control Pipe (D)											
24	Electronic Transmitters (pressure, DP Flow)											

50426



A. K. Jaiswal

25.04.2017

213



NTPC

PROJECT : Patratu STPS Phase-I (3 X 800MW)	No.	Major Equipment	QP Inspect on Category	QP No. 001-QVI	QP No. 001-QVI	QP No. 001-QVI	QP No. 001-QVI	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval Sub-SCH	Sub QR	Remark												
CONTRACT NO : CS-9545-001-2																										
PACKAGE : EPC PACKAGE																										
CONTRACTOR : BHEL Ltd																										
LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE																										
REVISION NO : 00																										
DATE : 28.04.2017																										
VENDOR AS APPROVED BY																										
			III					YOKOGAWA	Bangalore	A				EJA-E series 110-430-530												
			III					ABB	Bangalore	A				Model - 2600 T												
			III					ABB	GERMANY / Italy	A				Model - 2600 T												
			III					Siemens	France / Korea	A																
			III					Honeywell	Pune	A																
			III					Lexson Automation	Daman	A				SMART Make												
			III					Balboa	Mumbai	A				SMART Make												
			III					ENDRESS & HOUSER	Aurangabad/	DR																
			*						Germany																	
			*					CHINO	Chadford	DR																
25		Thermocouples, RTD & Thermomats	III					HERAUS SENSOR	GERMANY	A			Sub QR													
			III					WISE Control	Korea	A																
			III					Tempsons	Udaipur	A																
			II					Prolectric	Goa	A																
			II					Defive Instrumentation & Electronics Ltd	Mumbai	A																
			III					Minco	USA	A																
			III					OKAZAKI corporation	JAPAN	A																
			III					Yamari	JAPAN	A																
			III					Yamari	Singapore	A																
			II					ABB/SENSYCON	Germany	A				For RTD Reference list and Performance feedback is to be submitted.												
			II					EMERSON (Rosemount)	Germany	A				Imported from Emerson, Germany (make)												
			II					EMERSON (Rosemount)	Pawane	A																
			II					Thermal Instruments(DIC)	Savarnadi	A																
			II					Techno Instruments	Ahmadabad	A																
			II					GOA Instrument Industries	GOA	A																
			II					GOA Instrument Industries	GOA	DR				For Thermocouple only												
			*					Wika	Pune	DR				Max BHEL will forward only two proposals after details review of NTPC Technical specification requirements.												
			*					Technical Industries	Ajmer	DR																
			*					E & H	Aurangabad	DR																
			*					Nessle	Vapi	DR																
			*					Industrial Instruments	Kolkata	DR																
			*					Exotherm	Thane	DR																
			*					Baumer Technologies	Vapi	DR																
			*					Elans Engineering	Noida	DR																
			*					Siemens India	Gurgaon	DR																
			II					Jindal Electronics	Roorkee	A																
			III					E & H	Aurangabad/	A																
			III					EMERSON	Germany	A			Sub QR	For Generator Turbine & Motor												
			III					SIEMENS MILTRONICS	Pawane	A																
			III					Niveco	CANADA	A																
			*					Vega	Hungary	A																
26		Ultrasonic type Level Transmitter	III						Germany	DR																

6 of 26

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PROJECT : Patratu STPS Phase-I (3 X400MW)											
PACKAGE : EPC PACKAGE											
CONTRACTOR :BHEL Ltd											
CONTRACT NO : CS-555-001-2											
LIST OF ITEMS REQUIRING QP											
APPROVAL & ACCEPTABLE											
VENDOR AS APPROVED BY											
REVISION NO : 00											
DATE : 26.04.2017											
No.	Major Equipment	QP Category	QP No.	QP Submis- sion	QP Appro- val	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval Sub QR	Remark
		Y				Khrona	France / USA / Pura	DR			
		*				Yokogawa	Bangalore	DR			
		*				PAF	Germany	DR			
		*				Magnetrol	Belgium	DR			
		*				ABB	Germany / India	DR			
		*				Forbes Marshall	Pune	DR			
		III				Instrumentation Limited	Palghat	A			
		III				Microprecision	Palghat	A			
		III				Siemens	Pune	A			
		III				Flow Star	Farsabad	A			
		III				SEICO	Austria	A			
		III				MINCO India Pvt. Ltd.	GOA	A			
		III				MINCO India Flow Elements Pvt. Ltd.	GOA	A			
		III				WISE Control	Korea	A			
		III				T M Technomatic	Italy	A			
		*				IEPL	Hyderabad	DR			
		*				Engg. Specialities	Kolkata	DR			
		*				BALIGA	CHENNAI	DR			
		*				Proelectro	Mumbai	DR			
		*				Hydro Pneumatics	Madras	DR			
		*				Tanaka Equipment Pvt. Ltd.	Thane	DR			
		*				Dynamic Fluid Vales Pvt. Ltd.	Belgaum	DR			
		III				BUCHSBERG	UK	A			
		III				ASHCROFT	USA/Germany/	A			
		III				Wika	India	A			
		III				WISE Control	GERMANY	A			
		III				Nagano KEIKI	Korea	A			
		III				H Guna South India	Japan	A			
		III				A. N. Instruments	Bangalore	A			
		III				Gauge Bourdon	Kolkata	A			
		III				Gota Thermoclastic	Panvel	A			
		III				Wika	GOA	A			
		III				Baumer	Pune	A			
		III				Precision mass products Pvt. Ltd.	Vapi	A			
		III				H Guna	Gandhinagar	A			
		III				US Gauge	Rishabh Nagar	A			
		*				Winters	USA	DR			
		III				Forbes Marshall	USA	DR			
		*				Manometer	Hyderabad	A			
		III				Walchandnagar Industries Ltd.	Mumbai	DR			
		III				Nassatech	Chennai	A			
		*				Gauges Bourdon	Vapi	A			
		*				Fisher Mass	UK	DR			
		*					Germany	DR			



7 of 16

215



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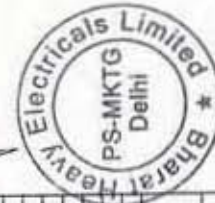
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PROJECT : Patrau STPS Phase-I (3 X800MW)										LIST OF ITEMS REQUIRING OP				REVISION NO : 00	
PACKAGE : EPC PACKAGE										APPROVAL & ACCEPTABLE				DATE : 28.04.2017	
CONTRACTOR : BHEL Ltd										VENDOR AS APPROVED BY					
CONTRACT NO : CS-3585-001-2															
No.	Major Equipment	QIP	QIP No.	QIP	QIP	QIP	QIP	QIP	QIP	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub QR	Remark
		Y								Levon	A				
		III								Kolkata	A				
		III								Kolkata	A				
		III								Pune	A				
		III								Chennai	DR				
		III								New Delhi	DR				
		III								Panvel	A				
		III								Gaugas Bourdon	A				
		III								Magnitrol	A				
		III								Ashcroft	A				
		III								Auxitrol	A				
		III								Meroid	A				
		III								Delta Control	A				
		III								Merium	A				
		*								Sunag Corporation	DR				
33	Controlling Pits	III								Main Contractor approved Sources	A				
34	Electric to Pneumatic converter	III								IMI NORGEN	A			Sub QR	Make : WATSON SMITH
		III								Fairchild	A				Subject to meeting the NTPC specification requirement
		*								ABB	A				
		*								SMC Pneumatics	DR				
		*								P & F	DR				
		*								Bangalore	DR				
		*								Fairchild India Pvt. Ltd.	DR				
		*								Noida	DR				
		*								Bangalore	DR				
		*								FESTO	DR				
35	Conduits lead coated (Flexible)	III								Plica	A				Main contractor can propose additional vendor for this item
		III								Bansal laboratories	A				
		III								Chabbi Electricals	A				
30	Intelligent Battery charger 24V DC & DCDB /BIMS	II								Jalgaon	A			Sub QR	Modules from EMERSON
		II								Eitech	A				Modules from ELTEK
		II								Wastech	A				Modules from ELTEK
		II								Emerson	A				
		II								India	A				
		II								Wastech (Serial Modules)	A				
		*								HBL Power Systems	DR				
		*								Dubai	DR				
		*								Chabbi Electricals (Chabbi Modules)	DR				BIMS from M/s USV, Germany
		*								Jalgaon	DR				
		*								Harshi H. Rel	DR				
		*								Suzlon Power Controls Pvt. Ltd.	DR				
		*								Noida	DR				
		*								Chloride Power Systems (calayna)	DR				
		*								Amara Raja	DR				
		*								Keltron Power Electronics	DR				

9 of 26

217

NTPC		PROJECT : Patrauli STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				VENDOR AS APPROVED BY				DATE : 26.04.2017		
		CONTRACTOR : BHEL Ltd										
		CONTRACT NO : CS-9588-001-2										
No.	Major Equipment	QP Inspect on Category	QP No. 9588-001-QV1	QP Submis SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub QR	Remark
37	Battery Health Monitoring System	-				Universal Instrument manufacturing co P Ltd	India	DR				
		-				Hind Rectifier Ltd	India	DR				
		III				Emerson	Mumbai	A				
		-				Elink SGS Pvt Ltd	Gurgaon	A				
		-				B Tech Inc	USA	DR				
		III				Hitech Hi Rel	Gandhinagar	A				
		-				Hipstick	Germany	DR				
		-				Hitech Hi Rel	Gandhinagar	DR				
38	Battery(Ni-co)	I				AMCO SAFT	Bangalore	A				
		II				SAFT	France/Sweden	A				
		I				HBL POWER	Hyderabad	A				
		II				Hopkine	Germany	A				
39	Socket weld fittings	III				BHEL Approved Sources	Raigarh	A				Carbon steel only
40	Impulse pipe & tubes	II				Maharashtra Seamless	Japan	A				
		II				Sunilomoharavskii/Nippon	Germany	A				
		II				TPS TECHNATUBE	Germany	A				
		II				Valvac & manestmann	Germany	A				
		II				BHEL	Tutty	A				
		II				Trourey and Calver	France	A				Makes shall be as per approved list (Sr. No. 41)
		II				ISMT	Ahmadnagar	A				Carbon steel only.
		-				Sandvik	Spain	DR				For SS only.
		-				TUBACES	Germany	DR				
		-				Sulgitier Mannesmann International	Germany	DR				
		-				Jindal saw	India	DR				
		II				Ratanamati Metal and Tubes	Ahmadabad	A				SS only
		-				Heavy metals and Tubes	Ahmadabad	A				SS and CS only.
		-				Shubhashmi Metal and Tubes	Mumbai	DR				
41	Compression fittings	III				Parker	USA	A				
		III				Precision	Mumbai	A				
		III				Asich	Mumbai	A				
		III				Fluid control Pvt. Ltd.	Pune	A				
		III				High Valves and fittings	CHENNAI	A				Ferrules are to be hardened at Exm Holland for pressure above 9000 psi.
		III				Excel hydro	Mumbai	A				Ferrules are to be hardened at Exm Holland for pressure above 9000 psi.
		III				Swagelok	USA	A				
		III				Penam	Mumbai	A				
		III				Meipress	Kolkata	DR				
		-				AURA INC	New Delhi	DR				
		-				Prima Engineers		DR				
		-				Arya Craft		DR				



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NTPC		PROJECT : Patratu STPS Phase-I (3 X600MW) PACKAGE : EPC PACKAGE CONTRACTOR : BHEL Ltd CONTRACT NO : CS-9993-091-2					LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY					REVISION NO : 00 DATE : 26.04.2017	
No.	Major Equipment	QP Inspect on Category	QP No. 555- 001-QV Q	QP No. Sub SCH	QP No. Sub SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval Sub SCH	Sub QR	Remark	
49	HIGH Temp. cable (PTFE/EP)	I				MINCO India Flow Elements Pvt. Ltd	GOA	A					
		*				SAMEL	Korea	DR					
		*				MINCO	GOA	DR					
		*				Eng. Specialties	Kolkata	DR					
		*				Pyroelectric	Mumbai	DR					
		*				Hydropneumatics	Mapusa / GOA	DR					
		*				ASIAN INDUSTRIAL VALVES	Chennai	DR					
		*				Dynaford valves Pvt. Ltd.	Belgium	DR					
		II				Habib cables	Sweden	A					
		II				Lapp cables	Germany	A					
		II				Kerpen cables	Germany	A					
		II				TEW & C	USA	A					
		II				Thermo-Electra Inc	Netherlands	A					
		II				Habib cables	China	A					
		II				Thermocables	Hyderabad	A					
		II				Templets	Udaipur	A					
		*				Delton Cables	Fardab	DR					
		*				RJ Cables	Rochester	DR					
50	Flow optic cable	II				HFCL	Goa	A					
		II				RAM	Switzerland	A					
		II				Akash Fibre	Bhubaneswar	A					
		II				Finclax	Pune/Goa	A					
		II				Beta Encas	India	A					
		II				Molex	UK	A					
		II				Coming	USA	A					
		II				Schneider	GOA	A					
		*				RPG Cables	India	DR					
		*				Unilux Cables	India	DR					
		*				Tenscom	India	DR					
51	Pneumatic Actuator (Powder Cylinder e.g. FOR SADC)	II				Dong Woo Valve Control Co. LTD	Korea	A					
		II				Shin Hwa Engineering Co. LTD	Korea	A					
		I				Instrumentation Limited	Palghat	A					
		I				Kellon	Cochin(Malapp)	A					
		*				SMC Pneumatics	Noida	A					
		*				Relax	Mumbai	A					
		*				Emerson Process Management	Chennai	DR					
		*				MIL Controls	Alway	DR					
		*				Festo	Bangalore	DR					
		*				IMI Norman	Noida	DR					
52	Level switch capacitance type	III				ENDRESS & HOUSER	Aurangabad	A					
		III				MAGNETROL	BELGIUM	A					
		III				SSEM	PUNE	A					
		III				PUNE TECHTROL	PUNE	A					



13 A 46

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NTPC		PROJECT : Patrauli STPS Phase-I (3 X 800MW)					LIST OF ITEMS REQUIRING QP					REVISION NO : 00	
		PACKAGE : EPC PACKAGE					APPROVAL & ACCEPTABLE					DATE : 26.04.2017	
		CONTRACTOR : BHREL Ltd					VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9395-001-3											
No.	Major Equipment	QP (Inspection Category)	QP No. 5565- 001-QVI	QP Submittal SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub OR	Remark	
53	Transducer	III				LEVCON	KOLKATA	A					
		III				Nivo Controls	Indore	A					
		III				V AUTOMAT	New Delhi	DR					
		III				D K Instrument	Kolkata	DR					
		III				Siemens	Germany	DR					
		III				ABB	Korea	DR					
		III				Rosemount	Korea	DR					
		III				AE	Mumbai	A					
		III				Southern Transducer	Chennai	A					
		III				Elster	Mumbai	A					
		III				Camille Bauer	Germany	A					
		III				Metrawal	Germany	A					
		III				Rustab	Nashik	A					
		III				Pyrotech	Udaipur	DR					
		III				Marbut	Gandhinagar	DR					
		III				SIEMENS	Germany	DR					
		III				EMERSON	Mumbai	A					
		III				EMERSON	Pune	A					
		III				Nisach Hi-Rel	Gandhinagar	A					
		III				APC	Bangalore	A					
		III				APLAI	Mumbai	A					
		III				Delia	Gurgaon	DR					
		III				Powerlinks	Bangalore	DR					
		III				DURAS ENGG PVT LTD.,							
		III				BANGALORE							
		III				Grid power conversion Pvt Ltd.							
		III				Schneider	Bangalore	DR					
		III				EMERSON (Solartron mobility)	UK	DR					
		III				Hi Tech	Kolkata	A					
		III				Varway	USA	A					
		III				LEVELSTATE	UK	A					
		III				Raman Instruments	Delhi	A					
		III				BHREL	Tokyo	DR					
		III				IGEMA	Germany	DR					
		III				ENDRESS & HOUSER	AURANGABAD	A					
		III				MAGNETROL	BELGIUM	A					
		III				LEVCON	KOLKATA	A					
		III				SEEM	PUNE	A					
		III				Chintrols samil	Madurai	A					
		III				NAKATTA	JAPAN	A					
		III				Sigma Industries	Mumbai	A					
		III				D K Instrument	KOLKATA	A					
		III				PURE TECHTROL	PUNE	A					
		III				V AUTOMAT	NEW DELHI	A					
		III				WAREE	WAPI	DR					
		III				LEVELSTATE	UK	A					
54	Mini UPS up to 3.5 KVA	III											
55	Level switch- cond type	III									Sub OR	Levelstate, UK System	
56	Level switch- FluidDisplacer Type	III									Sub OR	Emerson (Mobrey) System	



