

CLAUSE NO.		QUALITY ASSURANCE												
ELECTRICAL ACTUATOR WITH INTEGRAL STARTER														
ITEM/ COPONENT/ SUB SYSTEM ASSEMBLY/ TESTING	Test/Attributes Characteristics													
		RPM ®	No Load Current ®	IR & HV Test®	Mounting Dimension®	All routine Test as per Standard & Specification®	Correct Phase Sequence®	Operation & Setting of limit Switch/Torque Switch®	Stall Torque/Current (A)	Hand Wheel operation/ Auto de clutch function (A)	Function of Aux. like Potentiometer, space heater, position indicator ®	EPT output ®	Grease leakage ®	Local/ Remote (Open-Stop-Close) Operation® Safety check (Single phasing, Phase correction, Tripping etc.) (A)
	ELECTRICAL ACTUATOR WITH INTEGRAL STARTER(IS_9334)													
	Motor	Y	Y	Y	Y	Y								
	Final Testing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Note: 1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme in General Technical Conditions. Requirement of test and procedure finalized during QP finalization 2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the practices and procedure adopted along with relevant supporting documents.														
® - Routine Test (A) - Acceptance Test Y - Test applicable														
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:CS-9585-001-2						SUB-SECTION-E-68 ELECTRICAL ACTUATOR WITH INTEGRAL STARTER				Page 1 of 1		

बि ५५५ ५५  PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006					
								VOLUME		IIB			
								SECTION		C			
								ISSUE NO. 2		REV. NO. 00		DATE: 25.05.2016	
								SHEET		1		OF 6	
Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks	
									P	W	V		
1.0	INCOMING MATERIAL												
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3	---	2,1	TC for body/bonnet from foundry only	
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3/2	2	1	1.IBR Certification (if applicable) to be verified by BHEL. 2.Applicable for body /bonnet only	
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1	Applicable for body and bonnet for rating ANSI 900 and above.	
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2		
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1	After Machining on machined surface only	
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining.	
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2		

LEGEND: * CR - Critical characteristics
MA - Major characteristics
MI - Minor characteristics

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

\$ P - Agency Performing the Test.
W - Agency Witnessing the Test.
V - Agency Verifying the Test.

1 - BHEL
2 - Vendor
3 - Sub-vendor

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								SECTION C					
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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks	
									P	W	V		
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2		
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	3/2	---	2,1		
1.3	Spring	1. Composition	MA	Chemical-Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2		
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2		
		3. Performance	MA	1. Stiffness ratio	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2		
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2		
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	3	---	2,1		
				4. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Mfr. standard	Record	3	---	2		
1.4	Electrical items [Limit switches, Solenoids, Position Transmitter(if provided externally)]	1. Routine Test	MA	HV, IR, Continuity function	100%	Relevant Standards	Relevant Standards	Test Certificate	3	---	2		
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	Test Certificate	3	---	2,1		

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Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
1.5	Pressure Gauges	1. Performance	MA	Review of calibration certificates	100%	Mfr. Standard	Mfr. Standard	Test Certificate	3	---	2	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---	2	
2.0	IN PROCESS INSPECTION											
2.1	After machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring/cage	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ASME B 16.34	ASME B 16.34	Test Records	2	---	1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	2	---	1	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	2	---	1	
3.0	TESTS ON COMPLETED VALVE											
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19/ ASME B16.34	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1	1	Refer Note-4
4.0	OPERATION TEST ON COMPLETED VALVE (Final inspection)	1. Valve Travel	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test \$ P - Agency Performing the Test. 1 - BHEL MA - Major characteristics UT – Ultrasonic Test MT- Magnetic Test W - Agency Witnessing the Test. 2 - Vendor MI - Minor characteristics V - Agency Verifying the Test. 3 - Sub-vendor												

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Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
		4. Repeatability	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦ Measuremen t (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	Mfr. Procedure	Approved drg. / data sheet	Test Certificate	2	--	1	♦ Size = Body & port size Or Body size & CV for non std port. Refer Note 1.
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Mfr. Procedure	Approved drg./ data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	Approved drg./ data sheet	Records	2	1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	1	1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional, paint thickness	100%	Mfr. Procedure	Approved drg./ data sheet	Test Certificate	2	1	1	
		13. Surface Quality	MA	Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	

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Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
									P	W	V	
5.0	AUXILIARY ITEMS (Performance test of auxiliary items shall be performed on the completely assembled valve)											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	Certificate of Conformance (C.O.C)
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2	1	---	(C.O.C)
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	---	(C.O.C)
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	---	(C.O.C)
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
5.6	Smart Positioner	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	---	(C.O.C)

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								VOLUME IIB					
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Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks	
									P	W	V		
	(As Applicable)	2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	---	(C.O.C)	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Mfr. Standard	Mfr. Standard	Test Certificate	2	---	---	(C.O.C)	
6.0	PAINTING	Soundness of Painting	MA	Visual and Measurement	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-2	
7.0	PACKING	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3	

NOTES:

1. In case valid CV test certificate for a similar control valve (same size, same CV, same trim characteristics) is not submitted to BHEL by the vendor, CV test shall be conducted at FCRI/Any govt. approved laboratory/ BHEL approved Laboratory.
2. In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.
3. Sea worthy packing shall be provided, if called for in the Data sheets.
4. The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
5. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
6. Copies of all TC's (Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests (Leak/Operation), C.O.C's (Certificates of Conformance) shall be submitted to BHEL for verification and acceptance.

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CLAUSE NO.	TECHNICAL REQUIREMENTS			
1.00.00	MAINTENANCE AND CALIBRATION EQUIPMENT			
1.01.01	Maintenance and Calibration equipments of proven type, shall be provided as a minimum by the Contractor. The Contractor shall be responsible for supplying all accessories and any necessary additional tools as required for proper maintenance and calibration of the installed C&I devices/systems.			
1.01.02	Electrical power supply requirement of the instruments offered under this Sub-section shall be 230 V AC, 50 Hertz nominal, single phase.			
1.01.03	All the electronic M&C items shall be microprocessor based and shall have the data logging facility for keeping calibration/maintenance records with proper communication facility for downloading these data on the Lab PC.			
1.01.04	The calibration standards of all M&C equipments furnished under this sub-section shall be traceable to National Bureau of Standards, USA or NPL, India or to the applicable standards existing in the country where the equipment is manufactured.			
1.01.05	Bidder to note that these maintenance & calibration equipment shall be for Employer's use for normal operation & maintenance of the plant & shall not be used by the bidder for calibration etc during commissioning. During commissioning, for calibration and other activities, Bidder shall bring his own equipment.			
1.01.06	The accuracy of the M&C equipments shall be better than the instrument being calibrated. The range of all the M&C equipments shall cover the entire range of the instruments being provided under this contract. Dustproof carrying case and rechargeable battery along with external charger shall be provided with all equipments.			
1.01.07	Contractor shall ensure with appropriate documentation that direct service/support from the M&C item supplier/manufacture shall be available to the employer for all M&C items for a minimum period of 5 years after the expiry of defect liability period.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800MW)		TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.: CS:9585-001-2	SUB-SECTION - IIIC-16 MAINTENANCE & CALIBRATION EQUIP.	PAGE 1 OF 1

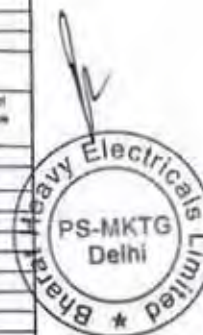
	PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	
	C & I TECHNICAL SPECIFICATION FOR DCS BASED FUEL OIL UNLOADING & STORAGE SYSTEM	
SUB VENDOR LIST		
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		PROJECT : Patratu STPP (2X660 MW) PACAKGE : EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL			REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017	
Sl. No.	ITEM	QP / INS CAT	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APP L SCH EDU LE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL STATUS AS PER NTPC	SC AP PL SC HE DU LE	REMARKS

13.	Junction boxes / Link Boxes/ Test Link Box/ Adopter box, Switch Boxes, Pull Boxes (Hot Dip Galvanized)	III				Main contractor approved sources with galvanization from NTPC approved sources (Note-2)		Noted		
14.	FRP Junction boxes	II	10			Main Contractor approved sources		Noted		
15.	Cable termination kits & straight through jointing kit upto 33KV	I	11			M/s 3M Electro & Communication	Pune	A		up to 33 KV
						Raychem	Mumbai	A		Heat shrinkable type up to 33 KV
						Yamuna Cable Accessories	Yamunanagar	DR		
						Hari Consolidated Pvt Ltd	Delhi	A		Heat shrinkable type Upto 11 KV with conditions, above rating DR
16.	Cable glands	III				Main contractor approved sources		Noted		
17.	Cable lugs	III				M/s Dowell	Mumbai	A		
						M/s Billets Elektro Werke Ltd.	Umbergaon	A		



NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP			REVISION NO : 00			
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE			DATE : 26.04.2017			
		CONTRACTOR :BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspecti on Categor y	QP No. 9585- 001-QVI- Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub QR	Remark
14	Tube thickness Meter	III				Main Contractor approved sources		A				
15	POSITIVE DISPLACEMENT FLOW METER/ TRANSMITTER	III				BROOKS	USA	A			Sub QR	Calibration reports to be submitted.
		III				BOPP & ROUTHIER	GERMANY	A				
		III				OVAL	JAPAN	A				
		II				Toshnival corporation Hyvac	Chennai	A				Up to 4 inch only
16	Coriolis Type Mass Flow meter	III				Main Contractor approved Sources		A			Sub QR	
17	Control Valve for Start Up System	II				CCI	USA/Switzerland/Korea	A				
		II				Tyco Sempel	Germany	A				
		II				EMERSON (Fisher)	USA/France/Japan	A				Reference list and performance feedback are to be submitted.
		II				Dressor Masonellan	France	DR				
		II				KOSO	Japan / Nasik	A				
		II				HORA	Germany	A				
		II				CCI	India	A				
18	Control valves for Soot blower pressure reducing ,SH/ RH Attenuation	II				CCI	USA/Sweden /Korea / Austria	A				
		II				Dressor Masonellan	France	A				
		II				HORA	Germany	A				
		II				EMERSON (Fisher)	USA/France /Japan	A				
		II				Spx Copes Vulcan	USA	A				only for SH/ RH Attenuation. for Soot blower application Reference to BHEL to be provided.
		II				KOSO	JAPAN	A				
		II				Tyco Sempel	Germany	A				
		II				Leslie	USA	A				
		II				Dressor	Colombatore	A				Up to 2500 Class
		II				IL	Palakkad	A				Up to 2500 Class
		II				KSB MIL	Alwaye	A				
		II				KOSO	Nasik	A				
		II				EMERSON	Chennai	A				Up to 2500 Class
		II				Flow Serve	Bangalore	A				Up to 2500 Class
		II				CCI	India	A				
		II				Copes Vulcan	UK	DR				
		II				Circor (Leslie)	Colombatore	DR				
19	Control Valve for BFP Recirculation	II				CCI	USA / Austria / Korea	A				
		II				EMERSON (Fisher)	USA/France/Japan	A				
		II				Dressor Masonellan	France	A				
		II				HORA	Germany	A				
		II				Sempel	Germany	DR				
		II				Leslie	USA	DR				M/s BHEL will forward only three proposals after details review of NTPC Technical specification
		II				CCI	India	A				



