


CLAUSE NO.	TECHNICAL REQUIREMENTS			
1.00.00	TYPE TEST REQUIREMENTS			
	TYPE TEST REQUIREMENTS			
	General Requirements			
	<p>The Contractor shall furnish the type test reports of all type tests as per relevant standards and codes as well as other specific tests indicated in this specification. A list of such tests are given for various equipment in table titled 'TYPE TEST REQUIREMENT FOR C&I SYSTEMS' at the end of this chapter and under the item Special Requirement for Solid State Equipments/Systems. If the bidder proposes a different standard/code from that indicated at table 3.00.00, the same is acceptable provided the equivalence of the proposed standard is established by the bidder. For the balance equipment instrument, type tests may be conducted as per manufactures standard or if required by relevant standard.</p>			
	<p>(a) Out of the tests listed, the Bidder/ sub-vendor/ manufacturer is required to conduct certain type tests specifically for this contract (and witnessed by Employer or his authorized representative) even if the same had been conducted earlier, as clearly indicated subsequently against such tests.</p> <p>(b) For the rest, submission of type test results and certificate shall be acceptable provided.</p> <p>i. The same has been carried out by the Bidder/ sub-vendor on exactly the same model /rating of equipment. (For control valves, this shall be same size, type & design).</p> <p>ii. There has been no change in the components from the offered equipment & tested equipment.</p> <p>iii. The test has been carried out as per the latest standards along with amendments as on the date of Bid opening.</p> <p>(c) In case the approved equipment is different from the one on which the type test had been conducted earlier or any of the above grounds, then the tests have to be repeated and the cost of such tests shall be borne by the Bidder/ sub-vendor within the quoted price and no extra cost will be payable by the Employer on this account.</p> <p>As mentioned against certain items, the test certificates for some of the items shall be reviewed and approved by the main Bidder or his authorized representative and the balance have to be approved by the Employer.</p> <p>The schedule of conduction of type tests/ submission of reports shall be submitted and finalized during pre-award discussion.</p> <p>For the type tests to be conducted, Contractor shall submit detailed test procedure for approval by Employer. This shall clearly specify test setup, instruments to be used, procedure, acceptance norms (wherever applicable), recording of different parameters, interval of recording precautions to be taken etc. for the tests to be carried out.</p> <p>The Bidder shall indicate in the relevant BPS schedule, the cost of the type test for each item only for which type tests are to be conducted specifically for this project. The cost shall only</p>			
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2	PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS	PAGE 1 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS	<div>एनटीपीसी</div> <div>NTPC</div>																									
2.00.00	be payable after the respective type tests are conducted in presence of authorized representative of Employer. If a test is waived off, then the cost shall not be payable.																										
	<p>SPECIAL REQUIREMENT FOR SOLID STATE EQUIPMENTS/ SYSTEMS</p> <p>The minimum type test reports, over and above the requirements of above clause, which are to be submitted for each of the major C&I systems shall be as indicated below:</p> <p>i) Surge Withstand Capability (SWC) for Solid State Equipments/ Systems</p> <p>All solid state systems/ equipments shall be able to withstand the electrical noise and surges as encountered in actual service conditions and inherent in a power plant. All the solid state systems/ equipments shall be provided with all required protections that needs the surge withstand capability as defined in ANSI 37.90.1/ IEEE-472. Hence, all front end cards which receive external signals like Analog input & output modules, Binary input & output modules etc. including power supply, data highway, data links shall be provided with protections that meets the surge withstand capability as defined in ANSI 37.90.1/ IEEE-472. Complete details of the features incorporated in electronics systems to meet this requirement, the relevant tests carried out, the test certificates etc. shall be submitted along with the proposal. As an alternative to above, suitable class of EN 61000-4-12 which is equivalent to ANSI 37.90.1/ IEEE-472 may also be adopted for SWC test.</p> <p>ii) Dry Heat test as per IEC-68-2-2 or equivalent.</p> <p>iii) Damp Heat test as per IEC-68-2-3 or equivalent.</p> <p>iv) Vibration test as per IEC-68-2-6 or equivalent.</p> <p>v) Electrostatic discharge tests as per EN 61000-4-2 or equivalent.</p> <p>vi) Radio frequency immunity test as per EN 61000-4-6 or equivalent.</p> <p>vii) Electromagnetic Field immunity as per EN 61000-4-3 or equivalent.</p> <p>Test listed at item no. v, vi, vii, above are applicable for electronic cards only as defined under item (i) above.</p>																										
3.00.00	<p>TYPE TEST REQUIREMENT FOR C&I SYSTEMS</p> <table><tr><th>Sl. No</th><th>Item</th><th>Test Requirement</th><th>Standard</th><th>Test To Be Specifically Conducted</th><th>NTPC's Approval Req. On Test Certificate</th></tr><tr><th>Col 1</th><th>Col 2</th><th>Col 3</th><th>Col 4</th><th>Col 5</th><th>Col 6</th></tr><tr><td>1</td><td>Elect. Metering instruments</td><td>As per standard (col 4)</td><td>IS-1248</td><td>No</td><td>Yes</td></tr><tr><td>2</td><td>Thermocouple</td><td>Degree of protection test</td><td>IS-2147</td><td>No</td><td>No</td></tr></table>	Sl. No	Item	Test Requirement	Standard	Test To Be Specifically Conducted	NTPC's Approval Req. On Test Certificate	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	1	Elect. Metering instruments	As per standard (col 4)	IS-1248	No	Yes	2	Thermocouple	Degree of protection test	IS-2147	No	No		
Sl. No	Item	Test Requirement	Standard	Test To Be Specifically Conducted	NTPC's Approval Req. On Test Certificate																						
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6																						
1	Elect. Metering instruments	As per standard (col 4)	IS-1248	No	Yes																						
2	Thermocouple	Degree of protection test	IS-2147	No	No																						
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2	PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS	PAGE 2 OF 6																							

CLAUSE NO.	TECHNICAL REQUIREMENTS					
	3	RTD	As per standard (col 4)	IEC-60751	No	No
	4	Electronic transmitter	As per standard (col 4)	BS-6447 / IEC-60770	No	Yes
	5	E/P converter	As per standard (col 4)	Mfr. standard	No	Yes
	6	Instrumentation Cables Twisted & Shielded				
		-Conductor	Resistance test	VDE-0815	No	Yes
			Diameter test	IS-10810	No	Yes
			Tin Coating test (Persulphate test)	IS-8130	No	Yes
		-Insulation	Loss of mass	VDE 0472	No	Yes
			Ageing in air ovens**	VDE 0472	No	Yes
			Tensile strength and elongation test before and after ageing**	VDE 0472	No	Yes
			Heat shock	VDE 0472	No	Yes
			Hot deformation	VDE 0472	No	Yes
			Shrinkage	VDE 0472	No	Yes
			Bleeding & blooming	IS-10810	No	Yes
		-Inner sheath***	Loss of mass	VDE 0472	No	Yes
			Heat shock	VDE 0472	No	Yes
			Cold bend/ cold impact test	VDE 0472	No	Yes
			Hot deformation	VDE 0472	No	Yes
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2		PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS	PAGE 3 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS					
		Shrinkage	VDE 0472	No	Yes	
	-Outer sheath	Loss of mass	VDE 0472	No	Yes	
		Ageing in air ovens**	VDE 0472	No	Yes	
		Tensile strength and elongation test before and after ageing**	VDE 0472	No	Yes	
		Heat shock	VDE 0472	No	Yes	
		Hot deformation	VDE 0472	No	Yes	
		Shrinkage	VDE 0472	No	Yes	
		Bleeding & blooming	IS-10810	No	Yes	
		Colour fastness to water	IS-5831	No	Yes	
		Cold bend/ cold impact test	VDE-0472	No	Yes	
		Oxygen index test	ASTMD-2863	No	Yes	
		Smoke Density Test	ASTMD-2843	No	Yes	
		Acid gas generation test	IEC-60754-1	No	Yes	
	-fillers	Oxygen index test	ASTMD-2863	No	Yes	
		Acid gas generation test	IEC-60754-1	No	Yes	
	-AL-MYLAR shield	Continuity test		No	Yes	
		Shield thickness		No	Yes	
		Overlap test		No	Yes	
	-Over all cable	Flammability Test	IEEE 383	No	Yes	
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2		PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS		PAGE 4 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS					<div>एनटीपीसी NTPC</div>
			Swedish Chimney Test	SEN 4241475	No	Yes
			Noise interference	IEEE Transactions	No	Yes
			Dimensional checks	IS 10810	No	Yes
			Cross talk	VDE-0472	No	Yes
			Mutual capacitance	VDE-0472	No	Yes
			HV test	VDE-0815	No	Yes
			Drain wire continuity		No	Yes
	* For Drain wire only					
	**These tests shall be carried out as per VDE0207 Part 6 & ASTM-D-2116 for TEFLON insulated & outer sheathed cables					
	***Applicable for armoured cables only					
	7	DC Power Supply System The Type Test reports for offered rectifier module and the controller module irrespective of the rectifier bank shall be acceptable				
			Degree of Protection	IS-13947 or equivalent	No	Yes
			Dry Heat Test	IEC-68-2-2 or equivalent	No	Yes
			Damp Heat test	IEC-68-2-3 or equivalent	No	Yes
			Vibration test	IEC68-2-6 or equivalent	No	Yes
			Electromagnetic field immunity	EN 61000-4-3 or equivalent	No	Yes
			Radio frequency immunity test	EN-61000-4-3 or equivalent	No	Yes
			Electrostatic discharge test	EN 61000-4-2 or equivalent	No	Yes
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2		PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS	PAGE 5 OF 6	