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NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO: 00	
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 28.04.2017	
		CONTRACTOR: BHEL Ltd				VENDOR AS APPROVED BY					
		CONTRACT NO : CS-3583-001-3									
No.	Major Equipment	Qp Inspection Category	Qp No.	Qp Sub Q	Qp Sub SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval Sub QR	Remark
57	Per filter regulator	III				Gluegas Bourdon (GIC)	Panvel	A			
		•				Nikan Scientific Process	Navi Mumbai	DR			
		III				Fairchild	USA	A			
		III				Shayo Morgan	Mumbai	A			
		III				SMC Pneumatics	NOIDA	A			
		III				Emerson (Asco)	Chennai	A			
		III				Festo	Bangalore	A			
		III				Flacka	Chennai	A			
		III				Dhaya Control Elements	Gulbati	DR			
58	Copper tubing/Brass connectors	III				Main Contractor approved Sources		A			
59	Coilwinding / Insulating relays	III				PARAMOUNT	BANGALORE	A			
		III				OMRON		A			
		III				OEN		A			
		III				Jyoti	Baroda	A			
		III				ELSTA	SWITZERLAND	A			
		•				Schneider	Germany	DR			
		•				Siemens	Germany	DR			
		•				Phoenix	Germany	DR			
		•				Finder	Germany	DR			
		III				Relax	Nasik	A			
		III				Avcon	Mumbai	A			
		III				Heron	Germany	A			
		III				IMI NORGEN	GERMANY	A			
		III				Jafferson	Argentina	A			
		III				Asco	Chennai/USA	A			
		III				Festo	Bangalore	A			
		III				SMC	Noida	A			
		III				Parker	Brazo Name	A			
		•				Schneider	Germany	DR			
		•				Neuson Industries Pvt. Ltd.		DR			
		•				NUOVO PIONONE	ITALY	A			
60	Lube oil control valve - Self Regulating	III				EMERSON	CHEMUR	A			
		III				SAMSON	GERMANY / PUNE	A			
		III				Forbes marshall arca pvt. Ltd.	Pune	A			
		III				Magnetrol	Belgium	A			
		III				Endress & Houser	Germany/	A			
		III				Emerson Process Management	Aurangabad	A			
		III				ABB(R-Tech)	Sweden/ PANJANE	A			
		III				Supreme Technology	USA	A			
		•				Yokogawa	Thane	A			
		•				ABB	Japan	DR			
		•				P & F	India	DR			
		•					Bangalore	DR			



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NTPC				PROJECT : Patratu STPS Phase-I (3 X600MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00	
				PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 28.04.2017	
				CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY					
				CONTRACT NO : CS-9555-001-2									
No.	Major Equipment	OP Inspection Category	QP No. 5595- 001-QV	QP Submis- sion SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark	
89	Graphic Interface Unit	III				Forbes Marshall Codel ICE(Asia) Private India Rockwell Automation	Pune Mumbai	DR OR					
		III				Digital Instruments and Control System (Produce)	Bangalore	A				Proface Brand	
		III				Red Lion	USA	A					
		III				Schneider Electric		A					
90	Hand Held Calibrator	III				Main contractor approved sources		A				Compatible with the Transmitter to be Supplied & Subject to meeting NTPC specification requirement	
91	Plant Management System	III				Yokogawa	India	A					
		III				Emerson Process Mgmt	USA / Singapore / India	A					
		III				P & F	Germany / Bangalore	A					
		III				MTL	Chennai	A					
		•				Stahl	Germany	DR					
92	Impact Head Type Flow Element	II				Detrich / Emerson	USA	A			Sub QR		
		II				Midwest	USA	A					
		II				Veris Inc	USA	A					
		•				TM Technomatic SPA	Italy	DR					
93	Isolator	III				Main contractor approved sources							
94	Master Slave Clock System	II				Hopf	Germany	A					
		I				Serial	Chennai	A					
		II				Halfway	USA	A					
		II				Moser Baer AG	Switzerland	A					
		I				Mein Berg	Germany	A					
		I				Sands	Chennai	A					
		•				Mastbus	Ganghinagar	A					
		•				Synapsis & System	Chennai	DR					
95	Modac Tiles / Console Items	III				Pro-Plan	Germany	A					
		III				Tew	Germany	A					
96	Network Components	III				Main contractor approved sources							
97	Online Mercury Analyser	•				Durag	Bangalore	A					
		•				Mahak	Germany	DR			Sub QR	Earlier Boyko Surey Earlier Subblew	
		•				Thermo	USA	DR				Main Contractor Can propose additional vendor for this Item	
		•				Commend	Austria	DR					
		•				Stanphone Zenitel	Norway	DR					
		•				Armel	Russia	DR					
		•				Industrie Electronic GmbH and Co. KG	Germany	DR					
		•				LARADN Engineers and Consultants Pvt. Ltd.	Gurgaon	DR					
		•				Asham Technologies India Pvt. Ltd.	Bangalore	DR					



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20

PROJECT : Palur STPS Phase-I (3 X500 MW)										LIST OF ITEMS REQUIRING QP			
PACKAGE : EPC PACKAGE										APPROVAL & ACCEPTABLE			
CONTRACTOR : BHEL LM										VENDOR AS APPROVED BY			
CONTRACT NO : CS-8585-001-2													
No.	Major Equipment	QP Inspect on Category	QP No. 9585-001-QM	QP Submision SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub QR	Remark	
98	Printer (Dot Matrix)	III				BHEL Approved Sources						Make	
99	Printer (Inkjet)	III				BHEL Approved Sources						Make	
100	Printer (Laser)	III				BHEL Approved Sources						Make	
101	Sensaphere Indicators	III				K & N	Germany	A					
		III				AUD	Austria	A					
		III				Siemens	Germany	A					
		III				Siemens	Germany	A					
		III				Siemens	Mumbai	A			Sub QR		
		III				Siemens	Chennai	A					
		III				Siemens	Bangalore	A					
102	Synchronizing Relay	III				ABB							
103	Synchroscope	III				BHEL Approved Sources							
104	Ultrasonic Type Flow Meter (for Stack)	III				Mahak	Germany	A					
		III				Chug	Germany	A					
		III				Telepne	USA	A					
		III				GE Sensing	USA	DR					
105	UPS / ACDB	I				EMERSON (DR Power)	Pune	A					
		I				Marlin & Green	France	A					
		I				Ortur	Switzerland	A					
		I				AEG (Safe)	Germany	A					
		I				Hitachi Hiral	Gandhinagar	A					
		I				Emerson (Tata Libert)	Ambarath	A					
		I				Pul Electric	Japan	A					
		I				Malcom	Kerala	DR					
		I				APC	India	DR					
		I				UBASI ENGIG PVT LTD.,							
		I				BANDALORE							
		I				Grid power conversion Pvt Ltd.							
		I				Shinkawa	Japan	A					
106	Vibration Monitoring System for BOP	II / I									Sub QR		
	Refer Note - 1	II / I				Bendley Nevada	USA	A					
		II / I				Vibrometer	Switzerland	A					
		II / I				Rockwell Automation	USA	A					
		II / I				GE	USA	A					
		I				GE	Pune	A					
		I				Meggil	Bangalore	A					
		I				Forbes Marshall	Pune	A					
		I				Rockwell Automation	Sahyadri	A					
		I				Emerson	Mumbai	DR					
		I				Bend and Kagar		DR					
		I				ROD Mechanalysis	Mumbai	DR					
		III				Flushah	Nashik	A					
107	Voltmeter	III				AE	Mumbai	A			Sub QR		
		III				Vishkawa	Japan	A					
		III				MECO		DR					
108	Vibration Meters	III				LAT	Bangalore	A					



24.04.17

24.04.17

PROJECT : Patna STPS Phase-I (3 X800MW)										LIST OF ITEMS REQUIRING QP			
PACKAGE : EPC PACKAGE										APPROVAL & ACCEPTABLE			
CONTRACTOR : BHEL LM										VENDOR AS APPROVED BY			
CONTRACT NO : GS-1585-091-2													
No.	Major Equipment	QP Inspect on Category	QP No. 885-001-QVR	QP Submis on SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark	
		II				Elster	Mumbai	A					
		III				Secure Motors	Udaipur	A					
		III				Yokogawa	Japan	A					
		II				DEC	UK	A					
		III				Schneider Electric	India	DR					
		III				Landis + Gyr	Kolkata	DR					
109	Wireless Solution (Microwave Tower Communication)	II				D Link	Goa	A					
		III				Shreeal	Pune	A					
		III				Protect	Udaipur	A					
		III				Arya Communications	New Delhi	A					
		*				Lotus Wireless	Vishakhapatnam	DR					
		*				Avionics	Telaviv	DR					
		*				Prodent Automation Pvt. Ltd.	Hyderabad	DR					
		*				MAG Systems Ltd.	UK	DR					
110	Large Video Screen (LED Based)	II				Delta	Gurgaon	A					
		III				Barco	Noida	A					
		III				Planet System	USA	A					
		*				Cherale	USA	DR					
		*				Eyevix	Germany	DR					
111	CNC Box (if applicable)	II				APM	ISRAEL	A					
112	3 D level Scanner for Solid Application	II				BHEL Approved Sources		A					
113	Dust Sensor	II				Switching Circuit	Kolkata	A					
114	Pulse Jitter Controller	II				Advanced Concept	Kolkata	A					
		II				Control Devices	Kolkata	A					
		*				Voltrah	Kolkata	DR					
115	Solid Mass Flow Meter	II				Micro System	Kolkata	DR					
		II				Schenk	Ranchi	A					
		II				Thermofisher (Germany)	Nasik	A					
		II				Siemens Mahindra	Canada	A					
		II				Mazec	Germany	A					
		II				SVR	Germany	A					
116	Nuclear Density meter	II				E & H	Aurangabad	A					
		II				Thermofisher Scientific	UK	A					
		*				Siemens	Germany	DR					
		*				EMERSON	USA	DR					
		*				GE Sensing	USA	DR					
		*				Bentham	Germany	DR					
		*				BHEL Approved Sources		A					
117	Humidistat / Thermostat / Overstat / Axial	II				EPF Engrs	Nasik	A			Sub QR		
118	Level Switch (RF Type)	II				FLOW STAR	Pandharpur	A			Sub QR		
		II				Nipr Controls	Indore	A					
		*				BHEL		DR					



27.04.2017

27.04.2017

PROJECT : Patratu STPS Phase-I (3 X800MW)										
PACKAGE : EPC PACKAGE										
CONTRACTOR : BHHEL Ltd										
CONTRACT NO : CS-3385-001-2										
No.	Major Equipment	QIP Category	QIP No. 1585-QIP	QIP Submis- sion	QIP SCH	Proposed Sub Supplier	Country	SS	SS	Remark
								Approval Status	Detail Sub SCH	
LIST OF ITEMS REQUIRING QIP APPROVAL & ACCEPTABLE DATE : 28.04.2017 VENDOR AS APPROVED BY										
119	Turbine supervisory Instruments along with vibration analysis system.	II				GE BENTLY	USA	A		
	Refer Note - 1	II				MEGGITT (VIBROMETER)	SWITZERLAND	A		
		II				SHINKAWA	JAPAN	A		
		I				GE	Pune	A		For GE Bently, USA System
		I				MEGGITT (VIBROMETER)	Bangalore	A		For Meggit, Switzerland System
		I				Forbes Marshall	Pune	A		For Shinkawa, Japan system
		*				EMERSON	INDIA	OR		
		*				Brüel and Kjaer	DR	OR		
		*				Rockwell Automation	Sahibabad	OR		
		*				SKF	USA / India	OR		
		*				BHEL EDN	Bangalore	OR		
120	SWAS (Sampling Handling System and Dry Panel)	I				Emerson Process Management	Navi Mumbai	A		Sub QR
		I				Forbes Marshall	Pune	A		
		I				Low	UK	A		Conditional
		I				ABB	Bangalore	A		
		I				Yokogawa	Bangalore	OR		
		I				Analysar Instrument Co. Ltd.	Kota	OR		
		I				Steam Equipment	Pune	A		
		*				Flow Line Instrument	Bangalore	OR		
		*				Instrumentation Limited	Kota	OR		
		*				Chemicon Controls	Pondichery	OR		
121	SWAS Analyser (Chloride)	III				ABB	UK	A		Sub QR
		III				Orion	USA	A		Orion Brand
		*				DKK	Japan	OR		
		III				Hach	Switzerland	A		Polymetron Brand
122	SWAS Analyser (Conductivity)	III				Emerson Process Management	Navi Mumbai	A		Sub QR
		III				Yokogawa	Japan	A		
		III				ABB	UK	A		
		*				Honeywell	USA	OR		
		*				DKK	Japan	OR		
		*				Orion	USA	OR		
123	SWAS Analyser (Dissolved Oxygen)	III				Orion	USA	A		Sub QR
		III				Hach	Switzerland	A		Orion Brand
		III				Emerson Process Management	USA	A		Polymetron Brand
		III				ABB	UK	A		
		*				Honeywell	USA	OR		
		*				DKK	Japan	OR		
		III				Hach	Switzerland	A		
124	SWAS Analyser (Hydrazine)	III				Orion	USA	A		Sub QR
		III				ABB	UK	A		Polymetron Brand
		III						A		Orion Brand



22-04-16

22-04-16

PROJECT : Patratu STPS Phase-I (3 X600MW)		LIST OF ITEMS REQUIRING QP				REVISION NO : 00						
PACKAGE : EPC PACKAGE		APPROVAL & ACCEPTABLE				DATE : 28.04.2017						
CONTRACTOR : BHEL Ltd		VENDOR AS APPROVED BY										
CONTRACT NO : CS-5553-051-2												
No.	Major Equipment	QP Inspected	QP No. 9585-001-QVA	QP Submittal	QP Approval	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
125	SWAS Analyser (pH)	III	III	III	III	DKK	Japan	DR				
126	SWAS Analyser (Phosphate)	III	III	III	III	ABB	UK	DR			Sub QR	Polymetron Brand
127	SWAS Analyser (Silica)	III	III	III	III	Hach	Switzerland	A				
128	SWAS Analyser (Turbidity)	III	III	III	III	Emerson Process Management	Navi Mumbai	A				
129	SWAS Analyser (Sodium)	III	III	III	III	Yokogawa	Japan	A				
130	Operator Testing Simulator	III	III	III	III	Honeywell	USA	DR				
131	Concentration Analyser	III	III	III	III	DKK	Japan	DR				
132	Electromagnetic Flow Meter	III	III	III	III	Orion	USA	DR			Sub QR	Polymetron Brand
133	Fiber Optic Generator End winding VMS	III	III	III	III	Hach	Switzerland	A				
134	H2 Gas Analyser Cabinet	III	III	III	III	ABB	UK	A			Sub QR	Polymetron Brand
135	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
136	H2 Gas Analyser	III	III	III	III	Emerson	USA	A				
137	H2 Gas Analyser	III	III	III	III	WTW	Germany	A				
138	H2 Gas Analyser	III	III	III	III	E & H	Germany	A				
139	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
140	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
141	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
142	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
143	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
144	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
145	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
146	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
147	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
148	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
149	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
150	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
151	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
152	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
153	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
154	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
155	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
156	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
157	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
158	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
159	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
160	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
161	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
162	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
163	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
164	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
165	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
166	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
167	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
168	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
169	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
170	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
171	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
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174	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
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179	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
180	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
181	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
182	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
183	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
184	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
185	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
186	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
187	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
188	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
189	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
190	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
191	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
192	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
193	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
194	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
195	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
196	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
197	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
198	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
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200	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
201	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
202	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
203	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
204	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
205	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
206	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
207	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
208	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
209	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
210	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
211	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
212	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
213	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
214	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
215	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
216	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
217	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
218	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
219	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
220	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
221	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
222	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
223	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
224	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
225	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
226	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
227	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
228	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
229	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
230	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
231	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
232	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
233	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
234	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
235	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
236	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
237	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
238	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
239	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
240	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
241	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
242	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
243	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
244	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
245	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
246	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
247	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
248	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
249	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
250	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
251	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
252	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
253	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
254	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
255	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
256	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
257	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
258	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
259	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
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261	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
262	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
263	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
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265	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
266	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
267	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
268	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
269	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
270	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
271	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
272	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
273	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
274	H2 Gas Analyser	III	III	III	III	DKK	Japan	DR				
275	H2 Gas Analyser	III	III</									