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NTPC		PROJECT : Patratu STPS Phase-I (3 X300MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR :BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 9585-001-QVI Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub-Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
		*				KOSO	Japan / Nasik	DR				requirements.
		*				Nakikata	Japan	DR				
		*				Parcol Spa	USA	DR				
		*				Yamatoku	Japan	DR				
		*				BOPP & ROUTHER	Germany	DR				
		*				KSB MIL	Ahwaye	DR				M/s BHEL will forward only three proposals after details review of NTPC Technical specification requirements.
20	Control valve for feedwater flow Control	II				CCI	USA/Austria	A				
		II				Dresser Masonellan	France	A				
		II				HORA	Germany	A				
		II				EMERSON (Fisher)	USA/France	A				
		II				Sampell	Germany	A				
		II				KOSO	Japan	A				
		*				LESUE	USA	DR				
		*				CCI	Italy	A				
		*				Parcol Spa	USA	DR				
		*				WEIR VALVES and Controls	UK	DR				
		*				KOSO	Nasik	DR				
		*				KSB MIL	Ahwaye	DR				
		*				Emerson Process Management	Chennai	A				
		*				BOMABA Special valve solutions Pvt. Ltd.	Ahmedabad	DR				
		*				Suzhou delan enery science and technology co. Ltd.	China	DR				
21	Control Valve (other than Sr. No. - 17 to 20)	II				CCI	USA/Switzerland/Korea	A				
		II				Tyco Sampell	Germany	A				
		II				EMERSON (Fisher)	USA/France/Japan / Chennai	A				
		II				Dresser Masonellan	France	A				
		II				KOSO	Japan	A				
		II				HORA	Germany	A				
		II				CCI	Italy	A				
		II				Spx Copes Vulcan	USA	A				
		II				Dresser	Colimbatore	A				
		II				II	Palakkad	A				
		II				KSB MIL	Ahwaye	A				
		II				KOSO	Palakkad	A				
		II				EMERSON	Chennai	A				
		II				Flow Serve	Bangalore	A				
		II				Copes Vulcan	UK	A				
		II				Leslie	USA	A				
		II				Parcol Spa	Italy	A				
		II				KOSO	Nasik	A				

Bharat Heavy Electricals Limited

PS-MKTG

Dalhi

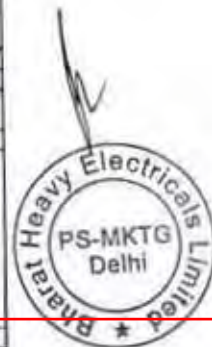


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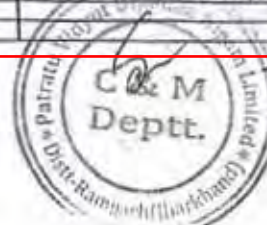
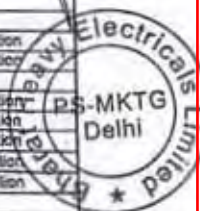
NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QV1 Q.	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		II				Forbes Arca	Pune	A				Approved up to 4" and 300 Class. "DR" for Higher rating and Size. M/s BHEL will forward only three proposals after details review of NTPC Technical specification requirements.
		-				Daume Regelarmaturen GmbH	Germany	DR				
		-				Mitsui Singapore PTE Ltd.	South Korea	DR				
		-				Severn Glocon	Chennai	DR				
		-				Spx Corporation	USA	DR				
		-				Ringo Valvulas SL	Spain	DR				
		-				Valvitalia SPA	Italy	DR				
		-				R K Controls	Thane	DR				
		-				Circor (Leslie)	Coimbatore	DR				
		-				Spx Flow Technologies	USA	DR				
		-				Circor (Leslie)	Coimbatore	DR				
		-				Schenjeng valve co. Ltd.	China	DR				
		-				Spx Flow Technologies	Ahmadabad	DR				
		-				WEIR Valves and Controls	UK	DR				
		-				WALDEMAR PRUSS ARMATURENFABRIK GMBH	Germany	DR				
		-				BOMABA Special valve solutions Pvt. Ltd.	Ahmedabad	DR				
		-				Suzhou delan entry science and technology co. Ltd.	China	DR				
22	Temperature Transmitter	III				EMERSON	U.S.A/Pawana / Singapore	A			Sub QR	
	(Single and Dual Input)	III				Yokogawa	Japan	A				Final testing at M/S YIL, Bangalore is also acceptable
		III				Moore	USA	A				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		III				M System	JAPAN	A				
		III				ABB	GERMANY/ Bangalore	A				
		III				ENDRESS & HOUSER	Aurangabad	A				
		-				Khrona		DR				
		-				Tokyo Kelco	Japan	DR				
		-				Honeywell	Pune	DR				
		-				INOR	Sweden	DR				
		-				P & F	Bangalore	DR				
		-				Siemens		DR				
		-				Yamatoka	JAPAN	DR				
		-				Yaman	JAPAN	DR				
		-				Foxboro		DR				
23	Conduits/Pipe(QI)					Refer Electrical List						
24	Electronic transmitters (pressure, DP,Flow)	III				EMERSON (Rosemount)	USA/ Pawana	A			Sub QR	
		III				FUJI ELECTRIC	France	A				Testing and Calibration at M/s YIL, Bangalore is also acceptable.
		III				YOKOGAWA	JAPAN	A				



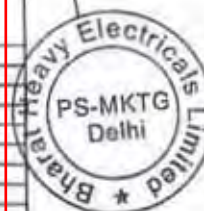
NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9565-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 9565-001-QV1 Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub SCH	SS Approval SCH	Sub QR	Remark
		III				YOKOGAWA	Bangalore	A				EJA- E series 110.435.530
		III				ABB	Bangalore	A				Model - 2600 T
		III				ABB	GERMANY / Italy	A				Model - 2600 T
		III				Siemens	France / Kahwa	A				
		III				Honeywell	Pune	A				
		III				Laxson Automation	Daman	A				SMAR Make
		III				Baldota	Mumbai	A				SMAR Make
		*				ENDRESS & HOUSER	Aurangabad/ Germany	DR				
		*				CHINO	Ghazipur	DR				
25	Thermocouples, RTD & Thermowells	III				HERAUS SENSOR	GERMANY	A			Sub QR	
		III				WISE Control	Korea	A				
		II				Tempsens	Udaipur	A				
		II				Pyroelectric	Goa	A				
		II				Detive Instrumentation & Electronics Ltd	Mumbai	A				
		III				Minco	USA	A				
		III				OKAZAKI corporation	JAPAN	A				
		III				Yamati	JAPAN	A				
		III				Yamati	Singapore	A				For RTD Reference list and Performance feedback is to be submitted.
		III				ABB/SENSYCON	Germany	A				
		II				EMERSON (Rosemount)	Germany	A				
		II				EMERSON (Rosemount)	Pawane	A				Imported from Emerson, Germany (make)
		II				Thermal Instruments(GIC)	Savarniwadi	A				
		II				Techno Instruments	Ahmadabad	A				
		II				GOA Instrument Industries	GOA	A				For Thermowells only
		*				GOA Instrument Industries	GOA	DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				Wika	Pune	DR				
		*				Tosnival Industries	Ajmer	DR				
		*				E & H	Aurangabad	DR				
		*				Nestech	Vapi	DR				
		*				Industrial Instruments	Kolkata	DR				
		*				Exotherm	Thane	DR				
		*				Baumer Technologies	Vapi	DR				
		*				Elaind Engineering	Noida	DR				
		*				Siemens India	Gurgaon	DR				
		II				Jedal Electronics	Roorkee	A				For Generator turbine & Motor
26	Ultrasonic type level Transmitter	III				E & H	Aurangabad/ Germany	A			Sub QR	
		III				EMERSON	Pawane	A				
		III				SIEMENS MILTRONICS	CANADA	A				
		III				Nivelco	Hungary	A				
		*				Vega	Germany	DR				



NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR :BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-555-001-2										
No.	Major Equipment	QP Inspect on Category	QP No. 555-001-QVI Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Khrona	France / USA / Pune	DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				Yokogawa	Bangalore	DR				
		*				P&F	Germany	DR				
		*				Magnetrol	Belgium	DR				
		*				ABB	Germany / India	DR				
		*				Forbes Marshall	Pune	DR			Sub QR	
27	Orifice plate assembly	III				Instrumentation Limited	Palghat	A				
		III				Microprecision	Palghat	A				
		III				Stameth	Pune	A				
		III				Flow Star	Fardabad	A				
		III				SEKO	Austria	A				
		III				MINCO India Pvt. Ltd.	GOA	A				Up to 32"
		III				MINCO India Flow Elements Pvt. Ltd.	GOA	A				Up to 28"
		III				WISE Control	Korea	A				
		III				T M Technomatic	Italy	A				
		*				IEPI	Hyderabad	DR				
		*				Engg. Specialites	Kolkata	DR				
		*				BALIGA	CHENNAI	DR				
		*				Pyroelectric	Mumbai	DR				
		*				Hydropneumatics	Mapusa	DR				
		*				Tansa Equipment Pvt. Ltd.	Thane	DR				
		*				Dynamic Fluid Vales Pvt. Ltd.	Belgium	DR				
28	Pressure, DP Gauge	III				BUENBERG	UK	A				
		III				ASHCROFT	USA/Germany/ India	A				
		III				Wika	GERMANY	A				
		III				WISE Control	Korea	A				
		III				Nagano KEIKI	Japan	A				
		III				H.Guru South India	Bangalore	A				Not for MS & FW application
		III				A.N. Instruments	Kolkata	A				Not for MS & FW application
		III				Gauge Bourdon	Penvel	A				
		III				Goa Thermostatic	GOA	A				Not for MS & FW application
		III				Wika	Pune	A				DR for MS & FW application
		III				Baumer	Vapi	A				DR for MS & FW application
		III				Precision mass products Pvt. Ltd.	Gandhinagar	A				Not for MS & FW application
		III				H.Guru	Rishra/Muzaffarpur	A				Not for MS & FW application
		*				US Gauge	USA	DR				
		*				Winters	USA	DR				
		III				Forbes Marshall	Hyderabad	A				
		*				Manometer	Mumbai	DR*				
		III				Welchandnagar Industries Ltd.	Dharwad	A				
		III				Nesstech	Vapi	A				
		*				Gauges Bourdon	UK	DR				QP Gauge for M/s Nesstech, Japan
		*				Fisher Mass	Germany	DR				