CLAUSE NO.	<div style="text-align: right;">  </div> TECHNICAL REQUIREMENTS					
			Surge Withstand Capability(SWC)	ANSI 37.90.1/ IEEE-472,EN 61000-4-12	No	Yes
	8	Battery	As per standard	IS-10918	No	Yes
	9	Voltage Stabiliser	Over Load Test	Approved procedure	No	Yes
			Temp rise test without redundant fans	Approved procedure	No	Yes
			Input voltage variation test	Approved procedure	No	Yes
	10	DDCMIS				
		BMS	Safety requirements	VDE0116 Sec 8.7	No	Yes
	11	Conductivity Type Level Switch	Degree of protection test	IS-2147	No	No
	12	Local Gauges	Degree of protection test	IS-2147	No	No
	13	Process actuated Switches	Degree of protection test	IS-2147	No	No
	14	Control Valves	CV test	ISA 75.02	No	Yes
	15	PLCs	As per standard	IEC 1131	No	No
	16	LIE / LIR	Degree of protection test	IS-2147	No	Yes
	17	Flue gas O2 analyser, other Flue Gas analysers	Degree of protection test	IS-2147	No	Yes
	18	Flow Nozzle Orifice plates	Calibration	ASME PTC BS 1042	No	Yes
	<p>Note:</p> <p>Type Tests are to be conducted only for the items, which are being supplied as a part of this Package.</p>					
LARA STPP (2x800MW) / DARLIPALI STPP-I (2 x 800MW) / GAJMARA STPP-I (2x 800MW) / KUDGI STPP-I (3 x 800MW) STEAM GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI BID DOC NO.: CS-9548/ 9549/ 9566/ 9573-102-2		PART - B SUB-SECTION-IV:19 TYPE TESTS REQUIREMENTS	PAGE 6 OF 6

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES				<div>एनटीपीसी NTPC</div>
9.00.00	CONTROL AND INSTRUMENTATION FOR PLANT AUXILIARY SYSTEMS				
9.01.00	Instrumentation and Control System with interlocks, protection and annunciation of the mechanical common auxiliary systems as mentioned below shall be provided. All necessary equipments/system for control, monitoring and operations of the plants as well as the incomers and bus couplers shall be provided.				
9.02.00	For certain plants, facility for control from DDCMIS shall be provided as mentioned below:				
	SI No	Auxiliary Plant	Control System	Connectivity/operation	
	01	Auxiliary Boiler (if applicable)	Independent control system in SG-C&I hardware	Dual two way Ethernet connectivity to Station LAN for information	
	02	Fuel Oil Pressurization/ Heating System (FOPH) & Fuel oil unloading system	Independent control system in SG-C&I based Hardware. I/O count for Fuel oil unloading system is 200 binary and 20 analogs.	Dual two way Ethernet connectivity to station LAN for information and control. Local operation of Fuel oil Handling System through GIU.	
	03	Mill Reject System (Unitised System)	SG C&I Based Control System from Control Room	Graphical interface unit (GIU) based local operation apart from CCR.	
	04	Air Compressor System including Air-Compressors of Mill Reject System	<p>If the controller is integral to compressor, then Microprocessor/ PLC based control system along with suitable operator interface as per vendor's practice for individual Air compressors control.</p> <p>If the controller for individual compressors is not integral to compressor then control shall be through SG-C&I</p> <p>For both the cases, over all Control shall be through SG-C&I</p>	Two way Ethernet Connectivity to SG-C&I for information and overall Control of Air Compressors. (Applicable only for compressors with integral controllers)	
	05	LP Dosing and Oxy-genated treatment	Control from BOP-C&I under Station C&I package(in Employer's scope).		
	06	Equipment Cooling Water System	Control from BOP-C&I under Station C&I Package		
LARA SUPER THERMAL POWER PROJECT (2x 800MW) STEAM GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-9548-102-2		PART-A SUB-SECTION-III:C CONTROL AND INST. SYSTEM	PAGE 7 OF 8

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES						एनटीपीसी NTPC
	Sl no	Item name	Unit	DDCMIS BASED			Remarks
	2.3	Programming station	Nos.	1 in CER, One in Programmer Room		-	If system documentation facility is not part of this station, separate workstations shall be provided for the same.
	2.4	Information Work Stations (only for Alternative 2)	Nos.	2	1*	1*	* The function of Information Workstations can be merged with each of the OWS
	2.5	Large Video Screens(LVS)	Nos.	NIL	NIL	NIL	
	2.6	Work Station for LVS	Nos.	3	NIL	NIL	Including that for flame camera.
	2.7	Suitable redundant interfaces and redundant links for connectivity between Unit LAN, stationwide LAN, and DDCMIS sub systems, unit / station PLCs, PC stations, PADO, Remote Service Centre as applicable.	sets	1	1	1	Each set will include components for respective remote I/O & FGs.
	2.8	Control System Programming device including EPROM Writer/eraser etc. (if applicable.)	Nos.	2	1	1	This item is not required in case not applicable.
	2.9	Data Communication System		On as required basis.	On as required basis.	On as required basis.	
	2.10	Remote Service centre hardware		On as required basis.			
	2.11	Graphical Interface Unit (10")	Nos	1 no for local operation of Mill Reject system (unitised part)	1 no in Fuel Oil Unloading station for local operation		
	3	Printers					
	3.1	Laser jet colour printer (A4 size)		1	1	1	
LARA SUPER THERMAL POWER PROJECT (2x 800MW) STEAM GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI BID DOC.NO:CS-9548-102-2		PART-A SUB-SECTION-III:C APPENDIX - I		PAGE 10 OF 13



1. FOR CONTRACT QUANTITIES, REFER SUBSECTION DDCMIS, SECTION VI, PART-B AND APPENDIX-I TO PART-B OF TECHNICAL SPEC.
2. CONTROL SYSTEM CABINETS REFER DRG. NO. 0260-102-POI-A-009 FOR FUNCTIONAL GROUPING.
3. HARDWIRED SIGNAL EXCHANGE (TYP.).
4. THE SKETCH IS ONLY INDICATIVE. FOR DETAILED PROGRAMMER STATION REQUIREMENT, REFER SUBSECTION DDCMIS.
5. ~~FULL FUNCTIONAL GROUPS SHALL ALSO BE PLACED IN REMOTE FOR AREAS MENTIONED IN APPENDIX TO DRG.~~

FOR TENDER PURPOSE ONLY

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ENGINEERING DIVISION

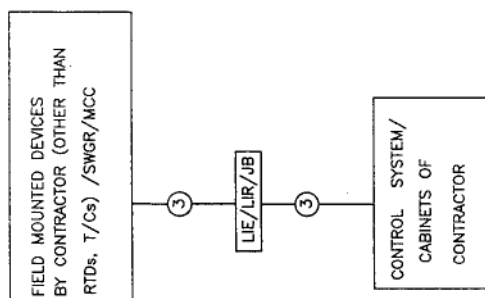
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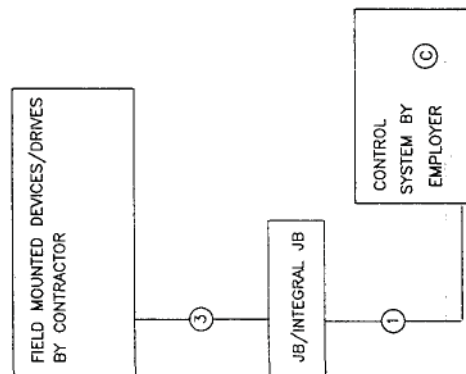
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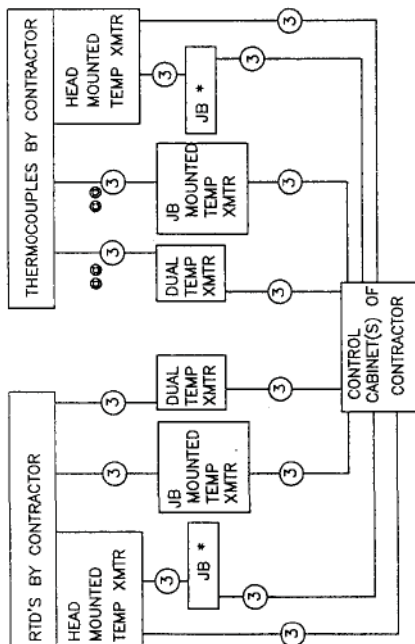
BOTH INSTRUMENTS/DEVICES AND CONTROLS IN CONTRACTOR SCOPE