23 A 26

232

PROJECT : Patra STPS Phase-I (3 X100MW)												
PACKAGE : EPC PACKAGE												
CONTRACTOR :BHEL Ltd												
CONTRACT NO : CS-3585-001-2												
LIST OF ITEMS REQUIRING QP												
APPROVAL & ACCEPTABLE												
VENDOR AS APPROVED BY												
REVISION NO : 00												
DATE : 28.04.2017												
No.	Major Equipment	QP Inspected on Category	QP No. 8585-001-QM-Q	QP Submis Q SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
135	Slight Flow Indicator	III				BHEL Approved Sources		A				
136	Ammonia Analyzer					Sick Mahab	Germany	DR				
						Emerson Process Management	Pawane	DR				
						Siemens	Germany	DR				
						Fuji Electric	Japan	DR				
						Thermofisher	Mumbai	DR				
						Yokogawa	Bangalore	DR				
						Dongwoo Option		DR				
137	AAQMS	I				Environment SA India Pvt. Ltd.	Bangalore	A			Sub QR	Analysers for Environment SA, France : Multipoint Calibrator from M/s L. H Industrial, Switzerland and Meteorological Sensors from M/s LSI Lastem SRL, Italy.
		I				Chemicals	GOA	A				Analysers for Teledyne APL USA, Meteorological Sensors & SIPM from M/s Metone Instruments, USA.
		I				Therma Electron LLC India Pvt. Ltd.	Mumbai	A				Analysers for M/s Thermo Environmental Instruments Inc., USA & Meteorological Sensors from M/s Metone Instruments, USA.
138	EQMS					Land Combustion	UK	DR				
						Thermofisher	India / USA	DR			Sub QR	
						SEPL	Pune	DR				
						ALCPL	Kota	DR				
						Nexco	Surat	DR				
						Thermofisher	Mumbai	DR				
						Thermax	Pune	DR				
						Suprema Technology	Mumbai	DR				
						E & I	GERMANY	A				
139	RESIDUAL CHLORINE ANALYSER.	III				EMERSON PROCESS	PAWANE	A				
						HACH	USA	A				
						Emerson process	USA/Pawane	A				
140	ORP ANALYZER	III				ABB	UK/USA	A				
						HACH	Switzerland	A				
						Yokogawa	Japan	A				
141	CL2 Leak detector	III				V&T	Germany	A				
142	Flame Scanner Cable	I				Thermocable	Hyderabad	A				
		I				Delton cables	Fardabad	A				



25 of 46

P. P. P.



NTPC		PROJECT : Paimetu STPS Phase I (3 X800MW) PACKAGE I EPC PACKAGE CONTRACTOR : BHEL Ltd CONTRACT NO : CS-9585-001-2						LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 00 DATE : 28.04.2017	
No.	Major Equipment	Inspected 9585- 001-QVI Category V	QP No.	QP 9585- 001-QVI Q	QP Submis- sion vst SCH	QP Apprm vat SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
		I					Corbin Caston	Bhivdagi / Kharwad	A				

LEGENDS :

1.6 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)

A - For those items proposed vendor is acceptable to NTPC, subject to meeting the NTPC Specification requirement. To be indicated with letter "A" in the list alongwith the condition of approval, if any.

NOTED: For these items vendors are approved by Main Supplier and accepted by NTPC without specific vendor approval from NTPC. To be identified with "NOTED"

2.9 QP INSPECTION CATEGORY :

CAT - 1 : For those items the Quality Plans are approved by NTPC and final acceptance will be on physical inspection witness by NTPC

For the items approved by NTTPC, the final acceptance shall be on the basis of review of documents.

CAT-III

UNITSWORKS : place of manufacturing. Place of main supplier of multi unit/works.

* - inspection category will be decided during vendor evaluation.

NOTE - 3: EMPTY CABINETS, COMPUTERS, SIGNAL ISOLATOR/MULTIPLIER, MCD, TB, POWER SUPPLY ETC, SHALL ALSO BE ACCEPTABLE FROM HOMOGENEOUS SOURCES AGREED BY NTPC IN QP. IF THE TOTAL INTEGRATED PANEL AND FAT IS CONDUCTED INDEGENOUSLY ITEM TO BE TREATED AS CAT -1.

NOTE - 2: Mandatory Signs will be treated as CAT-III

NOTE - 3 : For the items not appearing in the preaward list, bidder and NTPC will mutually discussed in future.

NOTE - 4: Integration testing of DDCMIS shall be done with monitor connected to the LVS workstation. This would be tied up in the QAP/ATST. Dispatch of LVS can be allowed (like a CAT-III item) but only after successful testing of functionality as indicated in QP and completion of ATST of first unit.

NOTE - 5 : C&I Items Integral for skid, Fan, Motor, Pump etc Instrument shall be supplied as per OEM standard/ approved sources.

NOTE - 8 : for instrumentation cable quantity less than 1 km of each type inspection category is III and for less than 2.5 km of each type inspection category is CAT-II
Ensp. Doc/04/1

26 Oct 26.

Prashant P. Patil
Dm (GA-CCF)

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234

PEM REGISTERED SUPPLIER LIST AS ON 2/19/2019

Sl No	Package Name	Supplier Name	Supplier Communication Address	Supplier Works Address
1		SAMSON CONTROLS PVT. LTD.	Mr. Atulraje-MD D 281, MIDC Ranjangaon Ta Shirur Pune Phone- 02067246600 Pincode : 412220 Email : sales@samsoncontrols.net	Works-1-> Others D 281, MIDC Ranjangaon -Pune-MAHARASHTRA India Phone- 02067246600,8554997963 FAX : Pincode : 412220 Email : sales@samsoncontrols.net
2		FORBES MARSHALL ARCA PVT.LTD.	A-34/35 , MIDC ESTATE, H-BLOCK, PIMPRI, PUNE, Phone- 020-27442020, Pincode : 411018 Email : mnadgaundi@forbesmarshall.com	Works-1->Mr. Sanjeev Shinde A-34/35 MIDC Estate,H Block, Pimpri, -Pune-MAHARASHTRA India Phone- 9323176406 FAX : 020-27442040 Pincode : 411018 Email : sshinde@forbesmarshall.com
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4		Koso India Private Limited,	H 33 & 34, MIDC, Ambad, Nashik, Phone- 09650233433 Pincode : 422010, Email : jetmal.gour@koso.co.in	Works-1->P.J.ASHOK KUMAR/SEEMA ANAND Control Valve Division, H-33&34, MIDC, Ambad, -Nashik-MAHARASHTRA India Phone- 91 944 744 3198 FAX : 0491 - 5269914 Pincode : 422010 Email : pja@koso.co.in Works-2->+P.J.ASHOK KUMAR/SEEMA ANAND J-1,MIDC,Ambad - Nashik-MAHARASHTRA India Phone- 91 944 744 3198 FAX : 0491 - 5269914 Pincode : 422010 Email : pja@koso.co.in
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9		Mascot Valves Pvt. Ltd.	166-167 GIDC Naroda Ahmedabad Phone- 0792282 1619 Pincode : 382330 Email : dom.sales@mascotvalves.com	Works-1->Varun Patel Dir 166-167 ,GIDC Naroda - Ahmedabad-GUJARAT India Phone- 0792282 1619 / 3369 FAX : Pincode : 382330 Email : dom.sales@mascotvalves.com
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11		DRESSER VALVE INDIA PVT. LTD	Mr. Raj Raman/Mr. Rajkumar Moria S.F. No: 608,Chettipalayam Road, Echanari Post, Coimbatore Phone- +91-98451 19085 Pincode : 641021 Email : Anoop.Ramachandran@ge.com	Works-1->Mr. Anoop Ramchandran S.F. No: 608,Chettipalayam Road, Echanari Post, -Coimbatore-TAMIL NADU INDIA Phone- +919500978296 FAX : +91 4223011200 Pincode : 641021 Email : Anoop.Ramachandran@ge.com
12		Severn Glocon India Pvt. Ltd.	F96 & F97, Sipcot Industrial Park, Irungattukottai, Chennai, Phone- 044-47104200, Pincode : 602117, Email : info@severnglocon.co.in,	Works-1->Mr. K.Kaushik, F96 & F97, Sipcot Industrial Park,Irungattukottai, -Chennai-TAMIL NADU India Phone- 044-47104200, FAX : 044-47100073, Pincode : 602117, Email : info@severndlocon.co.in
13		EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	147, KARAPAKKAM VILLAGE, CHENNAI Phone- 23722184, 23716242 Pincode : 600096 Email : jatinder.singh@emerson.com	Works-1->Mr. Rangarajan (Head - Lean and Manufact 147,Karapakkam Village, -Chennai-TAMIL NADU India Phone- 0444903 4395 FAX : Pincode : 600097 Email : Rangaraian.M@emerson.com
14		WALDEMAR PRUSS ARMATURENFABRIK GMBH	Mr. Winfried Dremhel Schulenburgerlandstrasse 261, Hannover Phone- +49-511279260 Pincode : 30419 Email : dremhel@pruss.de; vogel@pruss.de	Works-1->Mr. Winfried Dremhel CEO Schulenburgerlandstrasse 261, -Hannover- GERMANY Phone- +49-511279260 FAX : Pincode : 30419 Email : dremhel@pruss.de

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17		Barksdale GmbH, Germany	Michael Weileder Dorn Assenheimer, Strasse 27 Reichelsheim Phone- +91-9999107840 Pincode : D-61203 Email : msingh@barksdale.de	
18		GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai Phone- 9323195251 Pincode : 400016 Email : amarendra@general-gauges.com	
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20		SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com.	Works-1-> LARRY DEGARMO/ ROY STUMBOUGH 14685 W. 105TH STREET, LENEXA -KANSAS- USA Phone- 913-888-0767 FAX : 913-888-0767 Pincode : 66215 Email : rstumbough@sorinc.com
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50		Thermal Instrument India Pvt. Ltd.	Mr. Raghavendra M. Kulkarni 194/195, Gopi Tank Road Behind Citylight Cinema,Mahim Mumbai Phone- 09322664709 Pincode : 400016 Email : ramk@giconindia.com	

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56	YOKOGAWA INDIA LIMITED,	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE, Phone- 080-41586000, Pincode : Email : udav.shankar@in.yokogawa.com.	Works-1-> PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, -BANGALORE-KARNATAKA INDIA Phone- 080-41586000, FAX : 080-28521442, Pincode : Email : udav.shankar@in.yokogawa.com
57	ABB INDIA LIMITED	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD Phone- 09971085678 Pincode : 121003 Email : vipin.swami@in.abb.com	
58	V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	Works-1->Mr. BHAGWAN SINGH/ Mr. NANDAN SINGH F-61, OKHLA INDL.AREA,PHASE-I -NEW DELHI-DELHI INDIA Phone- 011-47627200 Extn. 3 FAX : 011- 26819440 Pincode : 110 020 Email : production@vautomat.com
59	Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	

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TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhpura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,	Works-1-> Khasra No.: 218-230& 235, Industrial Estate, Makhpura, -Ajmer-RAJASTHAN India Phone- 9887865856, FAX : 0145-2695174, Pincode : 305002, Email : raieev.gupta@tipl.com
SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE, Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in	Works-1->MR. MOHAN PADWAL 691/A/2,BIBWEWADI INDL ESTATE -PUNE-MAHARASHTRA INDIA Phone- 918600042374 FAX : 912024215670 Pincode : 411037 Email : wm@sbem.co.in
Endress + Hauser (India) Pvt. Ltd.,	Mr. Prakash Vaghela 215-216, DLF Tower 'A', Jasola District Centre, New Delhi, Phone- 9717593001, Pincode : 110025, Email : prakash.vaghela@in.endress.com.	Works-1-> M-171 to 173, MIDC, Waluj, -Aurangabad-MAHARASHTRA India Phone- 9881000474, FAX : 0240-2555179, Pincode : 431136, Email : Narendra.Kulkarni@wetzler.endress.com
Moore Industries International Inc.	Leonard.W. Moore/ Matt Moren 16650 Schoenborn St. North Hills Phone- +1 818 830 5548 Pincode : 91343 Email : mmoren@miinet.com	Works-1->Matt Moren/Gina Cruz 16650 Schoenborn St., North Hills -CALIFORNIA- USA Phone- +1 818 894 7111, ext FAX : +1 818 830 5588 Pincode : 91343 Email : gcruz@miinet.com
PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,	Works-1->Mr. Santosh Shukla Others R-628,TTC Industrial Area, MIDC Rabale, -Navi Mumbai-MAHARASHTRA India Phone- 9821350761, FAX : 022-27695559, Pincode : 400701, Email : sales@panamengineers.com
Honeywell Automation India Limited	Mr. Ritwiji Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI Phone- 9890200584 Pincode : 110019 Email : raiesh.chaudhary@honeywell.com	Works-1->Mr.Kedar Tillu 53, 54, 56 & 57,Hadapsar Industrial Estate -PUNE-MAHARASHTRA INDIA Phone- 9665034625 FAX : 020 66039905 Pincode : 411013 Email : kedar.tillu@honeywell.com
EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	Mr. Amit Patthar/Vikram Raj Singh 206-210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.com	Works-1->Kalpesh Chandan/Hrishikesh Aghor Plot No. A 145/4 TTC IND AREA,MIDC, PAWANE, -NAVI MUMBAI-MAHARASHTRA INDIA Phone- 9619688001 FAX : 022-66736000 Pincode : 400 705 Email : Kalpesh.chandan@emerson.com
SMART INSTRUMENTS LTD, BRAZIL	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI Phone- 28208477 Pincode : 400093 Email : corp@delbbv.rdgms.ems.vsnl.net.in	
SIEMENS LIMITED	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshnev@siemens.com	Works-1->Ankit Varshney Kalwa Works, Thane-Belapur Road, Thane, -MUMBAI-MAHARASHTRA INDIA Phone- FAX : Pincode : 400708 Email :

69		NIVO CONTROLS PVT. LTD.	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore Phone- 0731-4081305 Pincode : 452010 Email : sales@nivocontrols.com	Works-1->Mr. Praveen Toshniwal 104-115, Electronic Complex, -Indore-MADHYA PRADESH India Phone- 0731-4081305 FAX : 0731-255075 Pincode : 452010 Email : sales@nivocontrols.com
70	TEMPERATURE SWITCH	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com	Works-1->LARRY DEGARMO/ ROY STUMBOUGH 14685 W. 105TH STREET, LENEXA -KANSAS- USA Phone- 913-888-0767 FAX : 913-888-0767 Pincode : 66215 Email : rstumbough@sorinc.com
71		INDFOS (INDIA) LIMITED	MR.L.C.VENKATRAMAN/MR.B.KANINAN New No.17, II Floor, Adwawe Towers, Dr.Sevalia Shivaji Salai, T.Nagar Chennai Phone- +91 44 24353407 Pincode : 600017 Email : delhi@indfos.com	
72		TOSHNIWAL BROTHERS PVT.LTD.	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER Phone- 441171 Pincode : 305002 Email : toshniwalprocess@gmail.com	
73		DRESSER INDUSTRIES INC.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol Phone- 02764-233682 Pincode : 382729 Email : Nishit.patel@ashcroftindia.com	
74		SWITZER PROCESS INSTRUMENTS PVT. LTD.	Mr. V S Jayaprakash, 128, SIDCO North Phase, Ambattur Estates CHENNAI Phone- 044-26252017/2018 Pincode : 600050 Email : sales@switzerprocess.co.in	Works-1->C S Shankar 127, Sidco North Phase, Ambattur Estates, -CHENNAI-TAMIL NADU INDIA Phone- 8754491904 FAX : 044-26248849 Pincode : 600050 Email : cservice@switzerinstrument.com
75	DIFFERENTIAL PRESSURE SWITCH	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com	
76	LEVEL SWITCH-CAPACITANCE TYPE	SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@siamainstruments.co.in	Works-1->R Gopinath 27 Nahur Udyog Industrial Premises,M.M.Malviya Road, Mulund(-MUMBAI-MAHARASHTRA INDIA Phone- +912225918567 FAX : +912225918566 Pincode : 400080 Email : sales@siamainstruments.co.in
77	LEVEL SWITCH-CAPACITANCE TYPE	SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	Works-1->Scientific Center, Others By-Pass Junction, Near Kalsekar College kausa, mumbra, Thane -Mumbai-MAHARASHTRA INDIA Phone- 022-25491409,9892230623 FAX : Pincode : 400612 Email : sdbpl@vsnl.com