NTPC		PROJECT : Patratu STPS Phase-I (3 X600MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 29.04.2017		
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVI Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		-				Protech Control	Kolkata	DR				
		-				New Scientific	Kolkata	DR				
		-				PTCI	Kolkata	DR				
29	Level gauge (Transparent & Reflex, Tubular type)	III				Main Contractor approved Sources		A				
30	Press, DP, Vacuum Switch	III				SOR	USA	A			Sub QR	
		III				DRESSOR (ASHCROFT)	USA/Germany	A				
		III				ITT BARTON	USA	A				
		III				HERION	GERMANY	A				
		III				BARKSDALE	GERMANY	A				
		-				Nagano KEIKI	Japan	DR				
		II				Switzer Process Instrument	Chennai	A				Up to 40kg/cm2 & not for Compound Switch and except 900 series
		II				Trafag	Gurgaon	A				Up to 40kg/cm2 & not for Compound Switch
		II				Switzer Process Instrument	Ghaziabad	A				Up to 40kg/cm2 & not for Compound Switch
		III				Delta control	UK	A				
		I				Gauges Bourdon (GIG)	Parvel	A				Up to 40kg/cm2 & not for Compound Switch
		I				ASHCROFT	Gandhinagar	A				
		-				Wika	Pune	DR				
		III				Gergeon	France	A				
		III				United Electric	USA	A				
		-				SMC	Japan	DR				
		-				Neodyne	USA	DR				
		-				IMI NORGEN	Noida	DR				
		-				WISE Control	Korea	DR				
		-				Baumer	Vapi	DR				
		-				Vasu Tech	New Delhi	DR				
		III				Boh & Kirch	Germany	DR				
31	Temperature Switch	III				SOR	USA	A			Sub QR	
		III				DRESSOR (ASHCROFT)	USA/Germany	A				
		III				ITT BARTON	USA	A				
		III				DELTA CONTROLS	UK	A				
		I				Switzer Process Instrument	Chennai	A				up to 200 Deg. C
		I				Switzer Process Instrument	Ghaziabad	A				up to 200 Deg. C
		II				Trafag	Gurgaon	A				up to 200 Deg. C
		I				ASHCROFT	Gandhinagar	A				
		-				Wika	Pune	DR				
		III				Gergeon	France	A				
		III				United Electric	USA	A				
		-				SMC	Japan	DR				
32	Flow switch	III				UNIVERSAL FLOW METER	USA	A			Sub QR	
		III				Switzer	Chennai	A				

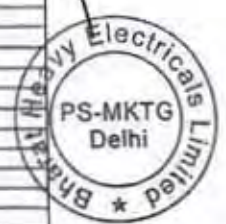


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NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspect on Category	QP No. 9585-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		-				Universal instrument manufacturing co P Ltd	India	DR				
		-				Hind Rectifier Ltd	India	DR				
37	Battery Health Monitoring System	III				Emerson	Mumbai	A				
		III				Eltek SGS Pvt Ltd	Gurgaon	A				
		-				B Tech Inc	USA	DR				
		III				Hitachi Hi Rel	Gandhinagar	A				
		-				Hoppecke	Germany	DR				
		-				Hitachi Hi Rel	Gandhinagar	DR				
38	Battery(Ni-cd)	I				AMCO SAFT	Bangalore	A				
		II				SAFT	France/Sweden	A				
		I				HBL POWER	Hyderabad	A				
		II				Hoppecke	Germany	A				
39	Socket weld fittings	III				BHEL Approved Sources						
40	Impulse pipe & tubes	II				Maharashtra Seamless	Raigarh	A				Carbon steel only
		II				Sumitomo/Kawasaki/Nippon	Japan	A				
		II				TPS TECHNITUBE	Germany	A				
		II				Veluric & mannemann	Germany	A				
		II				BHEL	Trichy	A				
		II				Trouvay and Carvin	France	A				Makes shall be as per approved list (Sr. No. 41)
		II				ISMT	Ahmadnagar	A				Carbon steel only.
		II				Sandvik		A				For SS only.
		-				TUBACES	Spain	DR				
		-				Salzgitter Mannesmann International	Germany	DR				
		-				Jindal saw	India	DR				
		II				Ratanamati Metal and Tubes	Ahmadabad	A				SS only
		II				Heavy metals and Tubes	Ahmadabad	A				SS and CS only.
		-				Shubhataxmi Metal and Tubes	Mumbai	DR				
41	Compression fittings	III				Parker	USA	A				
		III				Precision	Mumbai	A				
		III				Aslech	Mumbai	A				
		III				Fluid control Pvt. Ltd.	Pune	A				
		II				HP Valves and fittings	CHENNAI	A				Ferrules are to be hardened at Exim Hotbed for pressure above 9000 psi.
		III				Excel hydro	Mumbai	A				Ferrules are to be hardened at Exim Hotbed for pressure above 9000 psi.
		III				Swagelok	USA	A				
		III				Panem	Mumbai	A				
		III				Melpress	Kolkata	DR				
		-				AURA INC	New Delhi	DR				
		-				Prime Engineers		DR				
		-				Arya Craft		DR				

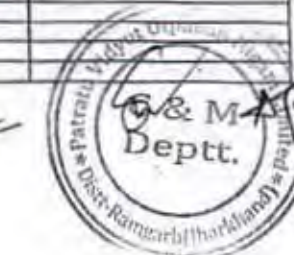


NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
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		CONTRACTOR :BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspection Category	QP No. 9585- 001-QV1 Q	QP Submis- sion SCH	QP Appro- val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				PMT Engineers	Ahemdabad	DR				
		*				Flowtech	Kolkata	DR				
		*				Parker Hannfin India Pvt Ltd		DR				
42	Instrument valves	III				BHEL	Trichy	A				
		II				Excel Hydro	Mumbai	A				
		II				Instrumentation Ltd.,	Palghat	A				
		III				Swagelok	USA	A				
		III				Parker	USA	A				
		II				HP Valves and fittings	CHENNAI	A				
		II				Fluid control Pvt. Ltd.	Pune	A				
		II				Baldota	Mumbai	A				
43	Valve manifolds	III				Excel hydro	Mumbai	A				
		III				SCHNEIDER	Germany	A				
		III				Anderson Greenwood	USA	A				
		III				Astech	Mumbai	A				
		III				HP Valves and fittings	CHENNAI	A				
		III				Fluid control Pvt. Ltd.	Pune	A				
		III				Microprecision	Faridabad	A				
		III				Parker	USA	A				
		III				Swagelok	USA	A				
		III				Baldota	Mumbai	A				
		*				Melness Engg. works	Kolkata	DR				
		*				Flow tech	Kolkata	DR				
44	Local Instrument Enclosure/Rack	I				Pyrotech	Udaipur	A				
		I				Instrumentation Limited	Kota	A				
		I				Sajas electrical	Trichurapalli	A				
		I				Prammen	Puddukottai	A				
		I				Chemlin	Pondicherry	A				
		*				Forbes Marshall	Pune	DR				
		*				Psatronics	Vadodara	DR				
		*				Procon	Chennai	DR				
45	Instrument Cables	I				Paramount	Khushkhera	A				PVC,FRLS type,RQP
		I				Polycab	Daman	A				PVC,FRLS type,RQP
		I				Delton	Faridabad	A				PVC,FRLS type,RQP
		I				KEI	Bhimwadi	A				PVC,FRLS type
		I				Elkey Telelinks	Faridabad	A				PVC,FRLS type
		I				CORDS	Chopanki	A				PVC,FRLS type,RQP
		I				CORDS	Kaharani	A				PVC,FRLS type,RQP
		I				Nicox	Kolkata	A				PVC,FRLS type
		II				TEW & C	USA	A				
		II				Habia cables	Sweden	A				
		II				Kerpen cables	Germany	A				
		II				Lapp cables	Germany	A				
		II				Thermo electa Bv	Netherlands	A				
		I				Universal Cable	Saina	A				PVC,FRLS type
		I				Thermocables	Hyderabad	A				PVC,FRLS type

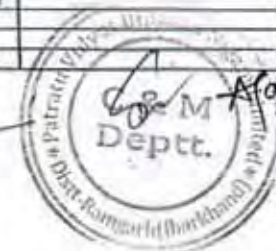
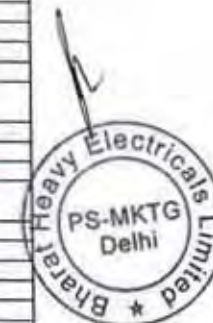


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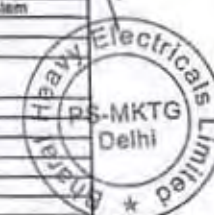
NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 26.04.2017		
		CONTRACTOR :BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9555-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 9555-001-QVI Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		I				Finolex Cable	Pune	DR *				
		I				Incab	Pune	DR *				
		I				Gupta Power Infrastructure Ltd.	Khurda	A				
		*				Lapp cables	India	DR				
		*				Liont cable	Pune	DR				
		*				RR Kabel	Shyva	DR				
		*				Gemacab	Bhivadi	DR				
		*				KEC International	Mysore	DR				
		*				Advance cable Technologies	Bangalore	DR				
		*				Suyog Electricals Ltd.	Vadodara	DR				
		*				Special Cable	India	DR				
		*				CMI	Faridabad	DR				
		*				Govind Cables	Kolkata	DR				
		*				Associate Cables	Mumbai	DR				
		*				Radiant RSCC Specialty	Hyderabad	DR				
		*				APAR Industries	Banglore	DR				
		*				Tempsens Cable	Udaipur	DR				
		*				Mansfield cables co. Ltd.	Hyderabad	DR				
		*				Servel India Pvt. Ltd.	Nasrana	DR				
		*				TC Communication Pvt. Ltd.	Ghaziabad	DR				
46	Electrical actuator	II				Auma	Germany	A				
		II				Uimtorge	USA	A				
		II				Rolorg	UK	A				
		II				Uimtorque	Faridabad	A				
		II				Rolork	Chennai/Bangalore	A				
		III				Nippon gear	Japan	A				
		II				Auma	Bangalore	A				
		III				Harold Beck	USA	A				
		III				Drehmo	Germany	A				
		I				Antrieb	Chennai	A				
		*				Uindoo	USA	DR				
		*				Siemens	Germany	DR				
47	Electrical actuator for ID/FD/PA Blade pitch and Guide vane control	III				Harold Beck	USA	A				
		III				SIPOS Aktorik GmbH	Germany	A				
		*				ABB	Germany	DR				
48	Flow nozzle / Venturi assembly	II				Microprecision	Faridabad	A			Sub QR	
		II				SEIKO	Austria	A				
		II				TECHNOMATIC	Italy	A				
		II				Instrumentation Limited	Palghat	A				
		I				Starmach	Pune	A				
		II				WISE Control	Korea	A				



NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP						
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				REVISION NO : 00		
		CONTRACTOR : BH&L Ltd				VENDOR AS APPROVED BY				DATE : 26.04.2017		
		CONTRACT NO : CS-5585-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 5585-001-QVI Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		I				MINCO India Flow Elements Pvt. Ltd.	GOA	A				
		*				SAMEL	Korea	DR				
		*				MINCO	GOA	DR				
		*				Engg. Specialities	Kolkata	DR				
		*				Pyroelectric	Mumbai	DR				
		*				Hydropneumatics	Mapusa / GOA	DR				
		*				ASIAN INDUSTRIAL VALVES	Chennai	DR				
		*				Dynafluid valves Pvt. Ltd.	Belgium	DR				
49	HIGH Temp. cable (PTFE/FEP)	II				Habia cables	Sweden	A				
		II				Lapp cables	Germany	A				
		II				Karpen cables	Germany	A				
		II				TEW & C	USA	A				
		II				Thermo-Electra Bv	Netherland	A				
		II				Habia cables	China	A				
		II				Thermocables	Hyderabad	A				
		II				Tempsens	Udaipur	A				
		*				Delton Cables	Faridabad	DR				
		*				RJ Cables	Roorkee	DR				
50	Fiber optic cable	II				HFCL	Goa	A				
		II				R&M	Switzerland	A				
		II				Aksh Fibre	Bhivadi	A				
		II				Finclax	Pune/Goa	A				
		II				Bvix Ericson	Rewa	A				
		II				Molex	UK	A				
		II				Corning	USA	A				
		II				Schneider	GOA	A				Previously known as D Link / Smarlink, Goa
		*				RPG Cables	India	DR				
		*				Uniflex Cables	India	DR				
		*				Terracom	India	DR				
51	Pneumatic Actuator (Power 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	Pelghat	A				
		I				Kelton	Cochin(Malappu)	A				
		I				SMC Pneumatics	Noida	A				Up to 12 inch only
		I				Rotax	Mumbai	A				Conditional
		*				Emerson Process Management	Chennai	DR				
		*				MTL Controls	Alwaya	DR				
		*				Festo	Bangalore	DR				
		*				IMI Norgon	Noida	DR				
52	Level switch capacitance type	III				ENDRESS & HOUSER	Aurangabad	A			Sub QR	
		III				MAGNETROL	BELGIUM	A				
		III				SBEM	PUNE	A				
		III				PUNE TECHTROL	PUNE	A				