CONTRACTOR'S INSTRUMENTS/DEVICES USED IN EMPLOYER'S CONTROL SYSTEM



CONTRACTOR'S RTD & THERMOCOUPLES AND TEMP TRANSMITTERS USED IN CONTRACTOR'S CONTROL SYSTEM



NOTES

- ③ --- EMPLOYER'S SCOPE
- --- WHEREVER APPLICABLE
- 1- CABLES IN EMPLOYER'S SCOPE
- 3- CABLES IN CONTRACTOR'S SCOPE
- ③ --- COMPENSATING CABLES
- ← X → --- SOFT LINKS

A	REV. NO.	DESCRIPTION	DESIGN DRG.	M	E	C	ARCH.	APPD.	DATE

CLEARED BY

एन टी पी सी
NTPC

NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT

TYPICAL THERMAL POWER PROJECT
SG PACKAGE

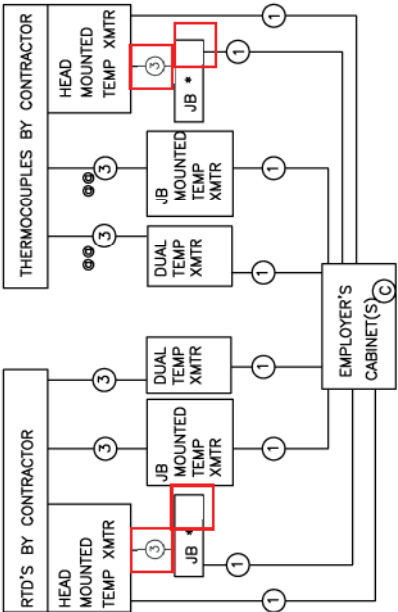
TITLE
INSTRUMENTATION CABLING DIAGRAM

SIZE	SCALE	DRG. NO.	REV. NO.
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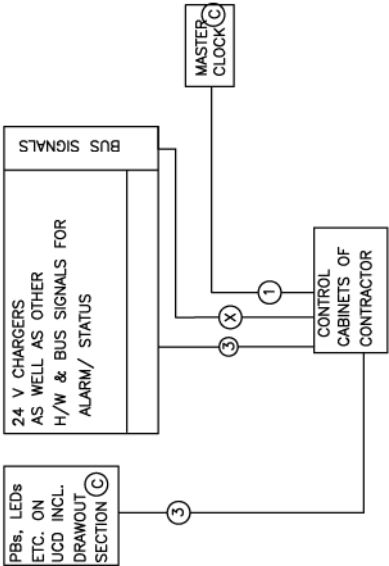
SH 1 OF 4

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CONTRACTOR'S RTD & THERMOCOUPLES AND TEMP TRANSMITTERS
USED IN EMPLOYER'S CONTROL SYSTEM



CONTROL DESK MOUNTED DEVICES AND OTHER MISC
SIGNALS INCLUDING ALARM/ STATUS SIGNALS ETC.



NOTES

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- * --- WHEREVER APPLICABLE
- 1- CABLES IN EMPLOYER'S SCOPE
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A	REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	ARCH.	APPD.	DATE

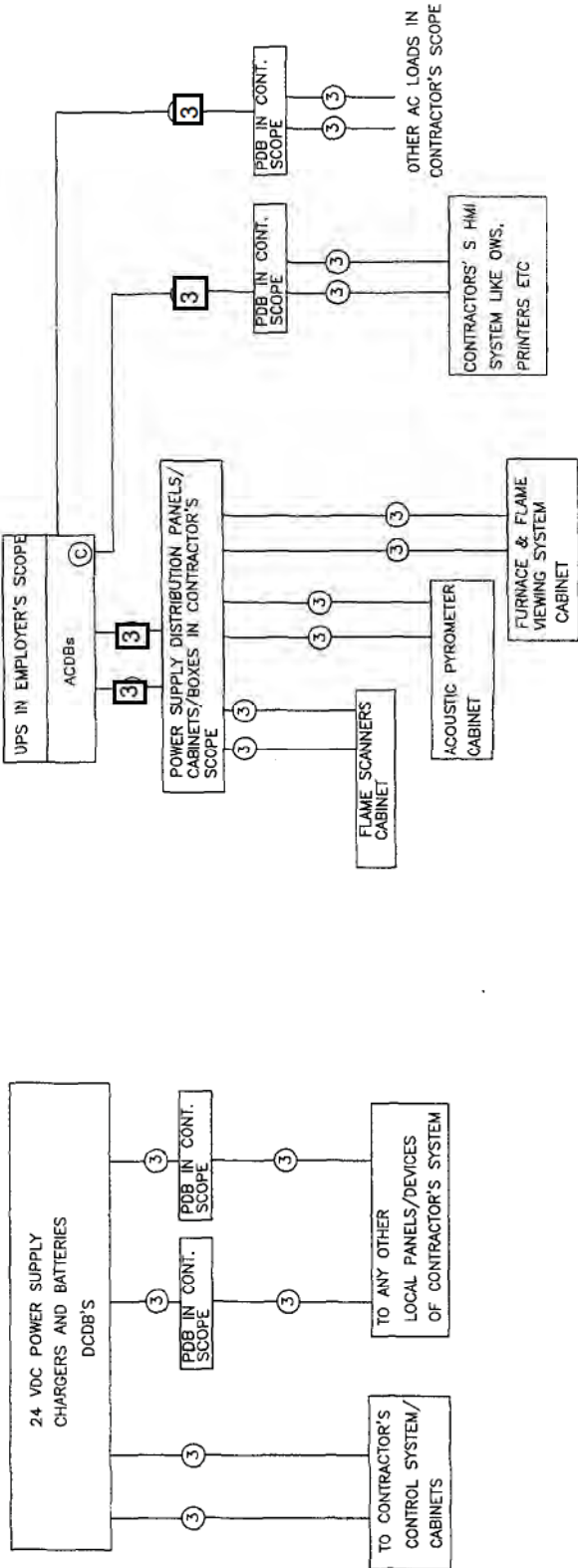


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**TYPICAL THERMAL POWER PROJECT
SG PACKAGE
INSTRUMENTATION CABLING DIAGRAM**

SIZE	SCALE	DRG. NO.	REV. NO.
A4	NTS	0000-101/102-POI-A-021	A
			SH 2 OF 4

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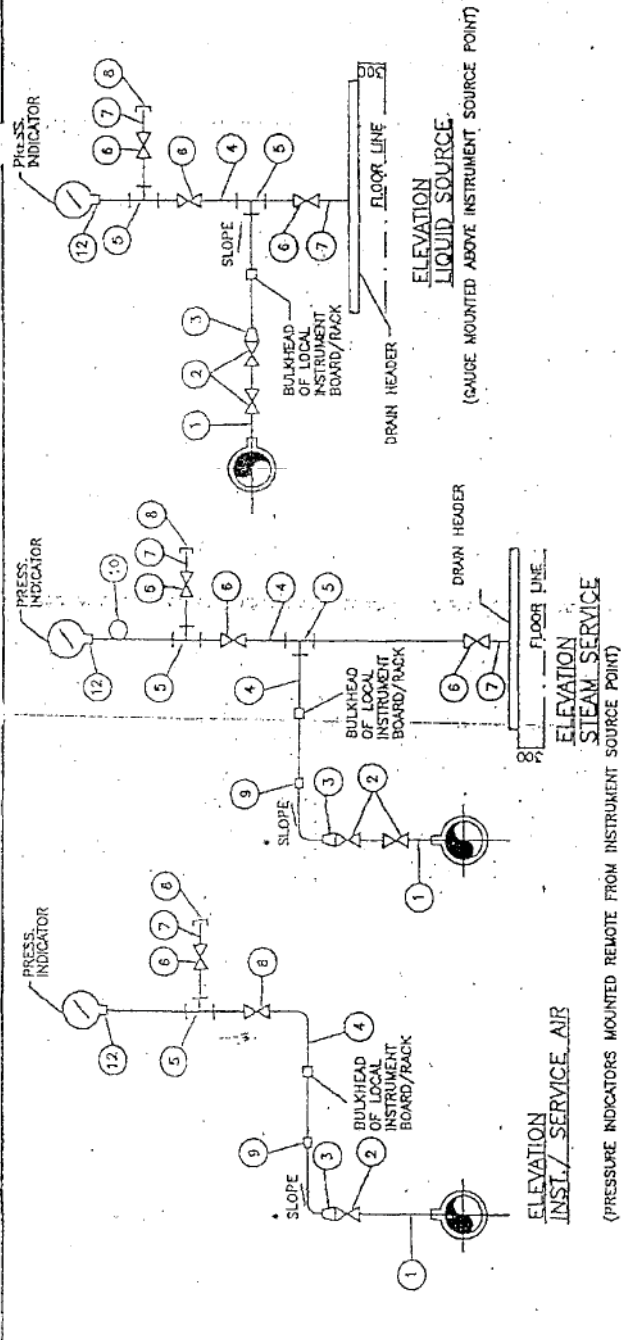
NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT
SG PACKAGE
INSTRUMENTATION CABLING DIAGRAM