78	V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	Works-1->Mr. BHAGWAN SINGH/ Mr. NANDAN SINGH F-61, OKHLA INDL.AREA,PHASE-I -NEW DELHI-DELHI INDIA Phone- 011-47627200 Extn. 3 FAX : 011- 26819440 Pincode : 110 020 Email : production@vautomat.com
79	LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal', 7th floor, 13, Camac Street KOLKATA Phone- 0 33 2283 2766 Pincode : 700017 Email : b_jana@levcongroup.com	
80	Flow Star Engineering Pvt. Ltd.,	MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No-7 F/2, Northern India Industrial 20/3, Mathura Road FARIDABAD Phone- 9818176380 Pincode : 121005 Email : khalid@flowstar.co.in	Works-1->MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No-7 F/2, Northern India Complex,20/3, Mathura Road - FARIDABAD-HARYANA INDIA Phone- 0129-4069661, FAX : 0129-4069663 Pincode : 121005 Email : tkiana@flowstar.co.in
81	Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	
82	Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	Works-1->Mr. Shyam Warilani/Mr. V Suresh Babu Plot No 34 À GIDC À Phase 1, -VAPI-GUJARAT INDIA Phone- +91 11 4161 7111 FAX : 022 2687 3613 Pincode : 396 195 Email : pbajaj@baumer.com
83	LEVEL SWITCH- CONDUCTIVITY TYPE	Sapcon Instrument Pvt Ltd. 131, PALSHIKAR COLONY Contact Person- Mr. Ashwin (9826080207) INDORE Phone- +91-731-4085751, Pincode : 452004 Email : sales@sapconinstruments.com	Works-1->Mr. Ashwin R Palshikar/Mr. Navin Bodse 131 PALSHIKAR COLONY, -INDORE-MADHYA PRADESH INDIA Phone- 9754261005 FAX : 0731-2475475 Pincode : 452004 Email : sales@sapcon.in
84	LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal', 7th floor, 13, Camac Street KOLKATA Phone- 0 33 2283 2766 Pincode : 700017 Email : b_jana@levcongroup.com	Works-1-> 38G, PICNIC GARDEN ROAD, -KOLKATA-WEST BENGAL INDIA Phone- FAX : Pincode : Email :
85	BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com	Works-1->Mr. Bharat Kumar/ Mr. Sasi Kumar Plot No. 92B & 93B,Sec-V, IMTManesar -GURGAON-HARYANA INDIA Phone- 0124-4366000 TO 9 FAX : 0124-2290884 Pincode : 122002 Email : bharat@blissanand.com
86	V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	Works-1->Mr. BHAGWAN SINGH/ Mr. NANDAN SINGH F-61, OKHLA INDL.AREA,PHASE-I -NEW DELHI-DELHI INDIA Phone- 011-47627200 Extn. 3 FAX : 011- 26819440 Pincode : 110 020 Email : production@vautomat.com

87	HI-TECH SYSTEMS & SERVICES LTD.	Mr. Vikash Agrawal/Mr. Tarun Debnath 119, PARK STREET , KOLKATA Phone- 033-22290045 Pincode : 700016 Email : sandeep@hitech.in	Works-1->Mr. Jitendra Kumar/Mr. Debasis Dey 82/1, Saruna Main Road, -KOLKATA-WEST BENGAL INDIA Phone- 9833994030 FAX : Pincode : 700061 Email : jitendra@hitech.in
88	RAMAN INSTRUMENTS PVT.LTD.	Mr. N R Shenoy/Mr G B Vijh 8, First Floor.Plot : 160A Bait-Ush-Sharaf, 29th Road,Bandra(W) MUMBAI Phone- 09892331381 Pincode : 400050 Email : ramanbpl@vsnl.com	Works-1->NA -- Phone- FAX : Pincode : Email :
89	SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in	Works-1->R Gopinath 27 Nahur Udyog Industrial Premises,M.M.Malviya Road, Mulund(-MUMBAI- MAHARASHTRA INDIA Phone- +912225918567 FAX : +912225918566 Pincode : 400080 Email : sales@sigmainstruments.co.in
90	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com.	Works-1->LARRY DEGARMO/ ROY STUMBOUGH 14685 W. 105TH STREET, LENEXA -KANSAS- USA Phone- 913-888-0767 FAX : 913-888-0767 Pincode : 66215 Email : rstumbough@sorinc.com
91	LEVEL SWITCH-FLOAT TYPE	Pune Techtrol Pvt. Ltd. N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	
92	D.K. INSTRUMENTS PVT.LTD.	N.SIKDAR/ SUMIT SIKDAR 76/2,SELIMPUR RD DHAKURIA Kolkata Phone- 033-2415-1310. Pincode : 700031 Email : dkinst@vsnl.net	
93	V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	Works-1->Mr. BHAGWAN SINGH/ Mr. NANDAN SINGH F-61, OKHLA INDL.AREA,PHASE-I -NEW DELHI-DELHI INDIA Phone- 011-47627200 Extn. 3 FAX : 011- 26819440 Pincode : 110 020 Email : .production@vautomat.com
94	SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	Works-1-> Scientific Center, Others By-Pass Junction, Near Kalsekar College kausa, mumbra, Thane -Mumbai- MAHARASHTRA INDIA Phone- 022-25491409,9892230623 FAX : Pincode : 400612 Email : sdbpl@vsnl.com
95	LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal', 7th floor, 13, Camac Street KOLKATA Phone- 0 33 2283 2766 Pincode : 700017 Email : b_jana@levcongroup.com	

96	GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai Phone- 9323195251 Pincode : 400016 Email : amarendra@general-augues.com	Works-1->MR. MOHAN PADWAL 691/A/2,BIBWEWADI INDL ESTATE -PUNE-MAHARASHTRA INDIA Phone- 918600042374 FAX : 912024215670 Pincode : 411037 Email : .wm@sbem.co.in
97	SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE, Phone- 912041030100 Pincode : 411009 Email : .newdelhi@sbem.co.in	Works-1->Mr. Shyam Warilani/Mr. V Suresh Babu Plot No 34 À GIDC À Phase 1, -VAPI-GUJARAT INDIA Phone- +91 11 4161 7111 FAX : 022 2687 3613 Pincode : 396 195 Email : pbajaj@baumer.com
98	Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	Works-1->R Gopinath 27 Nahur Udyog Industrial Premises,M.M.Malviya Road, Mulund(-MUMBAI- MAHARASHTRA INDIA Phone- +912225918567 FAX : +912225918566 Pincode : 400080 Email : sales@siamainstruments.co.in
99	SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@siamainstruments.co.in	Works-1->LARRY DEGARMO/ ROY STUMBOUGH 14685 W. 105TH STREET LENEXA -KANSAS- USA Phone- 913-888-0767 FAX : 913-888-0767 Pincode : 66215 Email : rstumbough@sorinc.com
100	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com.	

NOTE:

1. The above sub-vendor list is tentative & reference only. However Sub-Vendor List is subject to BHEL/ end user approval without any commercial/ delivery implication.
2. New Sub-Vendor if proposed by Vendor during contract stage shall subject to BHEL/ end user approval without any commercial/ delivery implication.



**NTPC 3X800 MW PVUNL PATRATU TPP
C&I SPECIFICATION FOR
SEWAGE TREATMENT PLANT**

SECTION: C
SUB SECTION: C&I

KKS TAGGING PHILOSOPHY

|

TYPICAL DRIVE LIST WITH KKS			
S.NO	KKS_CODE	DESCRIPTION	DRIVE_TYPE
1	00GRS01AP001	SEWAGE TRANSFER PUMP - A	LTUD
2	00GRS02AP001	SEWAGE TRANSFER PUMP - B	LTUD
3	00GRS04AP101	SLUDGE RECYCLE PUMP - A	LTUD
4	00GRS05AP101	SLUDGE RECYCLE PUMP - B	LTUD
5	00GRS08AP101	CLEAR WATER TRANSFER PUMP - A	LTUD
6	00GRS09AP101	CLEAR WATER TRANSFER PUMP - B	LTUD
7	00GRN02AP101	SODIUM HYPOCHLORITE DOSING PUMP - A	LTUD
8	00GRN03AP101	SODIUM HYPOCHLORITE DOSING PUMP - B	LTUD
9	00GRC01AN251	AIR BLOWER - A	LTUD
10	00GRC02AN251	AIR BLOWER - B	LTUD
11	00GRN01AM001	SODIUM HYPO CHLORITE TANK AGITATOR	LTUD

NOTES:-

1. IF THE NUMBER OF EQUIPMENT/INSTRUMENTS CHANGES, THE KKS FOR THE SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING.

2. FOR INSTRUMENTS KKS 6th AND 7th PLACE VALUE OF KKS CODE SHALL BE CHANGED FOR CORRESPONDING EQUIPMENT AS FOLLOWS:-

1. FOR PRESSURE -CP

2. FOR TEMPERATURE/GT/AT/TEMP SENSOR-CT

3. FOR LEVEL-CL

4. FOR FLOW-CF

5. R.H.SENSOR-CM

6. FOR ANALYSER-CQ

FOR INSTRUMENTS 8th,9th AND 10th PLACE VALUE OF KKS CODE SHALL BE CHANGED FOR CORRESPONDING EQUIPMENT AS FOLLOWS:-

1. FOR PRESSURE/TEMPERATURE/LEVEL TRANSMITTER-011

2. FOR PRESSURE/TEMPERATURE/LEVEL GAUGE-511

3. FOR PRESSURE/TEMPERATURE/LEVEL SWITCH-111

ANNEXURE - 1

FORMAT FOR PROVENNESS CERTIFICATE

Award/Contract Agreement/
Order enclosed

Sl.No.	Item Description	Plant No.1
5.00.00	INSTRUMENTS (PRIMARY & SECONDARY)	
(i)	Type of Instrument	
(ii)	Make / Model	
(iii)	Name of Power Station (Location & Address)	
(iv)	Unit Size (MW)	
(v)	Commissioning date	
	Whether above instruments have atleast one (1) year satisfactory operation in one (1) power station having unit rating of 200 MW or above.	Yes/No
(vi)	Client's certificate attached	Yes/No

Signature of authorized signatory.....



**C&I SPECIFICATION FOR
SEWAGE TREATMENT PLANT**

SECTION: C
SUB SECTION: C&I

ANNUAL MAINTENANCE CONTRACT (AMC)



C&I SPECIFICATION FOR SEWAGE TREATMENT PLANT

SECTION: C
SUB SECTION: C&I

1. SERVICES FOR ANALYSER INSTRUMENTS OF SEWAGE TREATMENT PLANT DURING DEFECT LIABILITY PERIOD.

- a) The Bidder shall provide an unlimited warranty on all equipment's during the Defect liability period. This warranty shall include repair, replacement, replenishment of consumables (for e.g. reagents, calibration gases etc. as applicable) and correction of identified discrepancies including Analysers, Sample Handling System, Transmitters, (as applicable) etc. at no cost.
- b) The Bidder shall provide warranty spares including components for each system based on (and keeping adequate over margin) normally experienced failure rate. Exhaustive list of all such items shall be submitted along with Datasheet for End customer's review and approval during details Engg stage regarding adequacy of the same. The warranty spares as per the list mentioned above will be dispatched by the bidder along with the main equipment consignment. However, for items which have a limited shelf life shall be dispatched in a phased manner during the warranty period. Unused spares/consumables shall be bidder's property after expiry of warranty period and shall be taken back.

2. SERVICES FOR ANALYSER INSTRUMENTS OF SEWAGE TREATMENT PLANT, DURING ANNUAL MAINTENANCE CONTRACT (AMC) PERIOD.

- a) The Bidder shall provide complete maintenance services for each System under comprehensive Annual Maintenance Contract (AMC) for period of three years after the Warranty period.
- b) The AMC shall cover total maintenance of all Analysers, Sample Handling System, Transmitters etc. coming under the scope of each system and shall include free repair/replacement of each items, replenishment of consumables, correction of problems (if any) and supply of expendable items.
- c) Further, Bidder may note that during the AMC he will be allowed to use End customer's mandatory spares, but has to replenish the same within three months' time or before completion of AMC period whichever is earlier.
- d) The Bidder shall prepare detailed list of faults corrected and parts, expendables utilized during AMC period and shall furnish the same to End customer, properly documented at the end of AMC period. Further, during AMC period the details as required by End customer/ Project Manager shall be made available by bidder's personnel.
- e) Bidder shall also provide a list of all required AMC spares which shall be finalized along with datasheet during detail Engineering stage. These spares will be dispatched by the bidder at



C&I SPECIFICATION FOR SEWAGE TREATMENT PLANT

SECTION: C
SUB SECTION: C&I

the beginning of AMC on yearly requirement basis. However, for items which have a limited shelf life shall be dispatched in a phased manner during the AMC period. Unused spare/consumable shall be bidder's property after expiry of AMC period and shall be taken back.

3. DEPUTATION OF TECHNICAL EXPERT FOR ANALYSER INSTRUMENTS OF SEWAGE TREATMENT PLANT.

- a) Bidder shall depute Technical Experts of the OAM/OEM/OES/ (Original Analyser Manufacturer/Original Equipment Manufacturer/Original Equipment supplier) for each of the above system at Site, who will be fully qualified to perform the required duties, supervision of maintenance, repair etc. for a period of six months. Employer will intimate the bidder two-week advance notice for start of deputation period.
- b) After expiry of above six-month period, Technical expert for each system shall visit site on monthly basis for monitoring the performance and rectify the problem (if any) for each system for the remaining warranty period and during entire AMC period. In the event of any malfunction/fault/failure in the system or any component thereof bidder shall depute Technical expert of respective system to reach site within 48hrs of call raised by site during the remaining warranty period and entire AMC period.



TITLE:
**TECHNICAL SPECIFICATION FOR
SEWAGE TREATMENT PLANT**
3X800 MW PATRATU STPP EXT.PH-I

BHEL DOCUMENTS NO.: PE-TS-434-673A-A001

VOLUME II-B

SECTION-D

REV. NO. 00

DATE:

SECTION-D
(GENERAL TECHNICAL REQUIREMENT)

PART - C

GENERAL TECHNICAL REQUIREMENTS

**EPC PACKAGE FOR
PATRATU SUPER THERMAL POWER STATION
EXPANSION PHASE-I (3x800 MW)**

**TECHNICAL SPECIFICATION
SECTION-VI, PART-C
BID DOC NO: CS-9585-001-2**

GENERAL TECHNICAL REQUIREMENTS

PART - C

CONTENTS

Clause No.	Description	Page No.
1.00.00	Introduction	1
2.00.00	Brand Name	1
3.00.00	Base Offer & Alternate Proposals	1
4.00.00	Completeness of Facilities	1
5.00.00	Codes & Standards	2
6.00.00	Equipment Functional Guarantee	4
7.00.00	Design of Facilities/ Maintenance & Availability Considerations	5
8.00.00	Documents, Data and Drawings to be furnished by Contractor	6
9.00.00	Technical Co-ordination Meeting	22
10.00.00	Design Improvements	22
11.00.00	Equipment Bases	23
12.00.00	Protective Guards	23
13.00.00	Lubricants, Servo fluids and Chemicals	23
14.00.00	Lubrication	24
15.00.00	Material of Construction	24
16.00.00	Rating Plates, Name Plates & Labels	24
17.00.00	Tools and Tackles	25
18.00.00	Welding	25

Clause No.	Description	Page No.
19.00.00	Colour Code for All equipments/Pipings/PlpeServices	26
20.00.00	Protection and Preserveative shop Coating	26
21.00.00	Quality Assurance Programme	27
22.00.00	General Requirements - Quality Assurance	28
23.00.00	Quality Assurance Documents	33
24.00.00	Project Manager's Supervision	35
25.00.00	Inspection, Testing and Inspection Certificates	36
26.00.00	Pre-commissioning and Commissioning Facilities	39
27.00.00	Taking over	42
28.00.00	Training of Employer's Personnel	42
29.00.00	Safety Aspects during Construction and Erection	44
30.00.00	Noise Level	44
31.00.00	Packaging and Transportation	45
32.00.00	Electrical Equipments/Enclosures	45
33.00.00	Instrumentation and Control	45
34.00.00	Electrical Noise Control	46
35.00.00	Surge protection for solid state equipment	47
36.00.00	Instrument Air System	47
37.00.00	Tapping Points for Measurements	47
38.00.00	System Documentation	47
39.00.00	Maintenance Manuals of Electronic Modules	48

EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3x800 MW)	TECHNICAL SPECIFICATION SECTION-VI, PART-C BID DOC NO: CS-9585-001-2
---	---

Clause No.	Description	Page No.
	Annexure - I	78
	Annexure - II	79
	Annexure - III	80
	Annexure - IV	81
	Annexure - V	82
	Annexure - VI	83
	Annexure - VII	85
	Annexure - VIII	92
	Annexure - IX	103
	Annexure – X	106
	Annexure – XI	107
	Annexure – XII	109

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
1.00.00	INTRODUCTION This part covers technical requirements which will form an integral part of the Contract. The following provisions shall supplement all the detailed technical specifications and requirements brought out in Section-VI, the Technical Specification and the Technical Data Sheets.			
2.00.00	BRAND NAME Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific item mentioned shall be understood to be indicative of the function and quality desired, and not restrictive; other manufacturer's products may be considered provided sufficient information is furnished to enable the Employer to determine that the products proposed are equivalent to those named.			
3.00.00	BASE OFFER & ALTERNATE PROPOSALS The Bidder's proposal shall be based upon the use of equipment and material complying fully with the requirements specified herein. It is recognized that the Contractor may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered, provided the base offer is in line with technical specifications and such proposals meet the specified design standards and performance requirement and are acceptable to the Employer. Sufficient amount of information for justifying such proposals shall be furnished to Employer alongwith the bid to enable the Employer to determine the acceptability of these proposals.			
4.00.00	COMPLETENESS OF FACILITIES			
4.01.00	Bidders may note that this is a turnkey contract. Each of the plant shall be engineered and designed in accordance with the specification requirement. All engineering and associated services are required to ensure a completely engineered plant shall be provided.			
4.02.00	All equipments furnished by the Contractor shall be complete in every respect, with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or those needed for erection, completion and safe operation of the equipment and for the safety of the operating personnel, as required by applicable codes, though they may not have been specifically detailed in the respective specifications, unless included in the list of exclusions. All same standard components/ parts of same equipment provided, shall be interchangeable with one another.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 1 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			एनटीपीसी NTPC
4.03.00	For the C&I systems, the Contractor shall be required to provide regular information about future upgrades and migration paths to the Employer.			
5.00.00	CODES & STANDARDS			
5.01.00	In addition to the codes and standards specifically mentioned in the relevant technical specifications for the equipment / plant / system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following : a) Indian Electricity Act b) Indian Electricity Rules c) Indian Explosives Act d) Indian Factories Act and State Factories Act e) Indian Boiler Regulations (IBR) f) Regulations of the Central Pollution Control Board, India g) Regulations of the Ministry of Environment & Forest (MoEF), Government of India h) Pollution Control Regulations of Department of Environment, Government of India i) State Pollution Control Board. (j.) Rules for Electrical installation by Tariff Advisory Committee (TAC). (k.) Building and other construction workers (Regulation of Employment and Conditions of services) Act, 1996 (l.) Building and other construction workers (Regulation of Employment and Conditions of services) Central Rules, 1998 (m.) Explosive Rules, 1983 (n.) Petroleum Act, 1984 (o.) Petroleum Rules, 1976, (p.) Gas Cylinder Rules, 1981			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 2 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
5.02.00	(q.) Static and Mobile Pressure Vessels (Unified) Rules, 1981 (r.) Workmen's Compensation Act, 1923 (s.) Workmen's Compensation Rules, 1924 (t.) NTPC Safety Rules for Construction and Erection (u.) NTPC Safety Policy (v.) Any other statutory codes / standards / regulations, as may be applicable. Unless covered otherwise in the specifications, the latest editions (as applicable as on date of bid opening), of the codes and standards given below shall also apply : a) Bureau of Indian standards (BIS) b) Japanese Industrial Standards (JIS) c) American National Standards Institute (ANSI) d) American Society of Testing and Materials (ASTM) e) American Society of Mechanical Engineers (ASME) f) American Petroleum Institute (API) g) Standards of the Hydraulic Institute , U.S.A. h) International Organization for Standardization (ISO) i) Tubular Exchanger Manufacturer's Association (TEMA) j) American Welding Society (AWS) k) National Electrical Manufacturers Association (NEMA) l) National Fire Protection Association (NFPA) m) International Electro-Technical Commission (IEC) n) Expansion Joint Manufacturers Association (EJMA) o) Heat Exchange Institute (HEI) p) IEEE standard			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 3 OF 111	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
5.03.00 5.04.00 5.05.00 5.06.00 5.07.00 5.08.00 6.00.00 6.01.00	q) JEC standard Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Bidder shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English. As regards highly standardised equipments such as Steam Turbine and Generator, National /International standards such as JIS, DIN, VDI, ISO, SEL, SEW, VDE, IEC & VGB shall also be considered as far as applicable for Design, Manufacturing and Testing of the respective equipment. However, for those of the above equipment not covered by these National / International standards, established and proven standards of manufacturers shall also be considered. In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern. Two (2) English language copies of all national and international codes and/or standards used in the design of the plant and equipment shall be provided by the Contractor to the Employer within two calendar months from the date of the Notification of Award. In case of any change in codes, standards & regulations between the date of bid opening and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect. A detailed list of standards apart from those mentioned in the respective detailed specifications in other parts of Section-VI to which all equipment/systems/civil works should conform as indicated in this Part C and elsewhere in the specification. EQUIPMENT FUNCTIONAL GUARANTEE The functional guarantees of the equipment under the scope of the Contract is given in Section-VI Part - A & B of Technical Specifications. These guarantees shall supplement the general functional guarantee provisions covered under Defect liabilities Section-IV, General Conditions of Contract.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 4 OF 111	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
6.02.00	Liquidated damages for shortfall in meeting functional guarantee(s) during the performance and guarantee tests shall be assessed and recovered from the Contractor as specified elsewhere in this specification.			
7.00.00	DESIGN OF FACILITIES/ MAINTENANCE & AVAILABILITY CONSIDERATIONS			
7.01.00	DESIGN OF FACILITIES All the design procedures, systems and components proposed shall have already been adequately developed and shall have demonstrated good reliability under similar conditions elsewhere. The Contractor shall be responsible for the selection and design of appropriate equipments to provide the best coordinated performance of the entire system. The basic requirements are detailed out in various clauses of the Technical Specifications. The design of various components, assemblies and subassemblies shall be done so that it facilitates easy field assembly and dismantling. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical or close to the operating range of the unit.			
7.02.00	MAINTENANCE AND AVILABILITY CONSIDERATIONS Equipment/works offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/ availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list. Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation. The intervals for each type of maintenance namely inspection of the furnace, inspection of the entire hot gas path and the minor and major overhauls shall be specified in terms of fired hours , clearly defining the spare parts and man-hour requirement for each stage. Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities. Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist / crane shall be provided by the contractor for lifting the equipment and accessories covered under the specification.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 5 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
8.00.00	DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR			
8.01.00	Bidders may note that this is a turnkey contract. Each of the plant and equipment shall be fully integrated, engineered and designed to perform in accordance with the technical specification. All engineering and technical services required to ensure a completely engineered plant shall be provided in respect of mechanical, electrical and power systems, control & instrumentation, civil & structural works. The Contractor shall furnish engineering data /drawings in accordance with the schedule of information as specified in Technical Data Sheets and Technical Specification. A comprehensive engg and quality coordination procedure shall be finalized with the successful bidder covering salient features as described in this section of specifications.			
8.02.00	The number of copies/prints/CD-ROMs/manuals to be furnished for various types of document is given in Annexure-VI to this Part-C, Section-VI of the Technical Specification.			
8.03.00	The documentation that shall be provided by the Contractor is indicated in the various sections of specification. This documentation shall include but not be limited to the following:			
8.03.01	A) BASIC ENGINEERING DOCUMENTATION Prior to commencement of the detailed engineering work, the Contractor shall furnish a Plant Definition Manual within 12 weeks from the date of the Notification of Award. This manual shall contain the following as a minimum: i) System description of all the mechanical, electrical, control & instrumentation & civil systems. ii) Technology scan for each system / sub-system & equipment. iii) Selection of appropriate technology / schemes for various systems/ subsystems including techno-economic studies between various options. iv) Optimisation studies including thermal cycle optimisation. v) Sizing criteria of all the systems, sub-systems/ equipments/ structures/ equipment foundations alongwith all calculations justifying and identifying the sizing and the design margins.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 6 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	vi) Schemes and Process & Instrumentation diagrams for the various systems/ sub-system with functional write-ups. vii) Water Balance diagram. viii) Operation Philosophy and the control philosophy of the Main Plant and other plants. ix) General Layout plan of the power station incorporating all facilities in Bidder's as well as those in the Employer's scope. This drawing shall also be furnished in the form of CD-ROMs to the Employer for engineering of areas not included in bidder's scope. x) Basic layouts and cross sections of the main plant building (various floor elevations), boiler, fuel oil area, transformer yard, switchyard and other areas included in the scope of the bidder. xi) Documentation in respect of Quality Assurance System as listed out elsewhere in this specification. The successful bidder shall furnish within three (3) weeks from the date of Notification of Award, a list of contents of the Plant Definition Manual (PDMs) including techno-economic studies, which shall then be mutually discussed & finalised with the Employer. B) DETAILED ENGINEERING DOCUMENTS i) General layout plan of the station. ii) Layouts, general arrangements, elevations and cross-sections drawings for all the equipment and facilities of the plant. iii) Flow diagram, process and instrumentation diagrams along with write up and system description. iv) Start up curves for boiler and both turbines and boiler combined together as a unit for various start ups, viz. cold, warm and hot start up. v) Piping isometric, composite layout and fabrication drawings. vi) Piping engineering diagrams, pipe and fittings schedules, valve schedules, hanger and support schedules, insulation schedules.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 7 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	vii) Technical data sheets for all bought out and manufactured items. Contractor shall use the Employer's specifications as a base for placement of orders on their sub vendors. viii) Detailed design calculations for components, system, piping etc., wherever applicable including sizing calculations for all auxiliaries like mills, fans, BFPs, CEPs, Heaters/ Deaerators, Condensers, vacuum pumps etc. ix) Boiler pressure part schedule and sizing calculations. Boiler performance data and boiler design dossier. x) Transient, hydraulic and thermal stress analysis of piping and system wherever applicable & input and output data alongwith stress analysis isometrics showing nodes.. xi) Thermal cycle information (heat balance diagrams, boiler performance calculations, condenser and heat exchanger thermal calculations etc.). xii) Characteristic Curves/ Performance Correction Curves. Hydraulic & Mechanical design calculations for condensers & heaters. xiii) Comprehensive list of all terminal points which interface with Employer's facilities, giving details of location, terminal pressure, temperature, fluid handled & end connection details, forces, moments etc. xiv) Power supply single line diagram, block logics, control schematics, electrical schematics, etc. xv) Protection system diagrams and relay settings. xvi) Cables schedules and interconnection diagrams. xvii) Cable routing plan. xviii) Instrument schedule, measuring point list, I/O list, Interconnection & wiring diagram, functional write-ups, installation drawings for field mounted instruments, logic diagrams, control schematics, wiring and tubing diagrams of panels and enclosures etc. Drawings for open loop and close loop controls (both hardware and software). Motor list and valve schedule including type of actuator etc. xix) Alarm and annunciation/ Sequence of Event (SOE) list and alarms & trip set points.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 8 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS एनटीपीसी NTPC		
8.03.02	xx) Sequence and protection interlock schemes. xxi) Type test reports, insulation co-ordination study report and power system stability study report. xxii) Control system configuration diagrams and card circuit diagrams and maintenance details. xxiii) Detailed DDCMIS system manuals. xxiv) Detailed flow chart for digital control system. xxv) Mimic diagram layout, Assignment for other application engg. xxvi) Civil and Structural works drawings and documents for all structures, facilities, architectural works, foundations underground and overground works and super-structural works as included in the scope of the bidder civil calculation sheets including structural analysis and design alongwith output results. xxvii) Underground facilities, levelling ,sanitary, land scaping drawings. xxviii) Geotechnical investigation and site survey reports (if and as applicable). xxix) Model study reports wherever applicable. xxx) Functional & guarantee test procedures and test reports. xxxi) Documentation in respect of Quality Assurance System, and Documentation in respect of Commissioning, as listed out elsewhere in this specification. The Contractor's while sumitting the above documents/ drawings for approval/ reference as the case may be, shall mark on each copy of submission the reference letter alongwith the date vide which the submissions are made. INSTRUCTION MANUALS The Contractor shall submit to the Employer, draft Instruction Manuals for all the equipments covered under the Contract by the end of one year from the date of his acceptance of the Letter of Award. The Instruction manuals shall contain full details required for erection, commissioning, operation and maintenance of each equipment. The manual shall be specifically compiled for this project. After finalisation and approval of the Employer the Instruction Manuals shall be submitted as indicated in Annexure-IV. The Contract shall not be considered to be completed		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 9 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	for purposes of taking over until the final Instructions manuals have been supplied to the Employer. The Instruction Manuals shall comprise of the following. A) ERECTION MANUALS The erection manuals shall be submitted atleast three (3) months prior to the commencement of erection activities of particular equipment/system. The erection manual should contain the following as a minimum. - Erection strategy. - Sequence of erection. - Erection instructions. - Critical checks and permissible deviation/tolerances. - List of tool, tackles, heavy equipments like cranes, dozers, etc. - Bill of Materials - Procedure for erection and General Safety procedures to followed during erection/installation. - Procedure for initial checking after erection. - Procedure for testing and acceptance norms. - Procedure / Check list for pre-commissioning activities. - Procedure / Check list for commissioning of the system. - Safety precautions to be followed in electrical supply distribution during erection. B) OPERATION & MAINTENANCE MANUALS - The manual shall be a two rim PVC bound stiff sided binder able to withstand constant usage or where a thicker type is required it shall have locking steel pins, the size of the manual shall not be larger than international size A3. The cover shall be printed with the Project Name, Services covered and Volume / Book number Each section of the manual shall be divided by a stiff divider of the same size as the holder. The dividers shall clearly state the section number and title. All written instructions within the manual not provided by the		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 10 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	manufacturers shall be typewritten with a margin on the left hand side. b) The arrangement and contents of O & M manuals shall be as follows : 1) <u>Chapter 1 - Plant Description</u> : To contain the following sections specific to the equipment/system supplied (a) Description of operating principle of equipment / system with schematic drawing / layouts. (b) Functional description of associated accessories / controls. Control interlock protection write up. (c) Integrated operation of the equipment alongwith the intended system. (The is to be given by the supplier of the Main equipment by taking into account the operating instruction given by the associated suppliers). (d) Exploded view of the main equipment, associated accessories and auxiliaries with description. Schematic drawing of the equipment alongwith its accessories and auxiliaries. (e) Design data against which the plant performance will be compared. (f) Master list of equipments, Technical specification of the equipment/ system and approved data sheets. (g) Identification system adopted for the various components, (it will be of a simple process linked tagging system). (h) Master list of drawings (as built drawing - Drawings to be enclosed in a separate volume). 2) <u>Chapter 2.0 - Plant Operation</u>: To contain the following sections specific to the equipment supplied (a) Protection logics provided for the equipment alongwith brief philosophy behind the logic, Drawings etc. (b) Limiting values of all protection settings. (c) Various settings of annunciation/interlocks provided.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 11 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	(d) Startup and shut down procedure for equipment alongwith the associated systems in step mode. (e) Do's and Don'ts related to operation of the equipment. (f) Safety precautions to be take during normal operation. Emergency instruction on total power failure condition/lubrication failure/any other conditions. (g) Parameters to be monitored with normal value and limiting values. (h) Equipment isolating procedures. (i) Trouble shooting with causes and remedial measures. (j) Routine testing procedure to ascertain healthiness of the safety devices alongwith schedule of testing. (k) Routine Operational Checks, Recommended Logs and Records (l) Change over schedule if more than one auxiliary for the same purpose is given. (m) Preservation procedure on long shut down. (n) System/plant commissioning procedure. 3) <u>Chapter 3.0 - Plant Maintenance</u>- To contain the following sections specific to the equipment supplied. (a) Exploded view of each of the equipments. Drawings alongwith bill of materials including name, code no. & population. (b) Exploded view of the spare parts and critical components with dimensional drawings (In case of Electronic cards, the circuit diagram to be given) and spare parts catalogue for each equipment. (c) List of Special T/ P required for Overhauling /Trouble shooting including special testing equipment required for calibration etc. (d) Stepwise dismantling and assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained etc. Clearance to be maintained etc.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 12 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	(e) Preventive Maintenance schedules linked with running hours/calendar period alongwith checks to be carried out. (f) Overhauling schedules linked with running hours/calendar period alongwith checks to be done. (g) Long term maintenance schedules (h) Consumables list alongwith the estimated quantity required during normal running and during maintenance like Preventive Maintenance and Overhauling. (i) List of lubricants with their Indian equivalent, Lubrication Schedule including charts showing lubrication checking, testing and replacement procedure to be carried daily, weekly, monthly & at longer intervals to ensure trouble free operation and quantity required for complete replacement.. (j) Tolerance for fitment of various components. (k) Details of sub vendors with their part no. in case of bought out items. (l) List of spare parts with their Part No, total population, life expediency & their interchangeability with already supplied spares to NTPC. (m) List of mandatory and recommended spare list along with manufacturing drawings, material specification & quality plan for fast moving consumable spares. (n) Lead time required for ordering of spares from the equipment supplier, instructions for storage and preservation of spares. (o) General information on the equipment such as modification carried out in the equipment from its inception, equipment population in the country / foreign country and list of utilities where similar equipments have been supplied.			
8.03.03	After finalization and approval of the Employer, the O & M Manuals shall be submitted as indicated in Annexure-VI. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals (both erection and O & M manuals have been supplied to the Employer. If after the commissioning and initial operation of the plant, the instruction manuals (Erection and /or O &M manuals) require modifications/additions/ changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 13 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	ii) All documents submitted by the Contractor for Employer's review shall be in electronic form (soft copies) along with the desired number of hard copies as per Annexure-VI of Part-C. The soft copies shall be uploaded by the vendors in C-folders, a Web-based system of NTPC ERP, for which a username and password will be allotted to the new vendor by NTPC. Similarly, the vendor can download the drawings/documents, approved/ commented by NTPC, through above site. The soft copies of identified drawings/documents shall be in pdf format, whereas the attachments/reply to the submitted document(s) can be in .doc, .xls, .pdf, .dwg or .std formats. iii) Final copies of the approved drawings along with requisite number of hard copies shall be submitted as per Annexure-VI of Part-C. iv) Contractor shall prepare the model of all the facilities located in Main Power Block area, covering Transformer Yard, TG building (including all facilities), Boiler area, ESP area, chimney area and any other facility located in Main Plant Block area in an integrated & intelligent 3D software solution using rule based, data centric 3D design software with equipment drawings, data sheets, intelligent P&ID correlated with intelligent 3D Model, BOQ, schematics and logic diagrams etc. attached to the respective equipment / systems in the aforesaid 3D model. All piping layouts, equipment layouts, floor plans, ducting layout (Air/flue gas, A/C, Ventilation etc.), General Arrangement drawings of major buildings, structural arrangement drawings and RCC layout drawings shall necessarily be extracted from the aforesaid 3D model and submitted for employer's review along with the 3D review model to enable NTPC to review and approve these drawings. Contractor shall prepare and provide 3D design review model (network ready, which shall include visual interference check, walk-through animation, video simulation for major equipment placement and removal, visual effect, photo realism etc.), which is extracted from intelligent 3D model and shall make a presentation of the same every 3 months from LOA to enable NTPC to review the progress of engineering or as & when required by employer. After the completion of engineering of respective area i.e. TG building/ Boiler/ ESP etc., the corresponding complete 3D review model shall be handed over to the employer for its reference.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 15 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS एनटीपीसी NTPC		
	b) All documents/text information shall be in latest version of MS Office/MS Excel/PDF format as applicable. c) All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail indicating the type, size, arrangement, weight of each component for packing and shipment, the external connection, fixing arrangement required, the dimensions required for installation and interconnections with other equipments and materials, clearance and spaces required between various portions of equipment and any other information specifically requested in the drawing schedules. d) Each drawing submitted by the Contractor (including those of subvendors) shall bear a title block at the right hand bottom corner with clear mention of the name of the Employer, the system designation, the specifications title, the specification number, the name of the Project, drawing number and revisions. If standard catalogue pages are submitted the applicable items shall be indicated therein. All titles, notings, markings and writings on the drawing shall be in English. All the dimensions should be in metric units. e) The drawings submitted by the Contractor (or their subvendors) shall bear Employer's drawing number in addition to contractor's (their sub-vendor's) own drawing number. Employer's drawing numbering system shall be made available to the successful bidder so as to enable him to assign Employer's drawing numbers to the drawings to be submitted by him during the course of execution of the Contract. The Contractor shall also furnish a "Master Drawing List" which shall be a comprehensive list of all drawings/ documents/ calculations envisaged to be furnished by him during the detailed engineering to the Employer. Such list should clearly indicate the purpose of submission of these drawings i.e. "FOR APPROVAL" or "FOR INFORMATION ONLY". Similarly, all the drawings/ documents submitted by the Contractor during detailed engineering stage shall be marked "FOR APPROVAL" or "FOR INFORMATION" prior to submission. Further, space shall be identified on each drawing for Approval stamp and electronic signature. f) The furnishing of detailed engineering data and drawings by the Contractor shall be in accordance with the time schedule for the project . The review of these documents/ data/ drawings by the Employer will cover only general conformance of the data/ drawings/ documents to the specifications and contract, interfaces with the equipments provided by others and external connections & dimensions which might affect plant layout. The review by the Employer should not be construed to be a thorough review of all dimensions, quantities and details of the equipments, materials, any devices or items indicated or the accuracy of the information submitted. The review and/ or		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 16 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	approval by the Employer/ Project Manager shall not relieve the Contractor of any of his responsibilities and liabilities under this contract. g) After the approval of the drawings, further work by the Contractor shall be in strict accordance with these approved drawings and no deviation shall be permitted without the written approval of the Employer. h) All manufacturing, fabrication and execution of work in connection with the equipment / system, prior to the approval of the drawings, shall be at the Contractor's risk. The Contractor is expected not to make any changes in the design of the equipment /system, once they are approved by the Employer. However, if some changes are necessitated in the design of the equipment/system at a later date, the Contractor may do so, but such changes shall promptly be brought to the notice of the Employer indicating the reasons for the change and get the revised drawing approved again in strict conformance to the provisions of the Technical Specification. i) Drawings shall include all installations and detailed piping layout drawings. Layout drawings for all piping of 65 mm and larger diameter shall be submitted for review/ approval of Employer prior to erection. Small diameter pipes shall however be routed as per site conditions in consultation with site authority/ representative of Employer based on requirements of such piping indicated in approved/ finalised Flow Scheme/ Process & Instrumentation Diagrams and/or the requirements cropping up for draining & venting of larger diameter piping or otherwise after their erection as per actual physical condition for the entire scope of work of this turnkey package. Assessing & anticipating the requirement and supply of all piping and equipment shall be done by the contractor well in advance so as not to hinder the progress of piping & equipment erection, subsequent system charging and its effective draining & venting arrangement as per site suitability. j) As Built Drawings After final acceptance of individual equipment / system by the Employer, the Contractor will update all original drawings and documents for the equipment / system to “as built” conditions and submit no. of copies as per Annexure VI. k) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to Engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission. The contractor shall make a visit to site to see the existing facilities and understand the layout		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 17 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