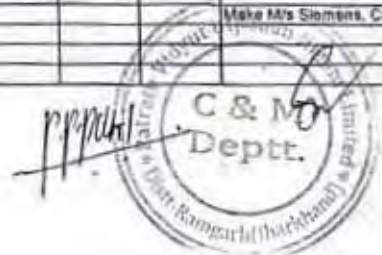
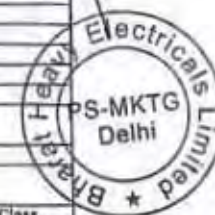
NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE						
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY				DATE : 26.04.2017		
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP (Inspection Category)	QP No. 9585- 001-QV Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				LEVCON	KOLKATA	A				
		II				Nivo Controls	Indore	A				
		*				V AUTOMAT	New Delhi	DR				
		*				D K Instrument	Kolkata	DR				
		*				Siemens	Germany	DR				
		*				ABB	Korea	DR				
		*				Rosemount	Korea	DR				
53	Transducer	II				AE	Mumbai	A				
		II				Southern Transducer	Chennai	A				
		II				Elster	Mumbai	A				
		III				Camille Bauer	Germany	A				
		III				Meltrawal	Germany	A				
		II				Rishab	Nashik	A				
		*				Pyrotech	Udaipur	DR				
		*				Masibus	Gandhinagar	DR				
		*				SIEMENS	Germany	DR				
54	Mini UPS up to 3.3 KVA	III				EMERSON	Mumbai	A				
		III				EMERSON	Pune	A				
		III				Hirachi Hi- Rel	Gandhinagar	A				
		III				APC	Bangalore	A				
		III				APLAB	Mumbai	A				
		III				Delta	Gurgaon	A				
		*				Powertronix	Bangalore	DR				
		*				DUBAS ENGG.PVT.LTD., BANGALORE		DR				
		*				Grid power conversion Pvt Ltd.		DR				
		*				Schneider	Bangalore	DR				
55	Level switch- cond type	III				EMERSON (Solartron mobrey)	UK	A			Sub QR	
		II				Hi Tech	Kolkata	A				Levelstate, UK System
		III				Varway	USA	A				
		III				LEVELSTATE	UK	A				
		II				Raman Instruments	Delhi	A				Emerson (Mobrey) System
		*				BHEL	Trichy	DR				
		*				IGEMA	Germany	DR				
56	Level switch - Float/Displacer Type	III				ENDRESS & HOUSER	AURANGABAD	A			Sub QR	
		II				MAGNETROL	BELGIUM	A				
		III				LEVCON	KOLKATA	A				
		III				SBEM	PUNE	A				
		III				Chemtrols samil	Mumbai	A				
		III				NAKATIYA	JAPAN	A				
		III				Sigma Industries	Mumbai	A				
		III				D K Instrument	KOLKATA	A				
		III				PUNE TECHTROL	PUNE	A				
		III				V AUTOMAT	NEW DELHI	A				
		*				WAREE	WAPI	DR				
		III				LEVELSTATE	UK	A				



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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-9585-001-3										
No.	Major Equipment	QP Inspecti on Category	QP No. 9585-001-QVI Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				Gauges Bourdon (GIC)	Panvel	A				
		*				Nisan Scientific Process	Navi Mumbai	DR				
57	Air filter regulator	III				Fairchild	USA	A				
		III				Shayo Norgen	Mumbai	A				
		III				SMC Pneumatics	NOIDA	A				
		III				Emerson (Asco)	Chennai	A				
		III				Festo	Bangalore	A				
		III				Placks	Chennai	A				
						Divya Control Elements	Gujarat	DR				
58	Copper tubing/Brass connectors	III				Main Contractor approved Sources		A				
59	Coupling / Interposing 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				
		*				Findex		DR				
60	Solenoid valve	III				Rolex	Vadodara	A			Sub QR	
		III				Avcon	Mumbai	A				
		III				Herion	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	Brand Name	A				
		*				Schneider	Germany	DR				
		*				Neuson Industries Pvt. Ltd.		DR				
61	Lube oil control valve - Self Regulating	III				NUOVO PIGNONE	ITALY	A				
		III				EMERSON	CHENNAI	A				
		III				SAMSON	GERMANY / PUNE	A				
		III				Forbes marshall arco pvt. Ltd.	Pune	A				Approved up to 16", 900 Class.
62	Guided wave/Radar type level transmitter	III				Magnetrol	Belgium	A			Sub QR	
		III				Endress & Houser	Germany/ Aurangabad	A				
		III				Emerson Process Management	Sweden/ PAWANE	A				
		III				ABB(X-Tech)	USA	A				
		II				Supreme Technology	Thane	A				Make M/s Siemens, Canada
		*				Yokogawa	Japan	DR				
		*				ABB	India	DR				
		*				J & F	Bangalore	DR				



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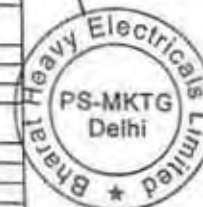
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NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP				REVISION NO : 00		
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE				DATE : 28.04.2017		
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-5565-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 5565-001-QV1 Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Khrono	France	OR				
		*				HONEYWELL	Pune	OR				
		*				Vega	Germany / India	OR				
		*				Siemens	India	OR				
		*				SSEM	Pune	OR				
83	Maintenance and Calibration Equipment					Main Contractor will propose the vendors during detail Engineering.						
84	Temperature Gauge	III				BUDENBERG	UK	A				
		III				DRESSOR (ASHCROFT)	USA/Germany	A				
		III				Wika	GERMANY/ Pune	A				
		III				WISE Control	Korea	A				
		III				Nagano KKKI	Japan	A				
		III				H.Guru South India	Bangalore	A				
		III				A.N. Instruments	Kolakkatta	A				
		III				NUOVA FIMA	ITALY	A				
		III				Goa Thermostatic	Goa	A				
		III				Goa Instrument Industries	Goa	A				
		III				Baumer	Vapi	A				
		III				Precision mass products Pvt. Ltd.	Gandhinagar	A				
		III				H.Guru	Rishra/Muzaffarpur	A				
		III				Baumer	Vapi	A				
		III				Forbes Marshall	Hyderabad	A				
		III				Gauges Bourdon (GIC)	Panvel	A				
		*				Konica	Korea	OR				
		*				Pyroelectric	GOA	OR				
		*				Winers Gauge	USA	OR				
		*				Weichandnager Industries Ltd.	Dharwad	OR				
		III				Nesstech	Vapi	A				
		*				US Gauge	USA	OR				
65	Furniture for computer (Chair, Almirah, Lock etc.)	III				Main contractor approved sources		A				
66	Terminal Block (Cage and Clamp type)	III				Weidmuller	Germany	A				
		III				Phoenix	Germany / India	A				
		III				Wago	Germany / India	A				
		III				Elmax	Vadodara	A				CE Mark only
67	FRP Junction Box for C&I system	III				BHEL Approved Sources		A				
68	PLC System (If applicable)	I				GE Intelligent platforms	Bangalore	A				
		I				ABB	Bangalore	A				
		I				Schneider	Nasik	A				
		I				Rockwell	Sahibabad	A				
		I				Siemens	Nasik	A				
		I				HONEYWELL	Pune	A				
69	SMART POSITIONER (Make)	#				ABB						# - To be covered in Control Val QP.

M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.

CE Mark only

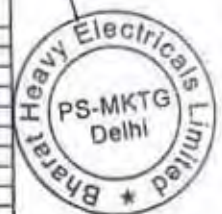
- To be covered in Control Valve QP



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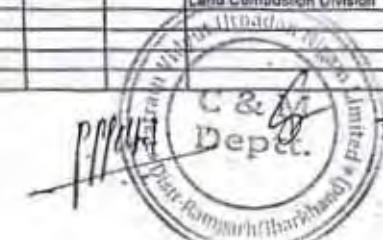
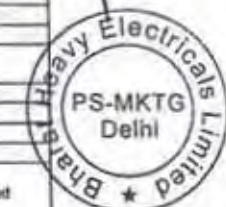
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NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING QP			REVISION NO : 00			
		PACKAGE : EPC PACKAGE				APPROVAL & ACCEPTABLE			DATE : 26.04.2017			
		CONTRACTOR : BHEL Ltd				VENDOR AS APPROVED BY						
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspecti on Categor y	QP No. 9585-001-QVI Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		#				Maschinen						
		#				Siemens						
		#				Smar						
		#				Yokogawa						
		#				EMERSON (Fisher Rosemount)						
		#				METSO						
		#				Yamatake						
		#				Moore						
70	ROTAMETER	III				IEPL	HYDRABAD	A			Sub QR	
		III				TRAC	HYDRABAD	A				
		III				PLACKA	CHENNAI	A				
		III				EUREKA	PUNE	A				
		III				SCIENTIFIC DEVICES	MUMBAI	A				UP TO 300 NB
		III				FLOW STAR	FARIDABAD	A				
		III				TOKYO KEISO	JAPAN	A				
		*				Flowtech Instrument Services	Vadodara	OR				
		*				Samli Chemtrol	MUMBAI	OR				
		*				Gauges Bourdon	Parval	OR				
		*				Tense Equipment Pvt. Ltd.	Thane	OR				
71	SINGLE AND MULTI POINT TEMPERATURE RECORDER (Microprocessor based)	III				YOKOGAWA INDIA	BANGALORE	A				Make Yokogawa, Japan
		III				CHINO CORPORATION	JAPAN	A				
		III				EUROTHERM	UK	A				
		III				EUROTHERM	INDIA	OR				
		III				YOKOGAWA	JAPAN	A				
		III				ABB	UK / GERMANY	A				
		III				FUJI	JAPAN	A				
		III				HONEYWELL	USA /	A				
		III					NETHERLAND					
72	Reverse Rotation Indicator (RRI)	III				GE BENTLY NEVEDA	USA	A			Sub QR	ALL TSI VENDORS ARE ALSO ACCEPTABLE
		III				SHINKAWA	JAPAN	A				
		I				P & F	Bangalore	A				
73	Instrument Tube Fittings (Air)	III				Main contractor approved sources		A				
74	pH Conductivity Analyser	III				HACH	Switzerland / USA	A			Sub QR	
		III				YOKOGAWA	Bangalore / Japan	A				Make Yokogawa- Japan
		III				ABB	UK / USA	A				
		III				EMERSON	Pawane	A				
		*				Thermo oden		OR				
		*				Forbes Marshall	Pune	OR				
75	PADO					Main Contractor will propose the vendors during detail Engineering.						
76	DEW Point Sensor / meter / Moisture Measuring System	III				GE Sensing	USA / Ireland	A				Parametric brand
		III				Michell Instrument	UK	A				
		III				Shaw	UK	A				