SIZE	SCALE	DRG. NO.	REV. NO.
A4	NTS	0000-101/102-POL-A-021	A

LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	1/2" x 3/4" 1" NPS SCH 40/80/160/XS/P81 (AS PER PROCESS REQUIREMENT) NIPPLE OF MATERIAL SAME AS THAT OF MAIN PIPE.
2.	1/2" x 3/4" 1" SW GLOBE VALVE/GATE VALVE
3.	3/4" x 1" x 1/2" SW REDUCING INSERT
4.	1/2" x 3/4" PIPE
5.	1/2" x 3/4" SW EQUAL TEE
6.	1/2" x 3/4" SW GLOBE VALVE
7.	1/2" x 3/4" NPS SW x 1/2" / 3/4" NPT(M)
8.	CARBON/ALLOY STEEL NIPPLE
9.	1/2" x 3/4" NPT(F) CS CAP.
10.	1/2" x 3/4" PIPE UNION
11.	5" SS SYPHON
12.	1/2" BLIND 3000# RF ANSI FLANGE DRILLED AND TAPED FOR 1" NPT PIPE
13.	SUITABLE ADAPTER
14.	1/4" CHROME MOLY STEEL TUBE
15.	1" x 3/4" SW EQUAL TEE
16.	DIAPHRAGM(WAFER ELEMENT)
17.	ISOLATION VALVE 316 SS, 1/4" SW



NOTES:-

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/FORCE FITTINGS SHALL CONFORM TO ANSI-B16-11.
3. INSTRUMENTS VALVES BODY STEEL MATERIAL AND PRESSURE CLASS SHALL BE AS PER TECHNICAL SPECIFICATIONS.
4. FOR BOILER AIR/FUE 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. 40 MM / METRE.

FOR TENDER PURPOSE ONLY

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NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT
(SG PACKAGE)

TITLE
INSTRUMENT INSTALLATION DIAGRAM
(FOR PRESSURE GAUGE)

REV. NO.	SIZE	SCALE	DRG. NO.	REV. NO.
A	A3	N.T.S.	0000-101-POI-A-022	A

REV. NO.	DESCRIPTION	DATE	APPD.	CHKD.	ARCH.	CLEAR BY
A	FIRST ISSUE	25.04.06				

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LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	42 X 405 MM M.S. BLACK PIPE
2.	M42X2 TO 3/4" REDUCING INSERT
3.	M42X2(F) M.S. CAP
4.	3/4" SW GLOBE VALVE/GATE VALVE
5.	3/4" NPS PIPE
6.	3/4" NPS SW 3/4" NPT(M) CS/AS NIPPLE
7.	3/4" SW EQUAL TEE
8.	3/4" NPS SCH 80 CARBON/ALLOY STEEL NIPPLE
9.	3/4" NPT(F) CS/AS CAP
10.	3/4" SW CS/AS EQUAL CROSS
11.	1/2" TUBE ADAPTER
12.	3 VALVE MANIFOLD
13.	3/4" PIPE UNION
14.	2 VALVE MANIFOLD
15.	3/4" SW 4 WAY VALVE
16.	QUICK DISCONNECT FITTING
17.	3/4" SW 1/2" SW BRANCH TEE
18.	1/2" NB SEAMLESS GI PIPE
19.	1/2" NPT (F) GI FITTING
20.	SS TUBE
21.	FLEXIBLE HOSE WITH ONE END SOCKET WELDED (PIPE SIDE) & OTHER END WITH SUITABLE FITTINGS
22.	3/4" x 1/2" S.S. TUBE UNION

NOTES:--

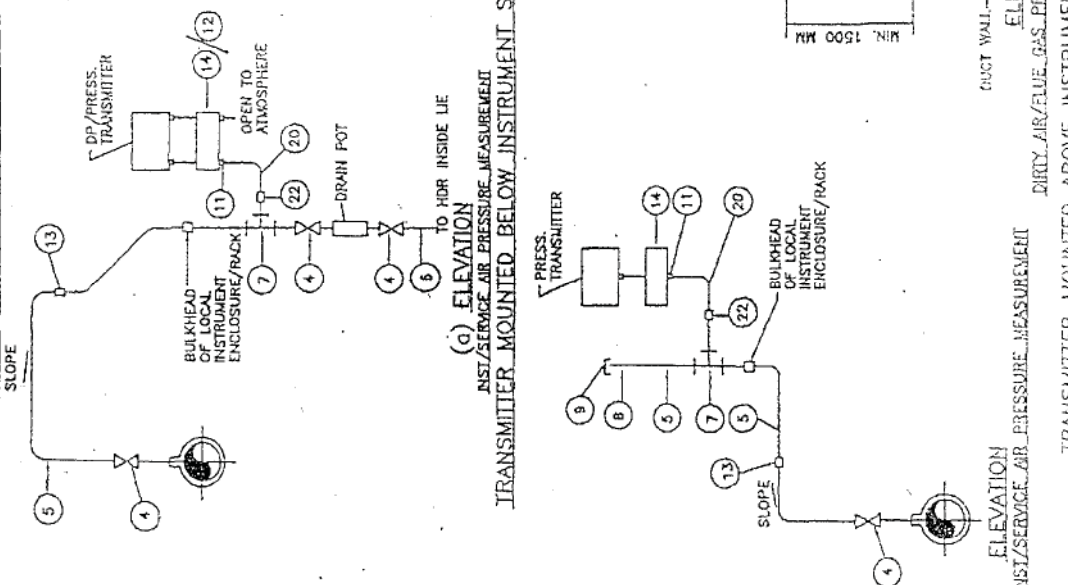
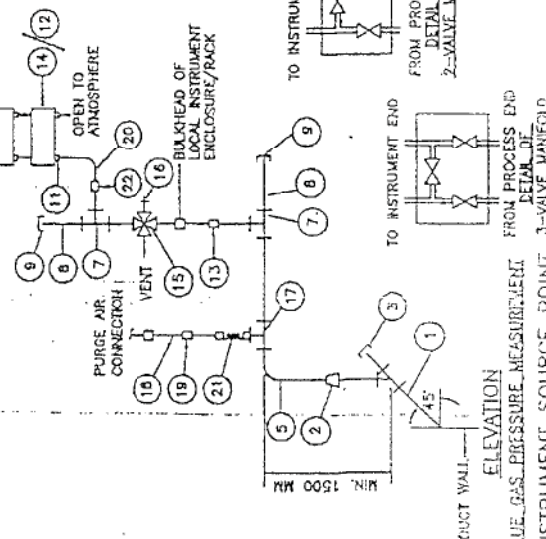
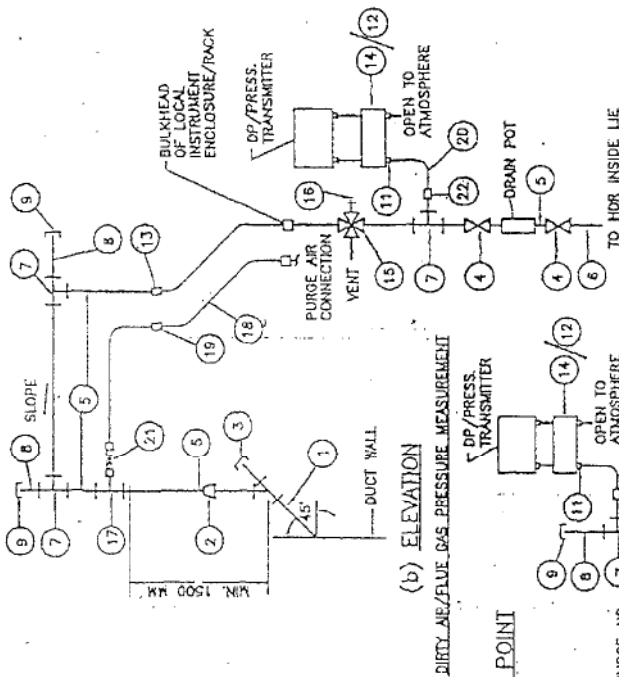
1. SEE NOTES UNDER DRG. NO.0000-101-POI-A-022.
2. IMPULSE LINE DRAIN CONNECTIONS SHALL BE DONE AS PER TECHNICAL SPECIFICATIONS
3. THE SLOPE IN THE HORIZONTAL OF THE IMPULSE PIPE SHALL BE APPROX. 50 mm/mtr.
4. THE EXACT ORIENTATION OF THE TRANSMITTERS WITH RESPECT TO VALVE MANIFOLDS ETC. WILL BE FINALISED DURING DETAILED ENGINEERING KEEPING IN VIEW THE MANUFACTURER'S RECOMMENDATIONS.
5. COMMON INSTRUMENT AIR HEADER (1"NB) USING REDUNDANT AIR FILTER REGULATORS WILL BE MADE IN EACH TRANSMITTER ENCLOSURE REQUIRING PURGE AIR. PURGE AIR FOR EACH INSTRUMENT LINE SHALL BE TAPPED FROM THIS HEADER USING INDIVIDUAL PURGE ROTAMETERS AS SHOWN IN DRG. NO. 0000-101-POI-A-034 TYPICALLY.