8.04.00	completely and collect all necessary data/ drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same. l) The Contractor shall submit adequate prints of drawing / data / document for Employer's review and approval. The Employer shall review the drawings and return soft copy to the Contractor authorizing either to proceed with manufacture or fabrication, or marked to show changes desired. When changes are required, drawings shall be re-submitted promptly, with revisions clearly marked, for final review. Any delays arising out of the failure of the Contractor to submit/rectify and resubmit in time shall not be accepted as a reason for delay in the contract schedule. m) All engineering data submitted by the Contractor after final process including review and approval by the Project Manager/ Employer shall form part of the contract documents and the entire works covered under these specification shall be performed in strict conformity with technical specifications unless otherwise expressly requested by the Project Manager in writing. ENGINEERING INFORMATION SUBMISSION SCHEDULE Prior to the award of Contract, a Detailed Engineering Information Submission Schedule shall be tied up with the Employer. For this, the bidder shall furnish a detailed list of engineering information alongwith the proposed submission schedule. This list would be a comprehensive one including all engineering data / drawings / information for all bought out items and manufactured items. The information shall be categorised into the following parts. i) Information that shall be submitted for the approval to the Employer before proceeding further, and ii) Information that would be submitted for Employer's information only. The Master Drawing List(MDL) shall be updated periodically and submitted to the employer, highlighting the changes made in MDL. The schedule should allow adequate time for proper review and incorporation of changes/ modifications, if any, to meet the contract without affecting the equipment delivery schedule and overall project schedule. The early submission of drawings and data is as important as the manufacture and delivery of equipment and hardware and this shall be duly considered while determining the overall performance and progress.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 18 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
8.05.00 8.05.01 8.05.02 8.05.03	Engineering Co-ordination Procedure The following principal coordinators will be identified by respective organizations at time of award of contract : NTPC Engineering Coordinator (NTPC EC) : Name : _____ Designation : _____ Address : _____ a) Postal : _____ b) Telegraphic / e-Mail : _____ c) FAX : _____ TELEPHONE : _____ Contractor's/ Vendor's Engineering Coordinator (VENDOR EC): Name : _____ Designation : _____ Address : _____ a) Postal : _____ b) Telegraphic / e-Mail : _____ c) FAX : _____ TELEPHONE : _____ All engineering correspondence shall be in the name of above coordinators on behalf of the respective organizations. Contractor's/Vendor's Drawing Submission and Approval Procedure : a) All data/information furnished by Vendor in the form of drawings/ documents/catalogues or in any other form for NTPC's information/ interface and or review and approval are referred by the general term "drawings". b) The 'Master drawings list' indicating titles, Drawing Number, Date of submission and approval etc. shall be finalised mutually between Contractor and Employer before the award of contract. This list shall be updated if required at suitable interval during detailed engineering.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 19 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	c) All drawings (including those of subvendor's) shall bear at the right hand bottom corner the 'title plate' with all relevant information duly filled in. The Contractor shall furnish this format to his subvendor along with his purchase order for subvendor's compliance. d) Employer and contractor shall follow their own numbering systems for the drawings. However, Employer shall intimate the contractor, NTPC drawing number on receipt of the first submission of each drawing. Vendor, thereafter, shall indicate NTPC's drawing number in subsequent Submission, in the space provided for this purpose in title plate, in addition to his own drawing number. e) The contractor shall make a visit to site to see the existing facilities and understand the layout completely and collect all necessary data / drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same. f) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper endorsement for checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission. g) The Contractor shall submit adequate prints of drawing / data / document for Employer's review and approval. The drawings submitted by the Contractor/vendor shall be reviewed by NTPC and their comments shall be forwarded within four (4) weeks of receipt of drawings. Upon review of each drawing, depending on the correctness and completeness of the drawing, the same will be categorized and approval accorded in one of the following categories : CATEGORY- I: Approved CATEGORY- II Approved, subject to incorporation of comments/ modification as noted. Resubmit revised drawing incorporating the comments. CATEGORY –III Not approved. Resubmit revised drawings for approval after incorporating comments/ modification as noted. CATEGORY -IV For information and records.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 20 OF 111	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	h) Contractor shall resubmit the drawings approved under Category II, III & IV within three (3) weeks of receipt of comments on the drawings, incorporating all comments. Every revision of the drawing shall bear a revision index wherein such revisions shall be highlighted in the form of description or marked up in the drawing identifying the same with relevant revision Number enclosed in a triangle (eg. 1, 2, 3 etc). Contractor shall not make any changes in the portions of the drawing other than those commented. If changes are required to be made in the portions already approved, the Contractor shall resubmit the drawing identifying the changes for Employer's review and approval. Drawings resubmitted shall show clearly the portions where the same are revised marking the relevant revision numbers and Employer shall review only such revised portion of documents. i) In case, the Contractor/ Vendor does not agree with any specific comment, he shall furnish the explanation for the same to NTPC for consideration. In all such cases the Contractor shall necessarily enclose explanations along with the revised drawing (taking care of balance comments) to avoid any delay and/or duplication in review work. j) It is responsibility of the Contractor/ Vendor to get all the drawings approved in the Category I & IV (as the case may be) and complete engineering activities within the agreed schedule. Any delay arising out of submission and modification of drawings shall not alter the contract completion schedule. k) If Contractor/ Vendor fails to resubmit the drawings as per the schedule, construction work at site will not be held up and work will be carried out on the basis of comments furnished on previous issues of the drawing. l) These comments will be taken care by the contractor while submitting the revised drawing. The contractor shall use a single transmittal for drawings. Submission. This shall include transmittal numbers and date, number of copies being sent, names of the agencies to whom copies being sent, drawing number and titles, remarks or special notes if any etc.		
8.06.00	ENGINEERING PROGRESS AND EXCEPTION REPORT		
8.06.01	The Contractor shall submit every month an Engineering progress and Exception Report giving the status of each engineering information including a) A list of drawings/engineering information which remains unapproved for more than four (4) weeks after the date of first submission b) Drawings which were not submitted as per agreed schedule.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS PAGE 21 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
8.06.02	The draft format for this report shall be furnished to the Employer within four (4) weeks of the award of the contract, which shall then be discussed and finalised with the Employer.			
9.00.00	TECHNICAL CO-ORDINATION MEETING			
9.01.00	The Contractor shall be called upon to organise and attend monthly Design/ Technical Co-ordination Meetings (TCMs) with the Employer/Employer's representatives and other Contractors of the Employer during the period of contract. The Contractor shall attend such meetings at his own cost at NEW DELHI / NOIDA or at mutually agreed venue as and when required and fully co-operate with such persons and agencies involved during the discussions.			
9.02.00	The Contractor should note that Time is the essence of the contract. In order to expedite the early completion of engineering activities, the Contractor shall submit all drawings as per the agreed Engineering Information Submission Schedule. The drawings submitted by the Contractor will be reviewed by the Employer as far as practicable within three (3) weeks from the date of receipt of the drawing. The comments of the Employer shall then be discussed across the table during the above Technical Co-ordination Meeting (s) wherein best efforts shall be made by both sides to ensure the approval of the drawing.			
9.02.01	The Contractor shall ensure availability of the concerned experts / consultants/ personnel who are empowered to take necessary decisions during these meetings. The Contractor shall be equipped with necessary tools and facilities so that the drawings/documents can be resubmitted after incorporating necessary changes and approved during the meeting itself.			
9.02.02	Should any drawing remain unapproved for more than six (6) weeks after it's first submission, this shall be brought out in the monthly Engineering Progress and Exception Report with reasons thereof.			
9.03.0	Any delays arising out of failure by the Contractor to incorporate Employer's comments and resubmit the same during the TCM shall be considered as a default and in no case shall entitle the Contractor to alter the Contract completion date.			
10.00.00	DESIGN IMPROVEMENTS The Employer or the Contractor may propose changes in the specification of the equipment or quality thereof and if the parties agree upon any such changes the specification shall be modified accordingly. If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any changing the price and/or schedule of completion before the Contractor proceeds with the change.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 22 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
	Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.			
11.00.00	EQUIPMENT BASES A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base, unless otherwise specifically agreed to by the Employer. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.			
12.00.00	PROTECTIVE GUARDS Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards shall be designed for easy installation and removal for maintenance purpose.			
13.00.00	LUBRICANTS, SERVO FLUIDS AND CHEMICALS			
13.01.00	All the first fill and one year's topping requirement of consumables such as greases, oils, lubricants, servo fluids / control fluids, gases (excluding H₂, CO₂ and N₂ for generator) and essential chemicals etc. which will be required to put the equipment covered under the scope of specifications into successful commissioning/initial operation and to establish completion of facilities shall be supplied by the contractor. Suitable standard lubricants as available in india are desired. Efforts should be made to limit the variety of lubricants to minimum. Bidder scope shall also include supply of H₂, CO₂ and N₂ as applicable for the generator till successful commissioning of generator. Bidder shall also supply a quantity not less than 10% of the full charge of each variety of lubricants, servo fluids, gases, chemicals etc (as detailed above) used which is expected to be utilized during the first year of operation. This additional quantity shall be supplied in separate containers.			
13.02.00	As far as possible lubricants marketed by the Indian Oil Corporation shall be used. The variety of lubricants shall be kept to a minimum possible. Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals etc. required for the complete plant covered herein shall be furnished. On completion of erection, a complete list of bearings/ equipment giving their location and identification marks shall be furnished to the Employer alongwith lubrication requirements.			
14.00.00	LUBRICATION			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2		GENERAL TECHNICAL REQUIREMENTS PAGE 23 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
14.01.00	Equipment shall be lubricated by systems designed for continuous operation. Lubricant level indicators shall be furnished and marked to indicate proper levels under both standstill and operating conditions.			
15.00.00	MATERIAL OF CONSTRUCTION			
15.01.00	All materials used for the construction of the equipment shall be new and shall be in accordance with the requirements of this specification. Materials utilised for various components shall be those which have established themselves for use in such applications.			
16.00.00	RATING PLATES, NAME PLATES & LABELS			
16.01.00	Each main and auxiliary item of plant shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the Employer.			
16.02.00	Each item of plant shall be provided with nameplate or label designating the service of the particular equipment. The inscriptions shall be approved by the Employer or as detailed in appropriate section of the technical specifications.			
16.03.00	Such nameplates or labels shall be of white nonhygroscopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back.			
16.04.00	Items of plant such as valves, which are subject to handling, shall be provided with an engraved chromium plated nameplate or label with engraving filled with enamel. The name plates for valves shall be marked in accordance with MSS standard SP-25 and ANSI B 16.34 as a minimum.			
16.05.00	Hanger/ support numbers shall be marked on all pipe supports, anchors, hangers, snubbers and restraint assemblies. Each constant and variable spring support shall also have stamped upon it the designed hot and cold load which it is intended to support.			
16.06.00	Valves, steam traps and strainers shall be identified by Employer's tag number of a metal tap permanently attached to non pressure parts such as the yoke by a stainless steel wire.			
16.07.00	Safety and relief valves shall be provided with the following: a) Manufacturer's identification.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 24 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
	b) Nominal inlet and outlet sizes in mm. c) Set pressure in Kg/cm² (abs). d) Blowdown and accumulation as percentage of set pressure. e) Certified capacity in Kg of saturated steam per hour or in case of liquid certified capacity in litres of water per minute.			
16.08.00	All such plates, instruction plates, etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.			
16.09.00	All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system.			
17.00.00	TOOLS AND TACKLES The Contractor shall supply with the equipment one complete set of all special tools and tackles and other instruments required and other instruments for the erection, assembly, disassembly and proper maintenance of the plant and equipment and systems (including software). These special tools will also include special material handling equipment, jigs and fixtures for maintenance and calibration / readjustment, checking and measurement aids etc. A list of such tools and tackles shall be submitted by the Bidder alongwith the offer. The price of each tool / tackle shall be deemed to have been included in the total bid price. These tools and tackles shall be separately packed and sent to site. The Contractor shall also ensure that these tools and tackles are not used by him during erection, commissioning and initial operation. For this period the Contractor should bring his own tools and tackles. All the tools and tackles shall be of reputed make acceptable to the Employer.			
18.00.00	WELDING			
18.01.00	If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed by others the requirements shall be submitted to the Employer in advance of commencement of erection work.			
19.00.00	COLOUR CODE FOR ALL EQUIPMENTS/ PIPINGS/ PIPE SERVICES			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 25 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
19.01.00	All equipment/ piping/ pipe services are to be painted by the Contractor in accordance with Employer's standard colour coding scheme, which will be furnished to the Contractor during detailed engineering stage.			
20.00.00	PROTECTION AND PRESERVATIVE SHOP COATING			
20.01.00	PROTECTION			
	All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either metallic or a nonmetallic protection device. All ends of all valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. All primers/paints/coatings shall take into account the hot humid, corrosive & alkaline, subsoil or over ground environment as the case may be. The requirements for painting specification shall be complied with as detailed out in Part-A & B of the Technical Specification.			
20.02.00	PRESERVATIVE SHOP COATING			
	All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall be treated beforehand and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and prepared in the shop. The surfaces that are to be finish-painted after installation or require corrosion protection until installation, shall be shop painted as per the requirements covered in the relevant part of the Technical Specification.			
	Transformers and other electrical equipments, if included shall be shop finished with one or more coats of primer and two coats of high grade resistance enamel. The finished colors shall be as per manufacturer's standards, to be selected and specified by the Employer at a later date.			
20.03.00	Shop primer for all steel surfaces which will be exposed to operating temperature below 95 degrees Celsius shall be selected by the Contractor after obtaining specific approval of the Employer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperature higher than 95 degrees Celsius and such primer shall also be subject to the approval of the Employer.			
20.04.00	All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of the Employer.			
20.05.00	All piping shall be cleaned after shop assembly by shot blasting or other means approved by the Employer. Lube oil piping or carbon steel shall be pickled.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 26 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
20.06.00	Painting for Civil structures and equipment/system covered under this package shall be done as specified under technical requirements on civil works in relevant part of this specifications.			
21.00.00	QUALITY ASSURANCE PROGRAMME			
21.01.00	To ensure that the equipment and services under the scope of contract whether manufactured or performed within the Contractor's works or at his sub-contractor's premises or at the Employer's site or at any other place of work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Employer/authorised representative after discussions before the award of the contract. The QA programme shall be generally in line with ISO-9001/IS-14001. A quality assurance programme of the contractor shall generally cover the following: - His organisation structure for the management and implementation of the proposed quality assurance programme - Quality System Manual - Design Control System - Documentation Control System - Qualification data for Bidder's key Personnel. - The procedure for purchase of materials, parts, components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc. - System for shop manufacturing and site erection control including process controls and fabrication and assembly controls. - Control of non-conforming items and system for corrective actions. - Inspection and test procedure both for manufacture and field activities. - Control of calibration and testing of measuring testing equipments. - System for Quality Audits. - System for indication and appraisal of inspection status. - System for authorising release of manufactured product to the Employer.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 27 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	n) System for handling storage and delivery. o) System for maintenance of records, and p) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per formats enclosed as Annexure-I and Annexure-II respectively.			
22.00.00	GENERAL REQUIREMENTS - QUALITY ASSURANCE			
22.01.00	All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive programme as it is the contractor's responsibility to draw up and implement such programme duly approved by the Employer. The detailed Quality Plans for manufacturing and field activities shall be drawn up by the Bidder and will be submitted to Employer for approval. Schedule of finalisation of such quality plans will be finalised before award on enclosed format No. QS-01-QAI-P-1/F3-R0. Monthly progress reports shall be furnished.			
22.02.00	Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's/ Sub-contractor's/ sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing. The Quality Plan shall be submitted on electronic media through C-folders, a web based system of NTPC ERP in addition to hard copy, for review and approval. After approval the same shall be submitted in compiled form on CD-ROM (As per format at Annexure-I)			
22.03.00	Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's "Site Quality Control Organisation", during various stages of site activities starting from receipt of materials/equipment at site (As per format at Annexure – II).			
22.04.00	The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality Plans and reference documents/standards etc. will be subject to Employer's approval without which manufacturer shall not proceed. These approved documents shall form a part of the contract. In these approved Quality Plans, Employer shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 28 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	Employer's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Employer in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Employer along with technical justification for approval and dispositioning. 22.05.00 The contractor shall submit to the Employer Field Welding Schedule for field welding activities in the format enclosed at Annexure-V. The field welding schedule shall be submitted to the Employer along with all supporting documents, like welding procedures, heat treatment procedures, NDT procedures etc. at least ninety days before schedule start of erection work at site. 22.06.00 The contractor shall have suitable Field Quality Organization with adequate manpower at Employer's site, to effectively implement the Field Quality Plan (FQP) and Field Quality Management System for site activities. The contractor shall submit the details of proposed FQA setup (organizational structure and manpower) for employer's approval. The FQA setup shall be in place at least one month before the start of site activities. 22.07.00 No material shall be despatched from the manufacturer's works before the same is accepted, subsequent to predespatch final inspection including verification of records of all previous tests/inspections by Employer's Project Manager/Authorised representative and duly authorised for despatch by issuance of Material Despatch Clearance Certificate (MDCC). 22.08.00 All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties; chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details 22.09.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the Employer. All welding/brazing procedures shall be submitted to the Employer or its authorised representative for approval prior to carrying out the welding/brazing. 22.10.00 All brazers, welders and welding operators employed on any part of the contract either in Contractor's/his sub-contractor's works or at site or elsewhere shall be qualified as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the Employer. 22.11.00 All brazers, welders and welding operators employed on any part of the contract either in Contractor's/sub-contractor's works or at site or elsewhere shall be qualified			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 29 OF 111	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
	as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the Employer..			
22.12.00	For all IBR pressure parts and high pressure piping welding, the latest applicable requirements of the IBR (Indian Boiler Regulations) shall also be essentially complied with. However, other piping shall be as per relevant code. Similarly, any other statutory requirements for the equipment/systems shall also be complied with. On all back-gauged welds MPI/LPI shall be carried before seal welding			
22.13.00	All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.			
22.14.00	No welding shall be carried out on cast iron components for repair.			
22.15.00	Unless otherwise proven and specifically agreed with the Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.			
22.16.00	All non-destructive examination shall be performed in accordance with written procedures as per International Standards, The NDT operator shall be qualified as per SNT-TC-IA (of the American Society of non-destructive examination). NDT shall be recorded in a report, which includes details of methods and equipment used, result/evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job.			
22.17.00	In general all plates of thickness greater than 40mm & for pressure parts plates of thickness equal to or greater than 25mm shall be ultrasonically tested otherwise as specified in respective equipment specification. All bar stock/Forging of diameter equal to or greater than 40 mm shall be ultrasonically tested.. The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the sub-contractor proposed by the Contractor for procurement of major bought out items including castings, forging, semi-finished and finished components/equipment etc., list of which shall be drawn up by the Contractor and finalised with the Employer, shall be subject to Employer's approval on enclosed format No. QS-01-QAI-P-01/F3. The contractor's proposal shall include vendor's facilities established at the respective works, the process capability, process stabilization, QC systems followed, experience list, etc. along with his own technical evaluation for identified sub-contractors enclosed and shall be submitted to the Employer for approval within the period agreed at the time of pre-awards discussion and identified in "DR" category prior to any procurement. Monthly progress reports on sub-contractor detail submission / approval shall be furnished preferably on enclosed format at Annexure-IV. Such vendor approval shall not relieve the contractor from any obligation, duty or responsibility under the contract.			
22.18.00	For components/equipment procured by the contractors for the purpose of the			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 30 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
	contract, after obtaining the written approval of the Employer, the contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the sub-contractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful vendors shall be finalised with the Employer and such approved Quality Plans shall form a part of the purchase order/contract between the Contractor and sub-contractor. Within three weeks of the release of the purchase orders /contracts for such bought out items /components, a copy of the same without price details but together with the detailed purchase specifications, quality plans and delivery conditions shall be furnished to the Employer on the monthly basis by the Contractor along with a report of the Purchase Order placed so far for the contract. 22.19.00 Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-contractor's quality management and control activities. The contractor shall provide all necessary assistance to enable the Employer carry out such audit and surveillance. 22.20.00 The contractor shall carry out an inspection and testing programme during manufacture in his work and that of his sub-contractor's and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. Contractor shall carry out all tests/inspection required to establish that the items/equipment conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan. 22.21.00 Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Employer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc. 22.22.00 For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable. 22.23.00 Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Employer/ authorised representative. 22.24.00 Environmental Stress Screening All solid state electronic system / equipment / sub assembly shall be free from infant mortile components. For establishing the compliance to this requirement, the			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 31 OF 111	