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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-0555-001-2										
No.	Major Equipment	QP Inspection Category	QP No. 555-001-QV1-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				COSA XENTAUR	USA	A				through Spectrum automation (aridabad)
		*				VAISHALA	Sweden / Japan	DR				
		*				DWER	USA	DR				
		*				Endee	Mumbai	DR				
		*				Nivo Controls	Indore	DR				
		*				Bartec GMBH	Germany	DR				
77	Blank Panels / Cabinets	III				Rital	Bangalore	A				
		III				Hoffman	BANGALORE	A				
		III				Pyrotech	Udaipur	A				
		III				BHEL	Bangalore	A				
		III				Schneider	Bangalore	DR				
78	CCTV Components (IP)	*				Sony	Japan	DR				
		*				Siemens	Pondichery	DR				
	Integrators will be decided during detail Engineering.	*				Dv Tel	USA	DR				
		*				Honey Well	Gurgaon	DR				
		II				Bosch	Bangalore	A				With Bosch Software
		II				Axis	Sweden	A				With Bosch Software
		*				Palco	USA	DR				
		II				Axis	Sweden	A				With Milestone Software
79	Control Desk, Server / PC Rack for Unit Control room and Auxiliary control room.	I				Pyrotech works Space	Udaipur	A				
		I				Cosmos	Noida	A				
		I				Adarsh Control	Bangalore	A				
		*				Chermin Controls	Pondichery	DR				
		*				Harmony Systems	New Delhi	DR				
80	Digital Indicators	III				Masibus	Gandhi Nagar	A				For Non mosaic mounting
		III				ABB	Germany	A				
		III				Foxboro	UK	A				
		III				Yokogawa	Japan	A				
		III				Gossen / Metrowall / Camille Bauer	Germany	A				
		III				Siemens	Germany	A				
		III				Chino	Japan	A				
		III				Weigel Messgeräte	Germany	A				
		III				Pyrotech	Udaipur	A				For Non mosaic mounting
		*				Chino Corporation	Mumbai	DR				
		*				Yokogawa	Bangalore	DR				For Non mosaic mounting and submit only two proposals
		*				Lektrolok	Pune	DR				
		*				Telechem	Chennai	DR				
81	Dust Emission Monitor	III				Land Instrument International	UK	A				Land Combustion Division
		III				Durag	Germany	A				
		III				Sick Mithak	Germany	A				
		III				Emerson Process Management	Ireland	A				
		III				Cedel	UK	A				



NTPC		PROJECT : Patrauli STPS Phase-I (3 X800MW)					LIST OF ITEMS REQUIRING QP					
		PACKAGE : EPC PACKAGE					APPROVAL & ACCEPTABLE			REVISION NO : 00		
		CONTRACTOR : BHEL Ltd					VENDOR AS APPROVED BY			DATE : 28.04.2017		
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspecti on Category	QP No. 9585-001-QM-Q	QP Submis sion SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
		I				Cords Cable	Bhilwadi / Koharani	A				

LEGENDS :

1.0 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.

DR - For those items "Detailed Required" for NTPC review. To be identified with letter "DR" in the list.

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

2.0 QP INSPECTION CATEGORY :

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

CAT - II : For those items the Quality Plans are approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents.

CAT-III:

UNITS/WORKS : Place of manufacturing. Place of main supplier of multi units/works.

* - Inspection category will be decided during vendor evaluation.

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

NOTE - 2 : Mandatory Sapre 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 : Intergration testing of DDCMS 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 - 6 : 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
FORMAT NO. : QS-01-QAP-P-1/FC-R0 Engg. Div/Q&I



P.P. Patil
PRASHANT P. PATIL
DGM (QA-C&I)



PEM SUPPLIER LIST AS ON 4/10/2018 5:17:49 PM

SI No	Package Name	Supplier Name	Supplier Communication Address
1	CONTROL VALVE	FORBES MARSHALL ARCA PVT.LTD.	A-34/35 , MIDC ESTATE, H-BLOCK, PIMPRI, PUNE, Phone- 020-27442020, Pincod : 411018 Email : mnadgaundi@forbesmarshall.com
2	CONTROL VALVE	INSTRUMENTATION LTD.	KANJIKODE WEST, PALALKKAD, PALAKKAD Phone- 2566127-130,2567128 Pincod : 678623 Email : icvldil@gmail.com;fa2@ilpgt.com
3	CONTROL VALVE	Koso India Private Limited,	H 33 & 34, MIDC, Ambad, Nashik, Phone- 09650233433 Pincod : 422010, Email : jetmal.gour@koso.co.in
4	CONTROL VALVE	BOMAFI SPECIAL VALVE SOLUTIONS PVT LTD	Mr. K.M. Anklesaria/ R. M. Anklesaria Plot No: 285/2, Panchratna Estate, Near Ramol Bridge, Vatva Ahmedabad Phone- 079-40083825 Pincod : 382445 Email : info@bomafi-india.com
5	CONTROL VALVE	KSB MIL CONTROLS LTD.	Mr.Jacob Cherian/Mr.Geo Jolly Meladoor, Annamanada P.O. MALA, Thrissur Phone- 0480-2695700 Pincod : 680741 Email : biju.simon@ksb.com
6	CONTROL VALVE	SUZHOU DELAN ENERGY SCIENCE & TECHNOLOGY CO., LTD.	No 566 Fangqiao Road Caohu Industrial Park, Xiangcheng Economic Development Zone, Suzhou Phone- 008618012776062 Pincod : 215143 Email : jeanielei@delan-valve.com
7	CONTROL VALVE	Valvitalia S.P.A. ,	Mr. Salvatore Ruggeri Via Tortona 69, Rivanazzano (Pavia) Phone- +39-03839459875 Pincod : 27055 Email : dario.torluccio@valvitalia.com
8	CONTROL VALVE	R.K.CONTROL INSTRUMENTS PVT. LTD.	PLOT NO.A-250, OPP.POLICE STATION, WAGLE INDUSTRIAL ESTATE, THANE Phone- 25820943/2331 Pincod : 400604 Email : rkcipl@vsnl.com ; rkcinvt@bol.net.in
9	CONTROL VALVE	Mascot Valves Pvt. Ltd.	166-167 GIDC Naroda Ahmedabad Phone- 0792282 1619 Pincod : 382330 Email : dom.sales@mascotvalves.com
10	CONTROL VALVE	EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	147, KARAPAKKAM VILLAGE, CHENNAI Phone- 23722184, 23716242 Pincod : 600096 Email : jatinder.singh@emerson.com
11	CONTROL VALVE	DRESSER VALVE INDIA PVT. LTD	Mr. Raj Raman/Mr. Rajkumar Moria S.F. No: 608,Chettipalayam Road, Echanari Post, Coimbatore Phone- +91-98451 19085 Pincod : 641021 Email : Anoop.Ramachandran@ge.com
12	CONTROL VALVE	WALDEMAR PRUSS ARMATURENFABRIK GMBH	Mr. Winfried Dremhel Schulenburgelandstrasse 261, Hannover Phone- +49-511279260 Pincod : 30419 Email : dremhel@pruss.de; vogel@pruss.de
13	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA Phone- 24757784,22472509 Pincod : 700020 Email : anidel@bol.net.in
14	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA Phone- 033 2282 2463 / 1637 Pincod : 700071 Email : mguru@vsnl.net
15	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	BOSE PANDA INSTRUMENTS PVT.LTD.	Mr. Partha Bose 44, Saheed Hemanta Kumar Bose, Sarani, Kolkata Phone- +91 33 2548 7220 Pincod : 700074 Email : parthabosebpi@gmail.com; bosepanda@vsnl.net
16	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol Phone- 9999464663 Pincod : 382729 Email : sales@precisionmass.com

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SI No	Package Name	Supplier Name	Supplier Communication Address
17	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	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 Pincod : 400093 Email : sales.in@baumer.com
18	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE Phone- 080-23370300, Pincod : 560022 Email : info@hgurusouth.com
19	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	FORBES MARSHALL (HYD) LTD.	MR SAI LESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD Phone- 9849913704 Pincod : 500 076 Email : mksrinivasan@forbesmarshall.com
20	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincod : 400016, Email : gicdelhi@general-gauges.com,
21	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincod : 400 701, Email : sdbpl@vsnl.com
22	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	Nesstech Instruments Private Limited	26/2, G Type, Global Industrial Park Near Nahuli Railway Crossing, Valvada Vapi Phone- 9920576002 Pincod : 396105 Email : sales@nesstech.co.in
23	TEMPERATURE GAUGE	FORBES MARSHALL (HYD) LTD.	MR SAI LESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD Phone- 9849913704 Pincod : 500 076 Email : mksrinivasan@forbesmarshall.com
24	TEMPERATURE GAUGE	GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	D2/5, Mapusa Industrial Estate, Mapusa, Goa, Phone- 09326054551, Pincod : 403507, Email : sumukh@goainstruments.com,
25	TEMPERATURE GAUGE	GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincod : 400016, Email : gicdelhi@general-gauges.com,
26	TEMPERATURE GAUGE	H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE Phone- 080-23370300, Pincod : 560022 Email : info@hgurusouth.com
27	TEMPERATURE GAUGE	GOA THERMOSTATIC INSTRUMENTS PVT.LTD.	FLAT -B , GF, HILL CROWN APTS., COLLEGE ROAD, MAPUSA Phone- Pincod : 403525 Email : gtilworks@pyro-electric.in
28	TEMPERATURE GAUGE	H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA Phone- 033 2282 2463 / 1637 Pincod : 700071 Email : mguru@vsnl.net
29	TEMPERATURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA Phone- 24757784,22472509 Pincod : 700020 Email : anidel@bol.net.in
30	TEMPERATURE GAUGE	PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol Phone- 9999464663 Pincod : 382729 Email : sales@precisionmass.com
31	TEMPERATURE GAUGE	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 Pincod : 400093 Email : sales.in@baumer.com
32	LEVEL GAUGE	TOSHNIWAL BROTHERS PVT.LTD.	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER Phone- 441171 Pincod : 305002 Email : toshniwalprocess@gmail.com