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NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT
(SG PACKAGE)

PROJECT	INSTRUMENT INSTALLATION DIAGRAM
TITLE	(PRESSURE MEASUREMENT USING PRESS / DP TRANSMITTERS (INST./SERVICE, DIRTY AIR/FLUE GAS))
SIZE	A3
SCALE	N.T.S.
DRG. NO.	0000-101-POI-A-023
REV. NO.	A



TRANSMITTER MOUNTED ABOVE INSTRUMENT SOURCE POINT

REV. NO.	A
DESCRIPTION	
DATE	26.04.05
APPROVED BY	
CHECKED BY	
DESIGNED BY	
DRAWN BY	
SCALE	N.T.S.
SIZE	A3
DRG. NO.	0000-101-POI-A-023
REV. NO.	A



TITLE:
**TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

VOLUME **II-B**

SECTION -D

REV. NO. 00

DATE: 04/10/2013

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VOLUME – II B

SECTION-D

STANDARD TECHNICAL REQUIREMENTS



TITLE:
**TECHNICAL SPECIFICATION FOR
AIR RECEIVER**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

VOLUME **II-B**

SECTION -D

REV. NO. 00

DATE: 04/10/2013

Page

1.0 GENERAL

This standard specification covers the design, material of construction, features, manufacture, inspection & testing at VENDOR'S and/or his sub-vendors' works, suitable painting and packing requirements of air receiver

2.0 CODES & STANDARDS

As far as possible, the design, manufacture and performance of air receivers shall be in accordance with the latest applicable Indian/British/American/DIN standards.

The latest editions of the following shall be followed in particular:

IS: 2825 – Code for unfired pressure vessels

ASME – Section-VIII, Division-1

BS – 487-Fusion welded steel air receivers

IS: 7938 – Air receivers for compressed air installation

The materials of the various components shall conform to applicable IS/BS/ASTM/DIN standards.

3.0 DESIGN AND CONSTRUCTION

3.1 The air receivers shall be vertical self-supporting cylindrical vessels with supporting stands for resting on the civil foundation.

3.2 Other design parameters and design internal pressure of the receiver shall be as per the data specification sheet, if any, enclosed. The receiver shall be designed as per IS:7938.

3.3 Receivers shall be of welded construction with a minimum number of joints. Longitudinal seams in adjacent section of shell shall not be in the same line.

3.4 Receivers shall be provided with gasket inspection openings. Receivers below 500 mm diameter shall have at least two inspection holes. For receivers of larger diameter, manhole of minimum 450 mm diameter shall be provided. These openings shall be placed as far as possible from any welded seam and in no instance shall pierce any seam.

3.5 All welding shall be performed in accordance with relevant codes. Filler material that will deposit weld metal with a composition and structure as near as that of the material being welded shall be used. All welding electrodes shall be got approved by the Owner. The electrodes shall be

BHEL – PS - PPEI: NOIDA, SECTOR-16A, U.P. – 201301



TITLE:
**TECHNICAL SPECIFICATION FOR
AIR RECEIVER**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

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dried in ovens immediately before use to ensure freedom from porosity. All the circumferential and longitudinal butt welds of the air receiver shall be subjected to spot radiography. Tee joints and dished welding shall be subjected to 100% radiography.

- 3.6** All other welding on the air receiver, including fillet weld and nozzle connection shall be DP tested as per IS: 2825 (Para 8.7.11).
- 3.7** Each finished receiver complete with all welded attachments shall be hydraulically tested at 150% of the design pressure. The test pressure shall be maintained for at least 30 minutes. All joints shall be gentle hammered during the test.
- 3.8** Receivers shall be provided with relief valve of the capacity and set pressure of the same at least 10% above working pressure. The spring in the relief valve in service for pressure up to and including 250 psi shall not be reset for any pressure more than 10% above or below the design set pressure. For higher pressures, the spring shall not be reset for any pressure more or below 5% design set pressure.
- 3.9** Each air receiver shall be complete with drain connection of 25 mm NB with a trap station consisting of a trap, strainer, isolation and bypass valves.
- 3.10** The receiver shall be provided with necessary number of nozzles. The orientation of the nozzles shall be subjected to the approval of the Owner.
- 3.11** Local instruments like pressure gauge, switch and temp. gauge of suitable range shall be supplied. Please refer specification for conveying air compressor for other instrumentation required.
- 3.12** The vendor will have all welding procedures & welders qualified in accordance with the relevant codes prior to commencing any welding at the works. These tests shall be witnessed by customer/client representative.



TITLE:
**TECHNICAL SPECIFICATION FOR
CHAIN PULLEY BLOCK & MONORAIL**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

VOLUME **II-B**

SECTION -D

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1.0.0 GENERAL

This specification covers the design, manufacture, assembly, inspection and testing at manufacturer's and/or his sub-constructor's works of hand operated chain pulley block.

2.0.0 CODES AND STANDARDS

The design, manufacture, inspection and testing and performance of hand operated chain pulley blocks shall confirm to latest editions of the following standards: -

- a) IS: 3832 Specification for hand operated chain pulley block
- b) IS 807: Codes of Practice for Design, Manufacture, Erection and Testing (Structural Portion) of cranes and hoists
- c) IS: 3109(Part II) Calibrated load chain for pulley blocks and other lifting appliances
- d) IS: 2429(Part II) Calibrated hand chain for pulley blocks and other lifting appliances
- e) IS: 4460 Method for rating of machine cut spur and helical gears
- f) Material Specification IS or approved

3.0.0 EQUIPMENT

3.1.0 CHAIN PULLEY BLOCK

The block shall be so designed that all components shall withstand without failure, an application to the block of a load equal to at least four times the working load limit.

3.1.1 Frame

Frame shall be robust in design and of welded construction. The frame shall be selected in such a way that head room requirement is minimum. Frame shall maintain alignment under all expected conditions of services.



TITLE:
**TECHNICAL SPECIFICATION FOR
CHAIN PULLEY BLOCK & MONORAIL**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

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3.1.2 Chain

The load chain shall be electrically welded, accurately calibrated, and pitched and polished conforming to IS: 6216 Grade 80 as specified in data sheet 'A'.

The hand chain shall also be electrically welded, calibrated, pitched and polished and shall conform to IS: 2429 (Part II) grade 30. The length of chain and link dimension shall be as per IS: 3832.

3.1.3 Hook

The forged hook shall be properly heat-treated and so designed that in loaded condition, it is free to swivel without twisting the load chain.

3.1.4 Reduction Gear

The reduction gear shall be spur or worm/worm wheel type. The spur gear and worm shall be of high-grade carbon steel and heat treated. The worm wheel shall be of bronze. A detachable steel cover shall be provided for total enclosure of the gear train and ample lubrication to be provided.

3.1.5 Brakes

Brakes shall be of screw friction disc type self-actuating or any other approved type as per manufacturer's standard practice. Brake capacity shall be ample and humid atmosphere shall not affect materials used. The brake shall prevent self lowering of load and arrest and sustain load in all working positions. The load brake shall also allow smooth lowering of the load without serious overheating which may impair sufficient working of block

3.1.6 Bearing

Bearing used shall be as per guidelines laid down in IS: 3832.

3.1.7 Wheel

The load chain wheel shall be made of heavy duty malleable casting and shall be designed to ensure, effective operation of the chain. Load chain, wheel shall be mounted on two ball bearings. Hand chain wheel shall be made from malleable casting/pressed sheet steel. The idler wheel shall be so shaped as to avoid the twisting of the chain during operation. The P.C.D of idler wheels shall be such that the bending action of the link is avoided. The hand chain wheel shall be provided with flanges and designed to ensure effective operation with hand chain.



TITLE:
**TECHNICAL SPECIFICATION FOR
CHAIN PULLEY BLOCK & MONORAIL**

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3.1.8 Other components

All other components of chain pulley block such as anchorage, guide, pawl, stripper etc. shall be designed and provided as per IS: 3832.