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	contractor / sub – contractor should meet the following. 1) The Contractor / Sub – contractor shall furnish the established procedure being followed for eliminating infant mortile components. The procedure followed by the Contractor / Sub – contractor should be substantiated along with the statistical figures to validate the procedure being followed. The necessary details as required under this clause shall be furnished at the stage of QP finalization. Or In case the Contractor / Sub – contractor do not have any established procedure to eliminate infant mortile components then two or 10% whichever is less, most densely populated Panels shall be tested for Elevated Temperature Cycle Test as per the following procedure. <u>Elevated Temperature Test Cycle</u> During the elevated temperature test which shall be for 48 hours, the ambient temperature shall be maintained at 50° C. The equipment shall be interconnected with devices and kept under energized conditions so as to repeatedly perform all operations it is expected to perform in actual service with load on various components being equal to those which will be experienced in actual service. During the elevated temperature test the cubicle doors shall be closed (or shall be in the position same as they are supposed to be in the field) and inside temperature in the zone of highest heat dissipating components / modules shall be monitored. The temperature rise inside the cubicle should not exceed 10° C above the ambient temperature at 50° C. In case of any failure during the test cycle, the further course of action should be mutually discussed for demonstrating the intent of the above requirement. 2) <u>Burn in Test Cycle</u> The test shall be conducted on all the panels fully assembled and wired including the panels having undergone the above mentioned elevated temperature test. The period of Burn in Test Cycle shall be 120 hrs and process shall be similar to the elevated temperature test as above except that the temperature shall be reduced to the ambient temperature prevalent at that time. During the above tests, the process I/O and other load on the system shall		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 32 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	be simulated by simulated inputs and in the case of control systems; the process which is to be controlled shall also be simulated. Testing of individual components or modules shall not be acceptable. During the Burn in Test the cubicle doors shall be closed (or shall be in the position same as they are supposed to be in the field) and inside temperature in the zone of highest heat dissipating components / modules shall be monitored. The temperature rise inside the cubicle should not exceed 10° C above the ambient temperature.			
22.25.00	The Contractor / Sub-contractor shall carry out routine test on 100% item at contractor / sub-contractor's works. The quantum of check / test for routine & acceptance test by employer shall be generally as per criteria / sampling plan defined in referred standards. Wherever standards have not been mentioned quantum of check / test for routine / acceptance test shall be as agreed during detailed engineering stage.			
23.00.00	QUALITY ASSURANCE DOCUMENTS			
23.01.00	The Contractor shall be required to submit the QA Documentation in two hard copies and two CD ROMs, as identified in respective quality plan with tick (✓)mark.			
23.01.01	Each QA Documentation shall have a project specific Cover Sheet bearing name & identification number of equipment and including an index of its contents with page control on each document.			
	The QA Documentation file shall be progressively completed by the Supplier's sub-supplier to allow regular reviews by all parties during the manufacturing.			
	The final quality document will be compiled and issued at the final assembly place of equipment before despatch. However CD-Rom may be issued not later than three weeks.			
23.02.00	Typical contents of QA Documentation is as below:-			
	(a.) Quality Plan			
	(b.) Material mill test reports on components as specified by the specification and approved Quality Plans.			
	(c.) Manufacturer / works test reports/results for testing required as per applicable codes and standard referred in the specification and approved Quality Plans.			
	(d.) Non-destructive examination results /reports including radiography interpretation reports. Sketches/drawings used for indicating the method of traceability of the radiographs to the location on the equipment.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2		GENERAL TECHNICAL REQUIREMENTS
				PAGE 33 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
23.05.00	TRANSMISSION OF QA DOCUMENTATION On release of QA Documentation by Inspector, one set of quality document shall be forwarded to Corporate Quality Assurance Department and other set to respective Project Site of Employer. For the particular case of phased deliveries, the complete quality document to the Employer shall be issued not later than 3 weeks after the date of the last delivery of equipment.			
24.00.00	PROJECT MANAGER'S SUPERVISION			
24.01.00	To eliminate delays and avoid disputes and litigation, it is agreed between the parties to the Contract that all matters and questions shall be referred to the Project Manager and without prejudice to the provisions of 'Arbitration' clause in Section GCC, the Contractor shall proceed to comply with the Project Manager's decision.			
24.02.00	The work shall be performed under the supervision of the Project Manager. The scope of the duties of the Project Manager pursuant to the Contract, will include but not be limited to the following: (a.) Interpretation of all the terms and conditions of these documents and specifications: (b.) Review and interpretation of all the Contractor's drawing, engineering data, etc: (c.) Witness or his authorised representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract : (d.) Inspect, accept or reject any equipment, material and work under the contract : (e.) Issue certificate of acceptance and/or progressive payment and final payment certificates (f.) Review and suggest modifications and improvement in completion schedules from time to time, and (g.) Supervise Quality Assurance Programme implementation at all stages of the works.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 35 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
25.00.00	INSPECTION, TESTING AND INSPECTION CERTIFICATES			
25.01.00	The word 'Inspector' shall mean the Project Manager and/or his authorised representative and/or an outside inspection agency acting on behalf of the Employer to inspect and examine the materials and workmanship of the works during its manufacture or erection.			
25.02.00	The Project Manager or his duly authorised representative and/or an outside inspection agency acting on behalf of the Employer shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Project Manager and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.			
25.03.00	The Contractor shall give the Project Manager/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within fifteen (15) days of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.			
25.04.00	The Project Manager or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall inform in writing to the Project Manager/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.			
25.05.00	When the factory tests have been completed at the Contractor's or sub-contractor's works, the Project Manager /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector. Project Manager /Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests or the issue of the certificates shall not bind the Employer to accept the equipment should it, on further tests after erection be found not to comply with the contract.			
25.06.00	In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 36 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	specified shall provide free of charge such items as labour, material, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Project Manager /Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the Project Manager/Inspector or to his authorised representative to accomplish testing.			
25.07.00	The inspection by Project Manager / Inspector and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the contract.			
25.08.00	To facilitate advance planning of inspection in addition to giving inspection notice as specified at clause no 9.05.03- of this chapter, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at Customer Hold Point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.			
25.09.00	All inspection, measuring and test equipment used by contractor shall be calibrated periodically depending on its use and criticality of the test/measurement to be done. The Contractor shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by NTPC. Wherever asked specifically, the contractor shall re-calibrate the measuring/test equipment in the presence of Project Manager / Inspector.			
25.10.00	Associated document for Quality Assurance programme			
25.10.01	Manufacturing Quality Plan Format No. : QS-01-QAI-P-09/F1-R1 enclosed at Annexure-I.			
25.10.02	Field Quality Plan Format No.: QS-01-QAI-P-09/F2-R1 enclosed at Annexure-II.			
25.10.03	List of items requiring quality plan and sub supplier approval. Format No.: QS-01-QAI-P-01/F3-R0 (Annexure-III).			
25.10.04	Status of items requiring Quality Plan and sub supplier approval. Format enclosed at Annexure-IV.			
25.10.05	Field Welding Schedule Format enclosed at Annexure-V.			
25.11.00	TESTING OF MAJOR DESIGN FEATURES: The major design features of the system shall be demonstrated by the Contractor at the Contractor's works or any other place mutually agreed within Six months from the date of LOA. These are the system function tests, which have a major impact on the detailed system design & finalization of important engineering documents like			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 37 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			एनटीपीसी NTPC
	configuration, functional grouping, BOM etc., but do not require a fully engineered system for conductance. Bidder shall identify these features & include detailed test procedures in the bid, which shall be finalized during discussions with the bidder before award. The developments and any augmentation of standard features undertaken by the Bidder to fulfill the various specification requirements, shall be also be tested during these major design tests. This shall include but not be limited to the following. a) System accuracy tests of DDCMIS for the various type of inputs identified in Part-B. b) Loop reaction time for sample loops/ logics. c) SOE functionality tests. d) Server changeover. e) Various response times, having serious implication on operation & maintenance philosophy. f) Duty cycle of controller/ HMIPIS with simulated load, representative of the final engineered load. g) Unified HMI for DDCMIS. The results of the above tests, after its acceptance by the Employer, shall be properly documented and submitted to Employer. If any of the envisaged tests have been carried out by Bidder in a previous NTPC project, then the same need not be specifically conducted by the Bidder for this project, provided it is clearly established by the Bidder & accepted by the Employer that there is no difference between the system offered for this project & the previous NTPC project with respect to the test. However, even in such a case, test report of the previous project shall be submitted by the Bidder as a part of MDFT (Major Design Feature Test) test report.			
25.12.00	DEMONSTRATION OF APPLICATION ENGINEERING			
25.12.01	Based on NTPC inputs, the Contractor shall prepare and submit typical implemented scheme in their system (Control system & HMI) on sample basis. The typical cases to be covered shall include but not be limited to the following. (i) Logics/Loops: a) Drive logics implementation for each type of binary drive along with its display in HMI.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 38 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
26.01.00	commissioning tests, commissioning and start-up at Site. The list of pre-commissioning tests to be performed shall be as mutually agreed and included in the Contractor's quality assurance programme as well as those included in Part-D, Section-VI and elsewhere in the Technical Specifications. (b) The Contractor's pre-commissioning/ commissioning/start-up engineers, specially identified as far as possible, shall be responsible for carrying out all the pre-commissioning tests at Site. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the commissioning of the complete facilities shall be commenced during which period the complete facilities, equipments shall be operated integral with sub-systems and supporting equipment as a complete plant. (c) All piping system shall be flushed, steam blown, air blown as required and cleanliness demonstrated using acceptable industry standards. Procedures to accomplish this work shall be submitted for approval to the Employer six months prior to the respective implementations. The Employer will approve final verification of cleanliness. (d) The time consumed in the inspection and checking of the units shall be considered as a part of the erection and installation period. (e) The check outs during the pre - commissioning period should be programmed to follow the construction completion schedule. Each equipment/system, as it is completed in construction and turned over to Employer's commissioning (start-up) Engineer(s), should be checked out and cleaned. The checking and inspection of individual systems should then follow a prescribed schedule to be agreed by Employer. (f) The Contractor during initial operation and performance testing shall conduct vibration testing to determine the 'base line' of performance of all plant rotating equipment. These tests shall be conducted when the equipment is running at the base load, peak load as well as lowest sustained operating condition as far as practicable. Contractor shall furnish the commissioning organization chart for review & acceptance of employer at least eighteen months prior to the schedule date of synchronization of 1st unit. The chart should contain : (1.) Biodata including experience of the Commissioning Engineers. (2.) Role and responsibilities of the Commissioning Organisation members. (3.) Expected duration of posting of the above Commissioning Engineers at site.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 40 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS एनटीपीसी NTPC		
26.02.00	Initial Operation (a) On completion of all pre-commissioning activities/ tests and as a part of commissioning the complete facilities shall be put on 'Initial Operation' during which period all necessary adjustments shall be made while operating over the full load range enabling the facilities to be made ready for the Guarantee Tests. (b) The 'Initial Operation' of the complete facility as an integral unit shall be conducted for 720 continuous hours. During the period of initial operation of 720 hours, the unit shall operate continuously at full rated load for a period not less than 72 hours. The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility. The Contractor shall intimate the Employer about the commencement of initial operation and shall furnish adequate notice to the Employer in this respect. (c) Any loss of generation due to constraints attributable to the Employer shall be construed as Deemed Generation. (d) An Initial Operation report comprising of observations and recordings of various parameters to be measured in respect of the above Initial Operation shall be prepared by the Contractor. This report, besides recording the details of the various observations during initial operation shall also include the dates of start and finish of the Initial Operation and shall be signed by the representatives of both the parties. The report shall have sheets, recording all the details of interruptions occurred, adjustments made and any minor repairs done during the Initial Operation. Based on the observations, necessary modifications/repairs to the plant shall be carried out by the Contractor to the full satisfaction of the Employer to enable the latter to accord permission to carry out the Guarantee tests on the facilities. However, minor defects which do not endanger the safe operation of the equipment, shall not be considered as reasons for with- holding the aforesaid permission.		
26.03.00	Guarantee Tests a) The final test as to prove the Functional Guarantees shall be conducted at Site by the Contractor in presence of the Employer. The contractor's Commissioning, start-up and initial operation shall make the unit ready to		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS PAGE 41 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	conduct such test. Such test will be commenced, within a period of three (3) months after the successful completion of Initial Operations. Any extension of time beyond the above three (3) months shall be mutually agreed upon. b) These tests shall be binding on both the parties of the Contract to determine compliance of the equipment with the functional guarantee. c) For performance/ demonstration tests instrumentations, of accuracy class shall be as per specified test codes. The numbers and location of the instruments shall be as per the specified test codes. In addition the values of parameters shall be logged from the information system provided under Employer's Distributed Digital Control Monitoring and Information system. Test will be conducted at specified load points. d) Any special equipment, tools and tackles required for the successful completion of the Guarantee Tests shall be provided by the Contractor, free of cost. e) The Guarantee tests and specific tests to be conducted on equipments have been brought out in detail elsewhere in the specifications.			
27.00.00	TAKING OVER Upon successful completion of Initial Operations and all the tests,other than Guarantee Tests conducted to the Employer's satisfaction,the Employer shall issue to the Contractor a Taking over Certificate as a proof of the final acceptance of the equipment. Such certificate shall not unreasonably be with held nor will the Employer delay the issuance thereof, on account of minor omissions or defects which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of the Contract after issuance of such certificate.			
28.00.00	TRAINING OF EMPLOYER'S PERSONNEL			
28.01.00	The scope of service under training of Employer's engineers shall include a training module covering the areas of Operation & Maintenance. Such training should cover the following areas as a minimum in order to enable these personnel to individually take the responsibility of operating and maintaining the power station in a manner acceptable to the Employer: (a) Training for Steam Generator & ESP Equipment, TG & Auxiliaries and related equipments. (b) Training for Electric Systems including VFD and Electric power supply system.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 42 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS एनटीपीसी NTPC		
28.03.00	(c) Training for other SG/TG related C&I systems/equipments including training on Flame Monitoring System, Furnace and Flame Viewing System , Turbine Supervisory System (TSS) including vibration analyzer, vibration monitoring system axial shift, eccentricity measurements etc. for Main Turbine, BFP Turbine etc. Burner management study, control loop study, misc system for SG C&I, EHTC, Turbine stress control system, Turbine protection system, ATRS, instrumentation etc. (d) Training for special packages for various PC based systems specified elsewhere in Part-B of Technical Specification, Section-VI. (e) Training for various C&I systems/equipment supplied includes the following: i) DDCMIS - Human Machine Interface – Hardware & Operating System ii) DDCMIS-Human Machine Interface System Engineering & Application Software. iii) DDCMIS – Control System Hardware and Control system Application Software. iv) DDCMIS – Operator Training : Use of the system at Works + at site. v) DDCMIS – Specialized Network security. (f) Training for power cycle piping/critical piping. (g) Training for UPS systems Annunciation system, SWAS, PA system, flue gas analyzers, CCTV and 24 VDC system. (h) Training for numerical relays & networking systems supplied under MV & LT switchgear system. (i) Training for Simulator System (j) Details of training modules for SG, TG, Electrical, C&I systems and Simulator System are given at Annexure – VII, VIII, IX, X, XI & XII. The exact details, extent and schedule for training shall be as finalized during detailed engineering and shall be subject to Employer's approval. The scope of services under training shall also necessarily include training of Employer's Engineering personnel covering a training module as indicated in Annexure – VII, VIII, IX, X, XI & XII . This shall cover all disciplines viz, Mechanical, Electrical, C&I , QA etc. and shall include all the related areas like Design familiarization, training on product design features and product deign software of major equipment and systems, engineering, manufacturing, erection, commissioning, training on operating features of equipment, quality assurance and testing, plant visits and visits to manufacturer's works, exposure to various kinds of		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)	TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS	PAGE 43 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	problems which may be encountered in fabrication, manufacturing erection, welding etc.			
28.04.00	Contractor shall also arrange for training of Employer's personnel in respect of fire detection and protection systems and other Balance of Plant equipments.			
28.05.00	Bidder shall furnish in his offer, details of training module(s) covering above requirements which shall be subject to Employer's approval. Consolidated training period included above [i.e. Annexure – VII, VIII, IX, X, XI & XII for O&M and Engineering] is indicative only. Employer reserves the right to reappropriate the training period between O&M and engineering depending upon the details of training module proposed by the Bidder.			
28.06.00	Exact details, extent of training and the training schedule shall be finalized based on the Bidder's proposal within two (2) months from placement of award.			
28.07.00	In all the above cases, wherever the training of Employer's personnel is arranged at the works of the manufacturer's it shall be noted that the lodging and boarding of the Employer's personnel shall be at the cost of Bidder. The Bidder shall make all necessary arrangements towards the same.			
28.08.00	Take off prices (product wise) should be indicated by the Bidder in the Bid Proposal Sheets. Employer reserves the right to include or exclude these item(s) during placement of Award.			
	Note: For training purposes, one (1) man month implies 30 working days (excluding all intervening holidays) per person.			
29.00.00	SAFETY ASPECTS DURING CONSTRUCTION AND ERECTION			
	In addition to the requirements given in Erection Conditions of Contract (ECC) the following shall also cover:			
	i) Working platforms should be fenced and shall have means of access.			
	ii) Ladders in accordance with Employer's safety rules for construction and erection shall be used. Rungs shall not be welded on columns. All the stairs shall be provided with handrails immediately after its erection.			
30.00.00	NOISE LEVEL			
	The equivalent 'A' weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) metre horizontally from the nearest surface of any equipment/machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2		GENERAL TECHNICAL REQUIREMENTS
				PAGE 44 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS 		
	i) Safety valves and associated vent pipes for which it shall not exceed 105 dBA-115 dBA. ii) Regulating drain valves in which case it shall be limited to 90 dBA-115 dBA. iii) Mill noise which will be limited to 85-90 dBA. iv) TG unit in which case it shall not exceed 90 dBA. v) For HP-LP bypass valves and other intermittantly operating control valves, the noise level shall be within the limit of 90 dBA. vi) For BFP Motor Noise level shall be with in the limit of 90 dBA.		
31.00.00	PACKAGING AND TRANSPORTATION All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The Contractor shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting despatch of equipment. Before despatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & preassembly to bare minimum. The Employer's Inspector shall have right to insist for completion of works in shops before despatch of materials for transportation.		
32.00.00	ELECTRICAL EQUIPMENTS/ENCLOSURES		
32.01.00	All electrical equipments and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specifications.		
33.00.00	INSTRUMENTATION AND CONTROL All instrumentation and control systems/ equipment/ devices/ components, furnished under this contract shall be in accordance with the requirements stated herein, unless otherwise specified in the detailed specifications.		
33.01.00	All instrument scales and charts shall be calibrated and printed in metric units and shall have linear graduation. The ranges shall be selected to have the normal reading at 75% of full scale.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION VI, PART-C BID DOC. NO.:CS-9585-001-2	GENERAL TECHNICAL REQUIREMENTS PAGE 45 OF 111