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SI No	Package Name	Supplier Name	Supplier Communication Address
33	LEVEL GAUGE	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
34	LEVEL GAUGE	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
35	TEMP. ELEMENT	PYRO ELECTRIC INSTRUMENTS GOA PVT.LTD.	M. D. BICHU/R. M. BICHU G.B, HILL CROWN APARTMENTS, COLLEGE ROAD, MAPUSA Phone- 9326114601 Pincode : 403507 Email : priyanka.marketing@pyro-electric.in
36	TEMP. ELEMENT	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
37	TEMP. ELEMENT	DETRIVE INSTRUMENTATION & ELECTRONICS LTD.	320, TV INDUSTIAL ESTATE, OFF.DR.A.BESANT ROAD, BEHIND GLAXO, WORLI, MUMBAI Phone- 24934125,24938403 Pincode : 400025 Email : trivtech@vsnl.com
38	TEMP. ELEMENT	Nesstech Instruments Private Limited	26/2, G Type, Global Industrial Park Near Nahuli Railway Crossing, Valvada Vapi Phone- 9920576002 Pincode : 396105 Email : sales@nesstech.co.in
39	TEMP. ELEMENT	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
40	TEMP. ELEMENT	TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhupura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,
41	TEMP. ELEMENT	GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincode : 400016, Email : gicdelhi@general-gauges.com,
42	TEMP. ELEMENT	GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	D2/5, Mapusa Industrial Estate, Mapusa, Goa, Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com,
43	TEMP. ELEMENT	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
44	TEMP. ELEMENT	Tempsens Instrument (I) Pvt Ltd	MR. V.P.RATHI/MR. HEMANT RATHI B-188A ROAD NO.5 , M.I.A UDAIPUR Phone- 09352420069 Pincode : 313003 Email : info@tempsens.com
45	TRANSMITTERS	ABB LIMITED	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD Phone- 09971085678 Pincode : 121003 Email : vipin.swami@in.abb.com
46	TRANSMITTERS	Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com
47	TRANSMITTERS	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
48	TRANSMITTERS	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
49	TRANSMITTERS	PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,
50	TRANSMITTERS	TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhupura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,

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51	TRANSMITTERS	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,
52	TRANSMITTERS	YOKOGAWA INDIA LIMITED,	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE, Phone- 080-41586000, Pincode : Email : uday.shankar@in.yokogawa.com,
53	TRANSMITTERS	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
54	TRANSMITTERS	Honeywell Automation India Limited	Mr. Ritwij Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI Phone- 9890200584 Pincode : 110019 Email : rajesh.chaudhary@honeywell.com
55	TRANSMITTERS	EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	Mr. Amit Paithankar/Vikram Raj Singh 206-210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.com
56	TRANSMITTERS	SMART INSTRUMENTS LTD, BRAZIL	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI Phone- 28208477 Pincode : 400093 Email : corp@delbby.rpgms.ems.vsnl.net.in
57	TRANSMITTERS	SIEMENS LIMITED	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com
58	TRANSMITTERS	NIVO CONTROLS PVT. LTD.	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore Phone- 0731-4081305 Pincode : 452010 Email : sales@nivocontrols.com
59	JUNCTION BOX	SUCHITRA INDUSTRIES	NO-2,OPP-27 AECS LAYOUT 2ND STG REJAMAHALVILAS EXTN 2ND STG BANGALORE Phone- Pincode : Email : suchitra.industriesblr@gmail.com
60	JUNCTION BOX	K.S.INSTRUMENTS PVT.LTD.	S Raghavan No. 72, 3rd Main, 1st Stage Industrial Suburb, Yeshwanthpur Bangalore Phone- 9880385770 Pincode : 560022 Email : sales1@ksinstruments.net
61	JUNCTION BOX	Shrenik & Company,	Mr. Mitesh Shah/Mr. Pulin Shah 39 A/3 ,Panchratna Industrial Estate, Sarkhej-Bavla Road Ahmedabad Phone- 9825024921 Pincode : 382213 Email : sales@pustron.com, pulin@sumip.com
62	JUNCTION BOX	FLEXPRO ELECTRICALS PVT. LTD.	Mr. Dineshbhai Zaveri C-1/ 27&37, GIDC, Kabilpore, Navsari Phone- 02637-265140,265003 Pincode : 396424 Email : flexpro@flexproltd.com
63	JUNCTION BOX	AJMERA INDUSTRIAL & ENGINEERING WORKS	JIGNESH MAHENDRA AJMERA DENA BANK BLDG.,SHREE NAGESH INDL. ESTATE,STATION ROAD, MUMBAI Phone- 022 67973578 Pincode : 400 088 Email : ajmera@ajmera.net, imaimera@yahoo.com
64	INSTRUMENTS TUBE FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
65	INSTRUMENTS TUBE FITTINGS	Fluid Controls Pvt. Ltd.	Sophie Y. Mochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
66	INSTRUMENTS TUBE FITTINGS	PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com
67	INSTRUMENTS TUBE FITTINGS	AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com

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68	INSTRUMENTS PIPE FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
69	INSTRUMENTS PIPE FITTINGS	AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com
70	INSTRUMENTS PIPE FITTINGS	PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com
71	INSTRUMENTS PIPE FITTINGS	Fluid Controls Pvt. Ltd.	Sophie Y. Moochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
72	INSTRUMENT FITTINGS	Perfect Instrumentation Control (India) Pvt. Ltd.	MD Hussain Shaikh/Shahanawaz Khan Gala No. 168, Loheki Chwal,216/ 218, Maulana Azad Rd. Nagpada Junction Mumbai Phone- 91-9324383121 Pincode : 400008 Email : shahanawaz.khan@perfectinstrumentation.com
73	INSTRUMENT FITTINGS	Comfit & Valve Pvt. Ltd.	Mr. Jeetu Jain/Mr. Vinay Sosa Survey No. 23/1, Part 2, Ahmedabad-Mehsana Highway Laxmipura, Nandasani Phone- 02764-267036/37 Pincode : 382705 Email : marketing@com-fit.com
74	INSTRUMENT FITTINGS	Arya Crafts & Engineering Pvt. Ltd.	Mr.Sanjay Brahman/Mr.Shyam Vazirani 102, Vora Industrial Estate No.4 Navghar, Vasai Road (E) Dist.Thane, Mumbai Phone- +91-250-2392246 Pincode : 401210 Email : arya@aryaengg.com
75	INSTRUMENT FITTINGS	HP VALVES & FITTINGS INDIA PVT. LTD.	S. Harichandran/P.S. Pandi B-11, Mugappair Industrial Estate, CHENNAI Phone- 044 26252537 Pincode : 600037 Email : sales@hpvalvesindia.com
76	INSTRUMENT FITTINGS	PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com
77	INSTRUMENT FITTINGS	AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com
78	INSTRUMENT FITTINGS	FLUIDFIT ENGINEERS PVT. LTD.	Mr. Abbas Bhola Potia Building No. 2, Office No. 3,292, Bellasis Road,Mumbai Central (East) Mumbai Phone- 9920044113 Pincode : 400008 Email : ab@fluidfitengg.com
79	INSTRUMENT FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
80	INSTRUMENT FITTINGS	Fluid Controls Pvt. Ltd.	Sophie Y. Moochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
81	INSTRUMENT FITTINGS	PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,

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	PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	
	C & I TECHNICAL SPECIFICATION FOR DCS BASED FUEL OIL UNLOADING & STORAGE SYSTEM	

INSTRUMENT INSTALLATION
DRAWING

Figure 1 consists of six sub-diagrams illustrating different pressure indicator connection methods:

- Diagram 1: Elevation Inst./Service Air** - Shows a pressure indicator connected to a service air line. The gauge is mounted above the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.
- Diagram 2: Elevation Steam Service** - Shows a pressure indicator connected to a steam service line. The gauge is mounted above the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.
- Diagram 3: Elevation Liquid Source (Gauge mounted above instrument source point)** - Shows a pressure indicator connected to a liquid source. The gauge is mounted above the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.
- Diagram 4: Elevation Liquid Source (Gauge mounted below instrument source point)** - Shows a pressure indicator connected to a liquid source. The gauge is mounted below the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.
- Diagram 5: Elevation Oil Service (Gauge mounted below instrument source point)** - Shows a pressure indicator connected to an oil service line. The gauge is mounted below the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.
- Diagram 6: Elevation Oil Service (Gauge mounted above instrument source point)** - Shows a pressure indicator connected to an oil service line. The gauge is mounted above the instrument source point. Components include a bulkhead of the local instrument board/rack, a drain header, and a floor line.

NOTES:-

1. THE MATERIAL SPECIFIED HEREIN SHALL BE AS SPECIFIED.
2. THE MATERIAL SPECIFIED HEREIN SHALL BE AS SPECIFIED.
3. INSTRUMENTS VALVES SHALL BE TECHNICAL SPECIFICATION.
4. FOR BOILER AIR/FLUE GAS FITTINGS SHALL BE 1/2" OR FRAME OR A RACK.
5. GAUGES SHALL NOT BE MOUNTED ON A RACK OR FRAME OR A RACK.
6. * SLOPE APPROX. 50°

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LIST OF MATERIALS	
ITEM NO.	DESCRIPTION
1.	1/2" / 3/4" / 1" NPS SCH 40/80/160/XKS/P91 (AS PER PROCESS REQUIREMENT) NIPPLE OF MATERIAL SAME AS THAT OF MAIN PIPE.
2.	1/2"/3/4"/1' SW GLOBE VALVE/GATE VALVE
3.	3/4" / 1" x 1/2" SW REDUCING INSERT
4.	1/2" / 3/4" PIPE
5.	1/2" / 3/4" SW EQUAL TEE
6.	1/2" / 3/4" SW GLOBE VALVE.
7.	1/2" / 3/4" NPS SW x 1/2" / 3/4" NPT(M) CARBON/ALLOY STEEL NIPPLE.
8.	1/2" / 3/4" NPT(F) CAP.
9.	1/2" / 3/4" PIPE UNION.
10.	6" SS SYPHON
11.	1/2" BLIND 300lbs RF ANSI FLANGE DRILLED AND TAPED FOR 1" NPT PIPE.
12.	SUITABLE ADAPTER.
13.	1/4" CHROME MOLY STEEL TUBE.
14.	
15.	1"/3/4" SW EQUAL TEE.
16.	DIAPHRAGM(WAFER ELEMENT)
17.	ISOLATION VALVE 316 SS,1/4"SW

1. THE MATERIAL SPECIFICATION AND SCHEDULE NO. OF IMPULSE PIPE & NIPPLE AS LISTED HEREIN SHALL BE AS PER TECHNICAL SPECIFICATIONS.
2. THE MATERIAL SPECIFICATION AND RATING OF FITTINGS AS LISTED SHALL BE AS PER SPECIFICATIONS, WELDED/THREADED FITTINGS SHALL CONFORM TO ANSI-B.16-11.
3. INSTRUMENTS VALVES BODY STEM MATERIAL AND PRESSURE CLASS SHALL BE AS PER TECHNICAL SPECIFICATIONS.
4. FOR BOILER AIR/FLUE GAS SERVICES SOURCE CONNECTIONS IMPULSE PIPING AND ALL FITTINGS SHALL BE OF 3/4" NB SIZE.
5. GAUGES SHALL NOT BE MOUNTED ON THE PIPE. IT WILL BE MOUNTED ON A CHANNEL OR FRAME OR A RACK..
6. * SLOPE APPROX. 50 MM / METRE.