3.2.0 MONORAIL TROLLEY

Monorail trolley shall be provided if called for in the enclosed Data Sheet—A. Monorail trolley frame shall be of heavy section rolled steel, held together by bolts. Wheels shall be of high grade cast iron mounted on ball bearings. Axles and shafts shall be of carbon steel, accurately machined and suitably supported. The trolley shall be suitable for variations in I section beams. The trolley shall be geared travel type.

The hand chain required for trolley travel shall be as per clause 3.1.2 of this specification.

Hand chain wheel shall be as per clause 3.1.7 of this specification.

4.0.0 INSPECTION AND TESTING

The scope of inspection shall include but not limited to the following:

- Material identification/co-relation for important items like hook, load chain, hand chain, wheels, nut and pawl etc.
- Hardness for pawl and ratchet
- Dye penetration test for hooks
- Operational test including operational effort, velocity ratio etc,
- Proof load test up to 1.5 times of working load limit.
- Dimensional check of hook
- Marking

DATASHEET

S. No.	Parameter	Description
1	Capacity (In Kg)	Suitable for lifting the heaviest load but not less than One (1) ton
2	Service condition	Class II outdoor
3	No. of CPB	
4	Lift (m)	To suit bunker height and equipment on bunker roof top to be handled.
5	Type of suspension	Travelling Trolley



TITLE:
**TECHNICAL SPECIFICATION FOR
CHAIN PULLEY BLOCK & MONORAIL**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

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6	Head Room	Minimum permissible
7	Type of gear in CPB	Spur Gear
8	Type of bearing	Ball/Roller
9	Grade of Load Chain	Alloy Steel /Gr 80
10	Grade of Hand Chain	Steel / Gr. 30
11	Factor of Safety	As per Relevant IS



TITLE:
**TECHNICAL SPECIFICATION FOR
CONVEYING AIR COMPRESSOR**

BHEL DOCUMENTS NO.: PE-TS-395-160-A001

VOLUME **II-B**

SECTION -D

REV. NO. 00

DATE: 04/10/2013

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1.0 GENERAL

This standard specification covers the design, material construction features, manufacture, inspection & testing at VENDOR'S and / or his sub vendors works suitable painting and packing requirements of air compressor with drive.

2.0 CODES & STANDARDS

2.1 The design, manufacture, inspection & testing of air compressor as specified hereinafter shall comply with the requirements of the latest applicable Indian/British American Standards. The following standards/codes shall be following in particular.

- a) IS:5456 Code of practice for testing of positive displacement type air compressors and exhauster.
- b) IS:5727 Glossary of terms relating to compressors and exhauster.
- c) IS:6206 Guide for selection, installation and maintenance of air compressors.

2.2 The material of various components shall conform as specified in Data Sheet-A and where not specified, the material shall conform to the applicable IS / BS / ASTM / DIN Standards.

2.3 In case of any conflict between the above mentioned standards / codes and specification, the stipulations in the technical specification shall prevail. In case of any further conflict the same shall be referred to purchaser's engineer for clarification whose decision shall be final & binding.

3.0 DESIGN AND CONSTRUCTION

3.1 Air Compressors of reciprocating type shall be designed for continuous operation to satisfy the conveying air requirement for fail safe operation.

3.2 The design, manufacture and performance of air compressors shall comply with the requirements of latest applicable Indian / British American / DIN standards.

3.3 The compressors shall be water cooled, non lubricated type along with all accessories as specified in the data sheet - A. Intercoolers/ aftercoolers, if provided, shall also be of water cooled, shell – tube construction.

3.4 The compressors shall be designed to ensure trouble free operation with min. vibration and noise. Multiple cylinders, if employed, shall be arranged in such a way as to ensure min. unbalance.

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- 3.5** The wall thickness of the compressor cylinder shall be selected to withstand highest internal pressure and at the same time shall allow a number of reborings.
- 3.6** The crank case shall be provided with oil level dip stick, breather and drain plug.
- 3.7** Any oil adhering to the piston rod shall be wiped-off by suitable wiper ring, suitable collars shall also be fixed on the piston rod between the packing and wiper rings so that any trickling oil flow can be stopped from moving towards the cylinder.
- 3.8** Suction and discharge valves shall be suitable for quick opening and closing in conformity with the rotating speed of the crank shaft. Valves shall have large effective areas permitting low air velocity along with cushioning arrangement to minimise shock. Valve discs shall be of stainless steel (containing 15% or more chromium) heat treated, tempered and ground. The valve seats, guides & springs shall be of hardened stainless steel.
- 3.9** Crankshaft, crank pin piston pin bearings shall be of antifriction or journal type depending on manufacturer's standard practice.
- 3.10** Splash or forced feed type of lubrication shall be provided for all bearings and sliding components.
- 3.11** The air receiver shall be sized that even in the event of total stoppage of air flow from the compressor, operation of conveying is not stopped for 2 cycle time duration.
- 3.12** Drive motor shall be connected to the air compressor directly or through V-belt or any other suitable type of power transmission system as specified in the data sheets. Shafts should be coupled through heavy-duty flexible coupling in case of direct drive.
- 3.13** The power rating of the drive shall be selected such that a min. margin of 15% is available over the total input power required at compressor drive shaft at the rated condition. Total input power shall include air compression power plus any power consumed in auxiliaries etc., (if any), when the driver is not directly coupled to compressor, due account shall be made for losses in power transmission in addition to the above 15% extra margin.

4.0 MATERIAL OF CONSTRUCTION

The material of construction for various parts of package air compressors shall be as follows:-

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- a) Compressor cylinder :CI ,IS- 210, grade FG-260
- b) Piston :Aluminum
- c) Piston rod :EN-8 as per BS -970
- d) Connecting rod :Forged steel as per IS-1875 CI IV
- e) Piston ring :Teflon with 25-30% carbon.
- f) Crank case :CI , IS-210 Grade FG-260
- g) Suction and delivery valves :S.S as per EN-56 of BS-970
- h) Air receiver :MS as per IS (2062)
- i) For other parts :As per latest IS/BS/ASTM/AIS/
equivalent standards depending upon the parts

5.0 INSTRUMENTATION AND ACCESSORIES

The conveying air compressor and drive shall be supplied completed with the following instrumentation and accessories as minimum.

- a) Discharge air pressure gauge
- b) Pressure switch to control actuation of compressor drive motor.
- c) Starter for drive motor.
- d) Pressure relief valve
- e) Drain valve
- f) Delivery valve

6.0 INSPECTION & TESTING

6.1 The manufacturer shall conduct all tests to ensure that the equipment finished shall conform to the requirements of this specification and in compliance with requirements of applicable codes & standard.

6.2 All materials used for conveying air compressor and drive shall be of tested quality. Materials shall be tested as per the relevant standards and test certificates shall be made available to the purchaser.

6.3 Test at Shop:

- a) All pressure parts shall be subjected to hydraulic testing at a pressure twice the maximum design pressure or 150% of design pressure whichever is more for a period not less than one (1) hour.
- b) Assembled receiver shall be hydraulically tested at a pressure twice the maximum working pressure or 150% of the design pressure and the test pressure shall be maintained for at least 30 minutes. All joints shall be gently hammered during the test.
- c) Pneumatic test at design pressure shall also be carried out.

7.0 PAINTING

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- 7.1** All parts of air compressors with drive shall be painted as specified in Data Sheet-A or as per the specification furnished elsewhere.
- 7.2** Before transportation of the equipment necessary cleaning, flushing etc, shall be done shop coats of rust inhibiting paints, lacquers etc., shall be applied to various parts as necessary.



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1.0 GENERAL

This specification covers the PURCHASER'S general requirement of design, materials, constructional features, manufacture, inspection and testing at VENDOR'S works and/or his sub vendor's works of Denseveyor, and accessories specified hereinafter.

2.0 CODES AND STANDARDS

2.1 The design, material, construction, manufacture, inspection and performance of the Transporter and accessories, shall comply with all statutory regulations and safety codes currently applicable in the locality where the equipment will be installed. The equipment shall also conform to the latest applicable Indian/British/USA/DIN Standards.

2.2 The material of construction and other works of the Transporter and accessories shall in general conform to the following standards/codes but will be subjected to any modification and requirement as specified in Section C of Technical Speciation.

- i) Transporter Vessel – Mild Steel to IS 2062 (Gr. A min); Construction as per IS-2825 / BS5500/ASME SEC-VIII, Div-1
- ii) Material Handling Valve – As indicated in Sec-C of the specification
- iii) Flange – MS as per ANSI B 16.5

2.3 Where the above standards are in conflict with the stipulations of this specification, this specification supersedes them. In case of any further conflict in this matter, the decision of the Engineer will be final and binding.

3.0 DESIGN REQUIREMENTS

3.1 The dense phase pneumatic conveying system shall be designed for low velocity for conveying of materials as indicated in Section C.