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		एनटीपीसी NTPC																		
	All scales and charts shall be calibrated and printed in Metric Units as follows: <table><tr><td>1. Temperature</td><td>- Degree centigrade (deg C)</td></tr><tr><td>2. Pressure</td><td>- Kilograms per square centimetre (Kg/cm²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.</td></tr><tr><td>3. Draught</td><td>- Millimetres of water column (mm wc).</td></tr><tr><td>4. Vacuum</td><td>- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).</td></tr><tr><td>5. Flow (Gas)</td><td>- Tonnes/ hour</td></tr><tr><td>6. Flow (Steam)</td><td>- Tonnes/ hour</td></tr><tr><td>7. Flow (Liquid)</td><td>- Tonnes / hour</td></tr><tr><td>8. Flow base</td><td>- 760 mm Hg. 15 deg.C</td></tr><tr><td>9. Density</td><td>- Grams per cubic centimetre.</td></tr></table>			1. Temperature	- Degree centigrade (deg C)	2. Pressure	- Kilograms per square centimetre (Kg/cm ²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.	3. Draught	- Millimetres of water column (mm wc).	4. Vacuum	- Millimeters of mercury gauge (mm Hg) or water column (mm Wcl).	5. Flow (Gas)	- Tonnes/ hour	6. Flow (Steam)	- Tonnes/ hour	7. Flow (Liquid)	- Tonnes / hour	8. Flow base	- 760 mm Hg. 15 deg.C	9. Density	- Grams per cubic centimetre.
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33.02.00	All instruments and control devices provided on panels shall be of miniaturized design, suitable for modular flush mounting on panels with front draw out facility and flexible plan-in connection at rear.																				
33.03.00	All electronic modules shall have gold plated connector fingers and further all input and output modules shall be short circuit proof. These shall also be tropicalised & components shall be of industrial grade or better.																				
34.00.00	ELECTRICAL NOISE CONTROL The equipment furnished by the Contractor shall incorporate necessary techniques to eliminate measurement and control problems caused by electrical noise. Areas in Contractor's equipment which are vulnerable to electrical noise shall be hardened to eliminate possible problems. Any additional equipment, services required for effectively eliminating the noise problems shall be included in the proposal. The equipment shall be protected against ESD as per IEC-61000-2. Radio Frequency interference (RFI) and Electro Magnetic Interference (EMI) protection against hardware damage and control system mal-operations/errors shall be provided for all systems as per EN-50082-2 (1995).																				
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			PAGE 46 OF 111																		