FOR TENDER PURPOSE ONLY

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NTPC

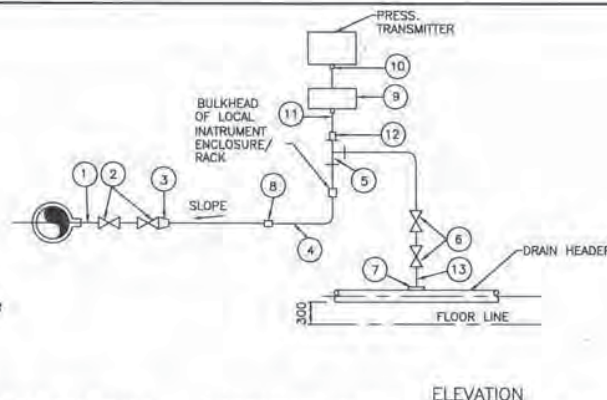
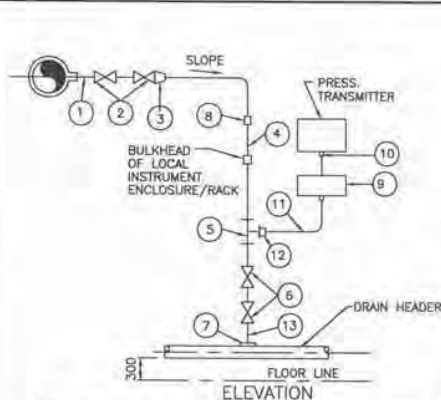
NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT	TYPICAL THERMAL POWER PROJECT
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TITLE INSTRUMENT INSTALLATION DIAGRAM
(FOR PRESSURE GAUGE)

A	FIRST ISSUE	10-A						T.G.			21.08.12	(FOR PRESSURE GAUGE)				
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.	
					CLEARED BY							A3	N.T.S.	0000-999-POI-A-022	A	

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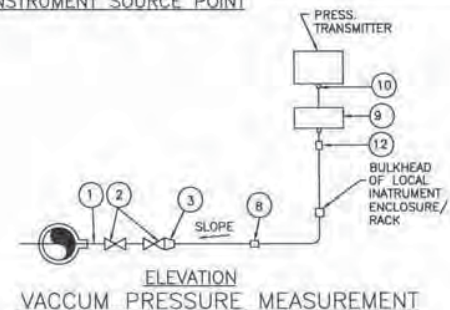
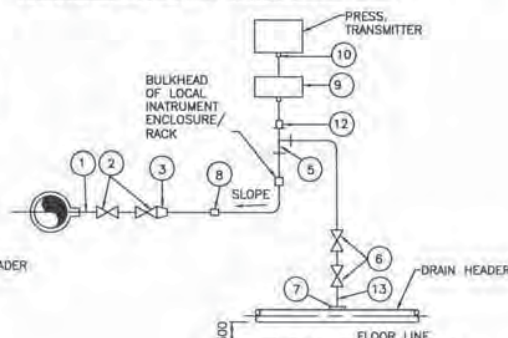
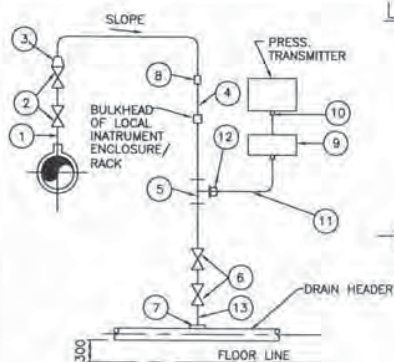


LIST OF MATERIALS	
ITEM NO.	DESCRIPTION
1.	1/2" / 3/4" / 1" NPS SCH. 80/160/XXS/P91 NIPPLE OF MATERIAL SAME AS THAT OF MAIN PIPE.
2.	3/4" / 1" SW GLOBE VALVE.
3.	3/4" / 1" TO 1/2" REDUCING INSERT
4.	1/2" NPS PIPE
5.	1/2" SW EQUAL TEE
6.	1/2" SW GLOBE VALVE
7.	1/2" NPS SCH. 80/160 SWx1/2" CS/AS COUPLER
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 SWx1/2" NPT(M) CS/AS NIPPLE

TRANSMITTER MOUNTED BELOW INSTRUMENT SOURCE POINT

TRANSMITTER MOUNTED ABOVE INSTRUMENT SOURCE POINT

LIQUID 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

TRANSMITTER MOUNTED BELOW INSTRUMENT SOURCE POINT

TRANSMITTER MOUNTED ABOVE INSTRUMENT SOURCE POINT

STEAM PRESSURE MEASUREMENT

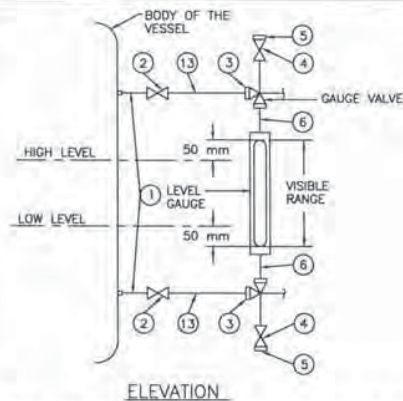
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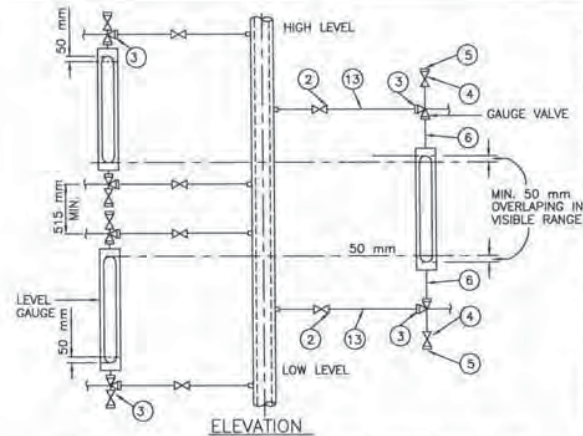
PROJECT		TYPICAL THERMAL POWER PROJECT	
TITLE		INSTRUMENT INSTALLATION DIAGRAM (PRESSURE MEASUREMENT USING PRESS /DP TRANSMITTERS STEAM/LIQUID VACUUM)	
SIZE	SCALE	DRG. NO.	REV. NO.
A3	N.T.S.	0000-999-POI-A-025	A

REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
A	FIRST ISSUE										21.08.12
CLEARED BY											

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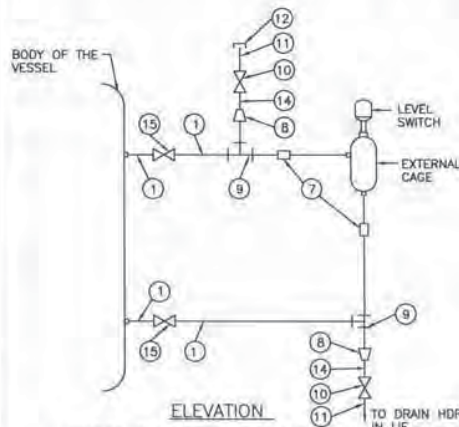


ELEVATION
LOCAL LEVEL INDICATION USING GAUGE GLASS

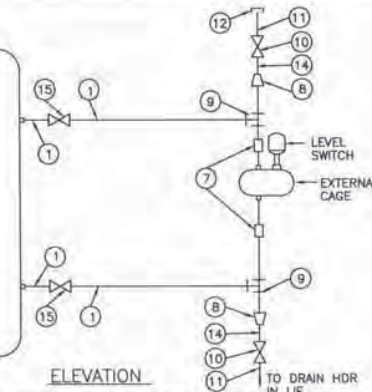


ELEVATION
LOCAL LEVEL INDICATION USING MULTIPLE GAUGES
FOR INCREASED RANGE NOT COVERED IN A SINGLE UNIT

LIST OF MATERIALS	
ITEM NO.	DESCRIPTION
1.	3/4" x 1" NPS SCH.40/80/160/P91 (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 SWx1/2" NPT(M) CS/AS NIPPLE.
12.	1/2" NPT (F) CAP.
13.	3/4"x1/2" NPS SCH.40/80 CS/AS PIPE.
14.	1/2" NPS SCH.80/160 CS/AS NIPPLE.
15.	1" SW GLOBE VALVE.



ELEVATION
FLOAT OR DISPLACER OPERATED EXTERNAL CAGE TYPE LEVEL SWITCH INSTALLATION



ELEVATION
TO DRAIN HDR. IN LIE

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

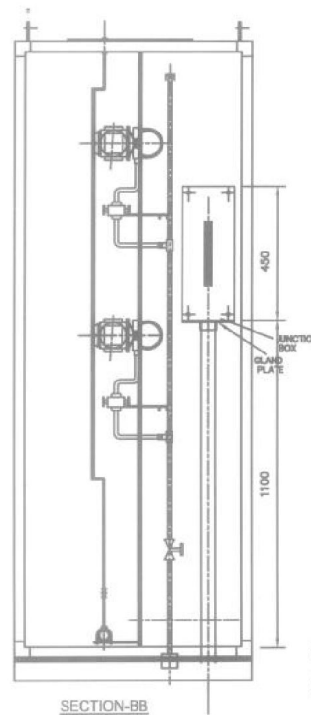
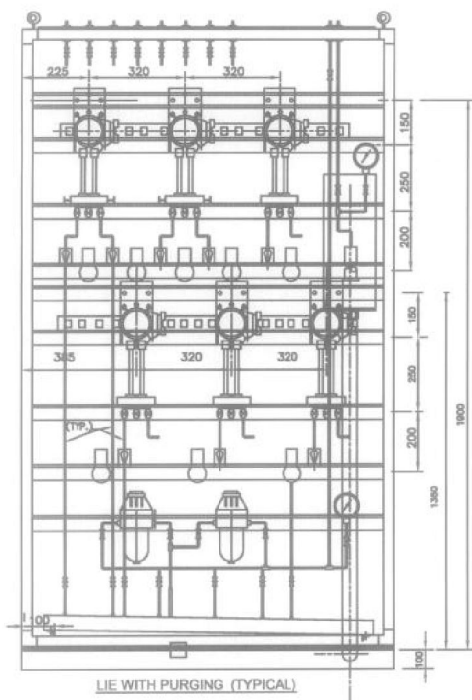
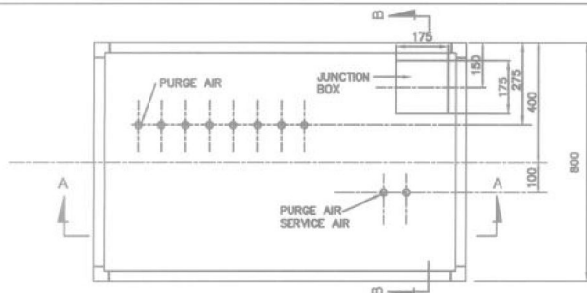


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PROJECT		TYPICAL THERMAL POWER PROJECT	
TITLE		INSTRUMENT INSTALLATION DIAGRAM (LEVEL GAUGE & SWITCHES)	
SIZE	SCALE	DRG. NO.	REV. NO.
A3	N.T.S.	0000-999-POI-A-031	A

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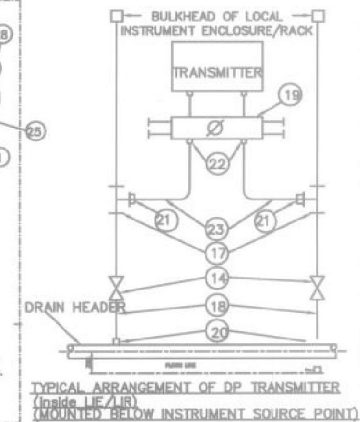
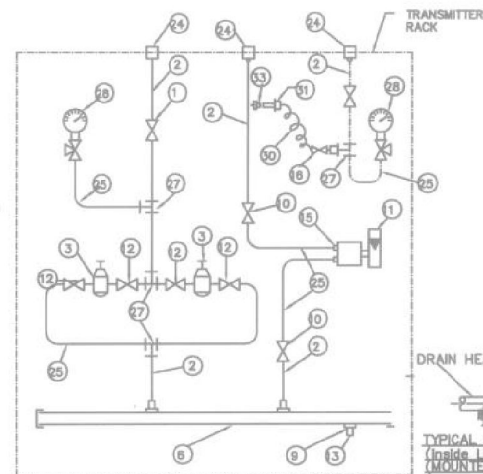


LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	ISOLATION VALVE(gate/globe). SS.
2.	SEAMLESS SS PIPE.
3.	AIR FILTER REGULATOR.
6.	INST. AIR HEADER SS.
10.	COMP. NEEDLE VALVE SS.
11.	AIR PURGE SET.
12.	COMP VALVE SS.
13.	PLUG SS.
15.	TUBE SS CONNECTOR.
16.	TUBE COMP. EQUAL TEE UNION.
24.	BULKHEAD-SS SUITABLE FOR GI PIPE CONNECTION
25.	SEAMLESS TUBE SS.
27.	BRANCH TEE SS.
28.	PR. GAUGE.
30.	NYLON FLEX. HOSE BRAIDED WITH SS WIRE.
31.	HOSE BARBED CONN. SS.
33.	QUICK DISCONNECT SS (PURGE AIR CONNECTION TO INSTRUMENT SOURCE END).