3.2 The system shall consist of dome shaped vessels made of Carbon Steel complete with pneumatically operated dome/metering valves capable of closing through a solid head of material to make a pressure tight seal.

3.3 The bottom of vessel shall have transition bend and a control air supply system to the side of the conveying vessel.

3.4 Airtight seal system shall be provided between the transporter and the feeding point.

3.5 Transporter shall be equipped with **air strainer** to prevent pipe scale /dirt from causing pressure regulator malfunctioning.



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3.6 Automatic drain filter and oil fog lubricator set shall be fitted into the air line to dome valve/metering valve for use with pneumatic controls.

3.7 Any air line stop valve fitted in the air supply line of transporter shall be of ball type to avoid any restriction to air flow, when open.

4.0 CONSTRUCTIONAL FEATURES

4.1 The transporter vessel shall be fabricated from mild steel plate to the design of vendor. The vessel shall be of welded structure and shall be provided with necessary supporting structure. The vessel shall be airtight/leak proof in fully assembled condition. Conveying vessel shall be designed and tested as per IS 2825 class-III vessel. Temperature of mill reject coming into the conveying vessel shall be considered as 200 °C. Conveying vessel shall be designed for a pressure 10% above the maximum pressure encountered in the vessel. The conveying vessel shall be constructed with tested quality mild steel plates. They shall withstand the abrasive & hot condition of the mill rejects and operating air pressure. The conveying vessel shall be supported independently on steel columns. The vessel shall have suitably located and adequately numbered air connections for supply of compressed air for conveying mill rejects through pipes to overhead bin.

4.2 Dome/Metering valve shall be of manufacturer's standard construction and will be easily openable and closeable type. All joints will be flanged with asbestos free or silicon rubber gaskets suitable for 200 °C.

4.3 All bends will be of long radius cast bends ($R = 5D$). Conveying pipes will be of mild steel heavy duty type.

5.0 TESTING AND INSPECTION

5.1 The purchaser shall have free access to those parts of manufacturer's works which are concerned with the fabrication of the steel work and shall be afforded with all reasonable facilities at all stages of preparation, fabrication and trial assemblies for satisfying himself that the fabrication is being undertaken in accordance with the provisions of this specification

5.2 Should any structure or part of a structure be found not to comply with any of the provision of this specification, it shall be liable to rejection. No structure or part of the structure, once rejected shall be resubmitted for inspection/test except in cases where the purchaser or his authorized representative considers the defect as rectifiable defects which may appear during fabrication shall be made with the consent of and according to the procedure laid down by the purchaser, the purchaser may, at his discretion, check the test results obtained at the manufacturer's works by independent tests at the Government test house or elsewhere, and should not be found to be unsatisfactory shall be rejected. The costs of such tests shall be borne by the contractor.



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5.3 Scope of inspection shall include but not limited to the following:

- i) Material used in the fabrication shall be with manufacturer's test certificate with proper correlation for physical properties and chemical analysis. In the absence of correlation actual tests shall be done.
- ii) Welders shall be qualified as per ASME Standard. Only qualified welders shall be employed for the fabrication purpose.
- iii) Electrodes shall be of makes approved by BHEL.
- iv) All fillet welds, root run and trial run of butt welds shall be subjected to visual dye penetrating test with no linear indication. Acceptable norm for dye-penetrating test shall be as per Appendix-8 of ASME SEC. VII Div. 1.
- v) Special tests like NDT as per relevant code will be carried out for fabrication items.
- vi) Chemical analysis and hardness tests of linear plates shall be carried out.
- vii) Dimension shall be maintained as per approved drawings.

DATA SHEET

S. No.	Parameter	Description
1	Quantity of material to be conveyed per hour by each denseveyor	900 Kg
2	Capacity of denseveyor envisaged	Adequately sized to meet above requirement
3	Air supply pressure available	Bidder to Decide
4	Any Cooling envisaged for dome valve & quantity of cooling water	Bidder to Decide
5	Distance over which material is to be conveyed	Refer Layout Drawings

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1.0 GENERAL

- 1.1 This specification covers the PURCHASER'S general requirement of design, manufacture, fabrication, assembly, inspection, testing and delivery to site or mill reject bunker and accessories specified.

2.0 CODES AND STANDARDS

- 2.1 The design, material, construction, manufacture, inspection, testing and performance of the mill reject bunker shall comply with all statutory regulations and all safety codes currently applicable in the locality where the equipment will be installed.

- 2.2 The material of construction and other works of the mill reject bunker shall in general conform to the following standards /codes but will be subject to any modification and requirements as specified in data sheet A of Section-D.

- | | | | |
|----|--|---|--------------------|
| a) | Structural steel | : | IS-2062 Gr A (min) |
| b) | Rolled Steel Beams, Channels and Angle Sections | : | IS-808 |
| c) | Scheme of Symbols for Welding | : | IS-813 |
| d) | Covered Electrodes for Metal Arc Welding of Structural Steel | : | IS-814 |
| e) | Code of practice for use of Metal Arc Welding for general Construction in Mild Steel | : | IS-816 |
| f) | Code of practice for inspection of Welds | : | IS-822 |
| g) | Code of practice for use of structural steel in general building construction | : | IS-800 |
| h) | Dimension for steel plate, sheet and Strip for structural and general Engineering purposes | : | IS-1730 |
| i) | Recommendation for metal arc welding | : | IS-9575 |

- 2.3 Where the above standards are in conflict with the stipulations of this specification, the specification supercedes them. In case of any further conflict in this matter, the decision of the ENGINEER shall be final binding.



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3.0 DESIGN REQUIREMENT

- 3.1 The coal mill reject bunker shall be fabricated of mild steel plate with adequate stiffeners welded on. The bunker shall be supported on the concrete foundation provided by the purchaser. Foundation bolts, gratings etc. shall be provided by the bidder.
- 3.2 The reject bunker shall be complete with twin sector discharge gate, stainless steel liners, flanged connections, platforms, gratings/chequered plates, access staircase, hand railings etc. The equipment shall be designed and equipped for outdoor operation, complete with all accessories.

4.0 CONSTRUCTIONAL FEATURES

- 4.1 The bunker shall be of welded structure and shall be provided with necessary supporting structure. Flanged opening shall be provided at the bottom of the bunker for attaching the twin sector gate. The inclined part of the bunker shall be designed with a valley angle of not less than 60 deg. To the horizontal. The design of the bunker shall be such that the problem of formation of arch is eliminated. The inside surface shall be provided with liner MOC as specified elsewhere in the specification. Explosion diaphragm/Pressure relief valve shall be provided to release air from the bunker in case pressure inside the bunker exceeds 1 .0 kg/cm²(g)
- 4.2 Vendor shall furnish all steel work required for support and access for operation and maintenance. This shall include platforms, grating/chequered plates, stairways, hand railings, base plates, foundation bolts etc. Purchaser will provide only the foundation with pockets. The bunker shall have shed over it and shall be provided with monorail & hoist for equipment handling.
- 4.3 The storage bunker shall be so arranged that any 10 ton capacity truck can be conveniently loaded under it by an operator standing on the platform. The bunker-supporting column shall be so spaced to have a clear road access of 5.0 m width & clear headroom of 5.5 m.
- 4.4 Access and platform shall be provided with 32 mm thick MS grating & 32 mm MS GI pipe hand railing.
- 4.5 The storage bunker shall be provided with filter bags as specified elsewhere in the specification. Filter bags shall be suitably treated to minimize the chances of filter catching fire. It shall be possible to plug opening for damaged bag filters, if any, to facilitate un-interrupted operation. Suitable explosion vents shall be provided for the bag filter unit. Sequential cleaning cycle shall be initiated with pressure drop signal across the bag filter once sufficient cleaning air pressure is available. Solenoid/pneumatic valves shall be provided for this purpose. Bag cleaning mechanism shall be automatic and



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shall comprise of solenoid valves. Air nozzles shall be provided just above the filter to facilitate individual cleaning of each bag.

- 4.6 The terminal boxes for terminating reject conveying pipes shall be of steel construction with necessary deflector or impingement plate to take care of impact and wear due to high velocity reject particles discharging into the bunker.