LIST OF MATERIALS

ITEM NO.	DESCRIPTION
14.	SW GLOBE VALVE.
17.	SW EQUAL TEE
18.	S.S. NIPPLE
19.	5 VALVE MANIFOLD
20.	SW HALF COUPLER CS
21.	PIPE x TUBE UNION
22.	SUITABLE ADAPTER
23.	SS TUBE



TYPICAL PURGE AIR CONNECTION INSIDE THE INST. ENCLOSURE
(APPLICABLE FOR MILL, AIR & FLUE GAS SERVICE INSTRUMENTS
REQUIRING PURGE AIR)
(Drain Header of each LIE/LIR shall be connected to nearest plant drain)

FOR TENDER PURPOSE ONLY

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ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT
(TURNKEY EPC PACKAGE)
TITLE
TYPICAL GA OF LOCAL INSTRUMENT
ENCLOSURE, PURGING SCHEME,
DP TRANSMITTER

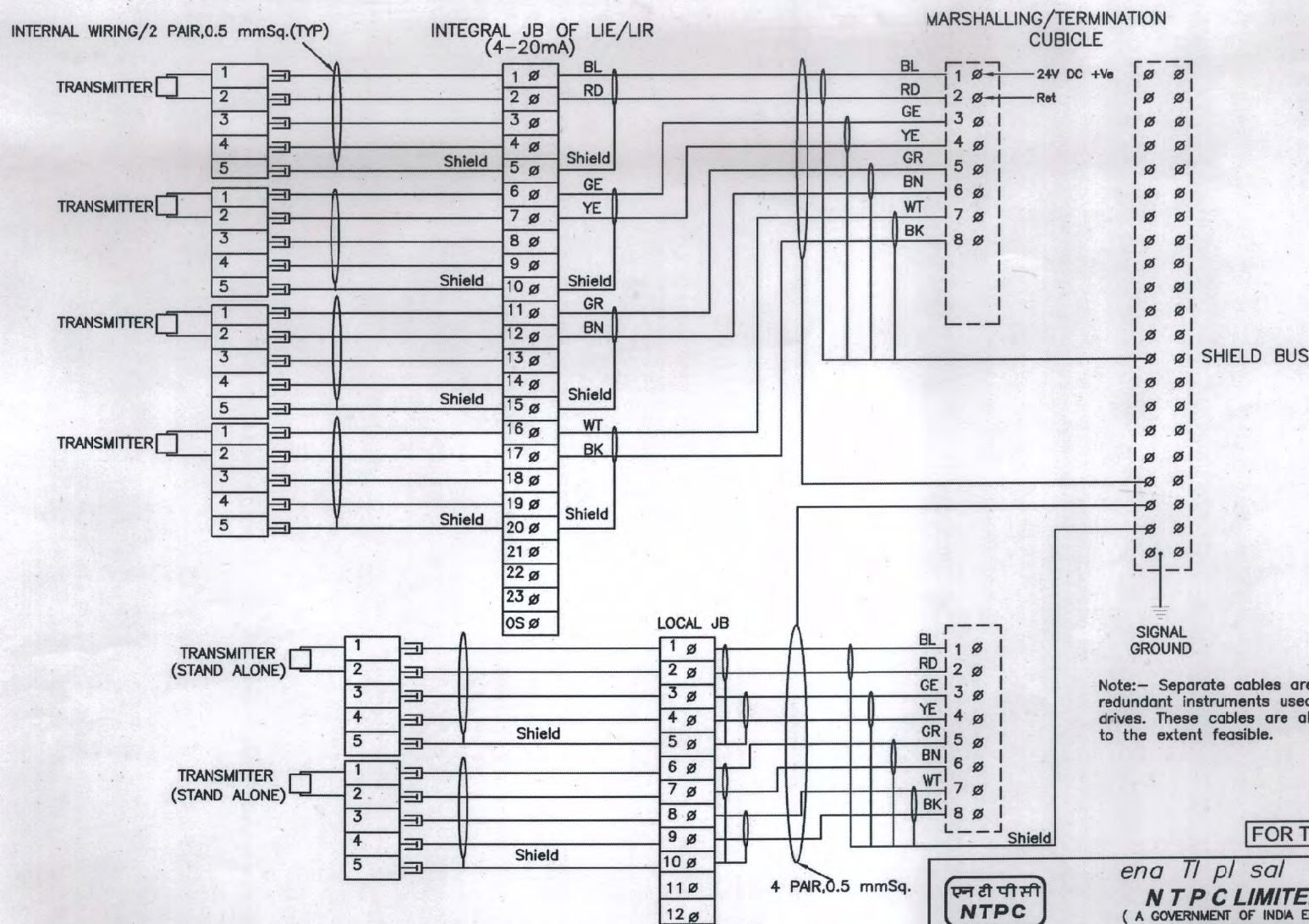
REV. NO.	DESCRIPTION	DATE	BY	CHECKED BY	APPROVED BY	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE	02.02.11					A2	N.T.S.	0000-999-POI-A-036	A
CLEARED BY										

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

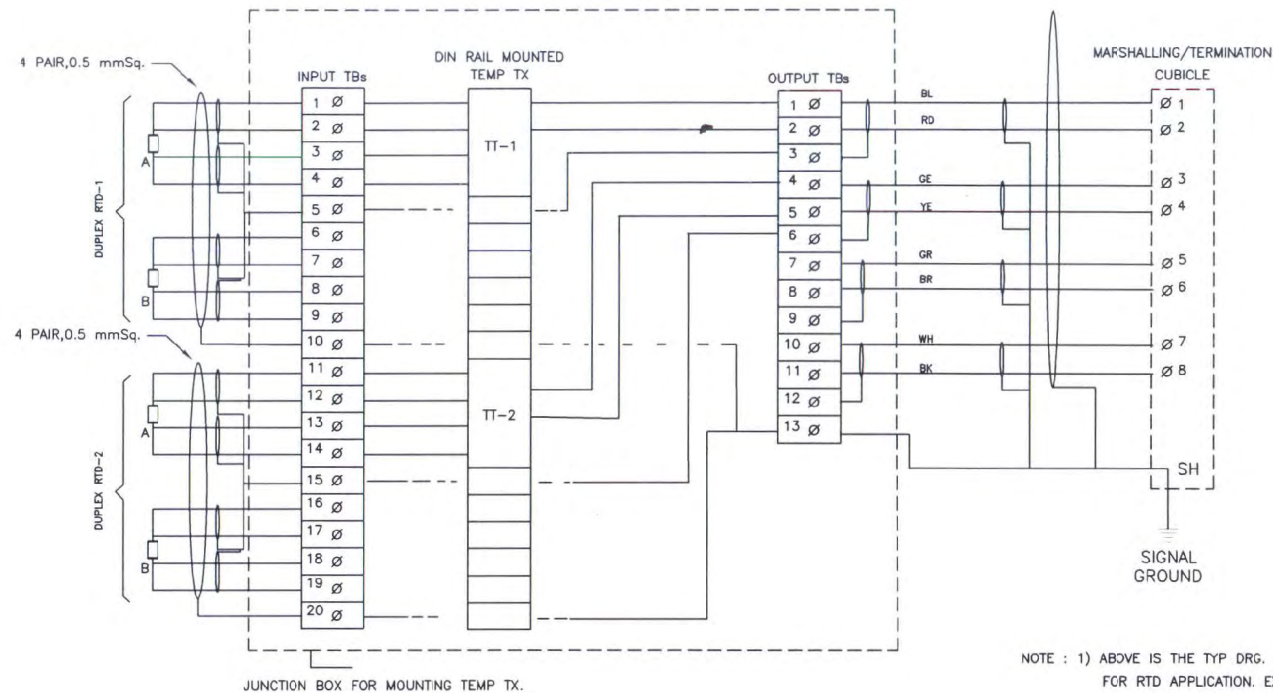
	PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	
	C & I TECHNICAL SPECIFICATION FOR DCS BASED FUEL OIL UNLOADING & STORAGE SYSTEM	
CABLE INTERCONNECTION AND TERMINATION PHILOSOPHY		
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C	NOTE REGARDING CABLE IS ADDED.									10.12.13	PROJECT	TYPICAL THERMAL POWER PROJECT			
B	INTERNAL WIRING FOR LIE/LIR MOUNTED SHOWN WIRING OF STAND ALONE TXTR SHOWN									10.12.06	TITLE	INTERFACING OF FIELD INSTRUMENTS 4-20mA			
A	FIRST ISSUE									12.1.05					
REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A3					NTS	0000-999-POI-A-065	C								
Cleared By					SH 04 OF 14										



- NOTE : 1) ABOVE IS THE TYP DRG. FOR DIN RAIL MOUNTED TEMP TRANSMITTERS FOR RTD APPLICATION. EXACT TYPE OF TEMP TRANSMITTER SHALL BE AS PER PART-A OF SPECIFICATION.
2) THE EXACT GROUPING OF TEMP TXs SHALL BE FINALISED DURING DETAILED ENGG. STAGE.

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PROJECT		TYPICAL THERMAL POWER PROJECT	
TITLE		INTERFACING OF FIELD INSTRUMENTS TYPICAL RTD CONNECTION WITH TEMP TRANSMITTERS IN JBS	
SIZE	SCALE	DRG. NO.	REV. NO.
A3	NTS	0000-999-POI-A-065	C
SH 06 OF 14			

REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	CLEARED BY					APPD	DATE
					M	E	C	C&I	ARCH.		
A	FIRST ISSUE										29.04.06

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	PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	
	C & I TECHNICAL SPECIFICATION FOR DCS BASED FUEL OIL UNLOADING & STORAGE SYSTEM	
MANDATORY SPARES (REFER MECHANICAL SPECIFICATION ANNEXURE-V)		
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	PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)	
	C & I TECHNICAL SPECIFICATION FOR DCS BASED FUEL OIL UNLOADING & STORAGE SYSTEM	

KKS TAGGING PHILOSOPHY