5.0 INSPECTION AND TESTING

- 5.1 The purchaser shall have a free access at all reasonable times to these parts of manufacturer's works which are concerned with the fabrication of the steel work and shall be afforded all reasonable facilities at all stages of preparation, fabrication and trial assemblies for satisfying himself that the fabrication is being undertaken in accordance with the provisions of this specification.
- 5.2 Should any structure or part of a structure be found not to comply with any of the provisions of this specification, it shall be liable to rejection. No structure or part of structure, once rejected shall be resubmitted for inspection/ test except in cases where the purchaser or his authorized representative considers the defect as rectifiable. Defects which may appear during fabrication shall be made good with the consent of and according to the procedure laid down by the purchaser. The purchaser may, at his discretion, check the test results obtained at the manufacture's works by independent tests at the government test house or elsewhere and should the material so tested be found to be unsatisfactory shall be rejected. The cost of such tests shall be borne by the contractor.
- 5.3 Examination of material of construction, verification, correlation and identification with material test certificate.
- 5.4 Ensuring that the relevant weld procedure and welder qualifications tests are in accordance with fabrication code.
- 5.5 Inspection during fabrication at appropriate stage including fit up. Witness of dye penetrant testing at root and final run for all groove welds and final run for fillet welds as per ASTM E 165. All surfaces examined shall be free of:
- a) Relevant linear indications (Linear indications are those indications in which length is more than three times the width and only indication with major dimension greater than 1.6 mm shall be considered relevant).
 - b) Four or more rounded defects in a line separated by 1.6 mm or less (edge to edge). Rounded indications are those where length less than three times the width.
- 5.6 Any other tests as specified in the fabrication code.

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5.7 Dimensional check match marking as per approved drawings.

6.0 SCOPE OF INSPECTION FOR RACK AND PINION GATE

- 6.1 Examination of materials of construction, verification, correlation/testing and identification of material with test certificate for important items like body, drives, worm shaft, rack & pinion, wheel etc.
- 6.2 Dye Penetration check on drive shaft & worm shaft as per IS-3658 and there shall be no surface defects.
- 6.3 Dimensional check
- 6.4 For chain proof load shall be carried out.
- 6.5 Hardness of rubber component
- 6.6 Check for overall dimension, completeness, no load working after assembly.
- 6.7 Clearing, marking and painting.



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**TECHNICAL SPECIFICATION FOR
MILL DISCHARGE SPOUT & PYRITE
HOPPER**

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Mill Discharge Spout and Pyrite Hopper

- Each coal mill has a discharge spout with a pneumatic cylinder operated knife gate valve for discharging rejects into a pyrite hopper of adequate capacity. This hopper shall serve to store the mill rejects between each operating cycle of dense phase system. Minimum effective storage capacity shall be 2-3 times the effective (batch capacity) of the conveying vessel.
- Each pyrite hopper shall be provided with a pneumatic cylinder operated plate/ dome type valve of approved design at the bottom, adequately sized manhole/inspection door, impingement deflector plate, sizing grid and emergency chute with pneumatic operated Knife gate valve and reject quenching arrangement (water spray) shall be provided. Any platform/ structural support (as per IS 2062 Gr A/B) required to maintain the above equipment before pneumatically operated plate / dome valve. Necessary explosion vent (rupture disc with MOC SS 304/316) of proven design shall be provided in each pyrite hopper.
- Each emergency chute shall be provided with a pneumatic operated gate valve to transfer mill rejects from pyrite hopper to ground or to Owner's trolley. The gates shall be of robust construction and suitable for trouble free operation. The lever/gear wheel arrangement for manual operation shall be designed such that minimum effort is required to operate the gate. Necessary access and platform shall be provided. Limit switches shall be provided to indicate the valve position on control panel.
- Each pyrite hopper shall be provided with two level switches – one to start the operating sequence and the other to indicate the hopper above grid chocked condition.
- Open/ Close Limit switches shall be provided in all manual and pneumatic KGVs and these limit switches shall be interlocked with MRS control system. Solenoid box cum local control panel shall be provided. Same shall house system start stop, vessel pressure indication, probe over ride, purge button so that system can be locally optd. It shall be possible to operate individual vessel from local pneumatic panel for few cycles in emergency.
- Following control modes shall be provided
- Remote mode: System shall be controlled through MRS control System. (DCS)
- Local Mode:
 - a) Energized mode: Manual override shall be selected from MRS control System. System logic shall be executed in MRS control system itself. (DCS)
 - b) De-energized mode: MRS control system shall be delinked and system (individual stack up assembly) shall be operated manually.

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- The sizing grid shall be provided inside the pyrite hopper to prevent oversized mill rejects, tramp iron etc. from entering the conveying vessel. The arrangement for collecting bigger pieces of coal rejects from the grid includes, among others, Knife Gate Valve, chute work etc. Bigger pieces of coal rejects shall roll down from the grid and through KGVs, chute work etc. Bigger pieces of coal rejects shall roll down from the grid and can be removed through the over sized seized reject removal gate (to be provided preferably at the bottom of inspection door) be discharged to Owners trolley. The arrangement shall be finalized during detail engineering. The grid shall be made of minimum 10 mm dia. M.S. bars IS with clear opening of 40 mm x 40 mm.



TITLE:

**TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM**

2X800MW GADARWAR STPP,STAGE-I

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		VOLUME: III
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COMPLIANCE CUM CONFIRMATION CERTIFICATE


The bidder shall confirm compliance with following by signing/ stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions other than those mentioned under "exclusion" and those resolved as per 'Schedule of Deviations', if applicable, with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'.
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ CUSTOMER approval & customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This shall be within the contracted price with no extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets/ calculations etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ CUSTOMER approval in the event of order.

- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified/ intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre - bid discussions, otherwise BHEL/ Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC /SCC /Other Commercial Terms & Conditions.
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities. This clause will apply in case during site commissioning additional requirements emerges due to customer and/ or consultant's comments. No extra claims shall be put on this account.
- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.

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- k) As built drawings shall be submitted as and when required during the project execution.
- l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.



TITLE

MILL REJECT HANDLING SYSTEM
TECHNICAL SPECIFICATION
MILL REJECT HANDLING SYSTEM
DATA SHEET – B

SPECIFICATION NO. PE-TS-395-160-A001

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S.NO DESCRIPTION**DATA/PARTICULARS**


- | | | | |
|----|---|---|-------------|
| 1 | Type of pneumatic conveying system | : | Dense Phase |
| 2 | Material and thickness of conveying vessel | : | |
| 3 | Size and material of vessel inlet valve | : | |
| 4 | Compressor parameters (Nm ³ /min and kg/sqm) | : | |
| 5. | Air Receiver capacity and qty | : | |
| 6 | Capacity of Vessel (Water filled cap.) | : | |
| 7 | Conveying Pipe size | : | |
| 8. | Air Booster offered, size and qty | : | |

:

	TITLE MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME III
		SECTION
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		SHEET 1 OF 2

S. No.	Description	Data to be filled by successful bidder
A.	General	
1	Manufacturer & country of origin	
2	Motor type	
3	Type of starting	
4	Name of the equipment driven by motor & Quantity	
5	Maximum Power requirement of driven equipment	
6	Rated speed of Driven Equipment	
7	Design ambient temperature	
B.	Design and Performance Data	
1	Frame size & type designation	
2	Type of duty	
3	Rated Voltage	
4	Permissible variation for	
5	a) Voltage	
6	b) Frequency	
7	c) Combined voltage & frequency	
8	Rated output at design ambient temp (by resistance method)	
9	Synchronous speed & Rated slip	
10	Minimum permissible starting voltage	
11	Starting time in sec with mechanism coupled	
12	a) At rated voltage	
13	b) At min starting voltage	
14	Locked rotor current as percentage of FLC (including IS tolerance)	
15	Torque	
	a) Starting	
	b) Maximum	
16	Permissible temp rise at rated output over ambient temp & method	
17	Noise level at 1.0 m (dB)	
18	Amplitude of vibration	
19	Efficiency & P.F. at rated voltage & frequency	
	a) At 100% load	
	c) At 75% load	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME III
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S. No.	Description	Data to be filled by successful bidder
	c) At starting	
C.	Constructional Features	
1	Method of connection of motor driven equipment	
2	Applicable Standard	
3	DOP of Enclosure	
4	Method of cooling	
5	Class of insulation	
6	Main terminal box	
	a) Type	
	b) Power Cable details (Conductor, size, armour/unarmour)	
	c) Cable Gland & lugs details (Size, type & material)	
	d) Permissible Fault level (kArms & duration in sec)	
7	Space heater details (Voltage & watts)	
8	Flame proof motor details (if applicable)	
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	
10	Winding connection	
11	Kind of rotor winding	
12	Kind of bearings	
13	Direction of rotation when viewed from NDE	
14	Paint Shade & type	
15	Net weight of motor	
16	Outline mounting drawing No (To be enclosed as annexure)	
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			



TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

SPECIFICATION NO. PE-TS-395-160-A001

VOLUME III

SECTION

REV 00

DATE 04/10/2013

SHEET 1 OF 6

PRE-BID CLARIFICATION SCHEDULE

S. No.	Section/Clause /Page No.	Statement of the referred clause	Clarification Required

The bidder hereby certifies that above mentioned are the only clarifications required on the technical specification for the subject package.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

TITLE TECHNICAL SPECIFICATION FOR MILL REJECT HANDLING SYSTEM	SPECIFICATION NO. PE-TS-395-160-A001	
	VOLUME III	
	SECTION	
	REV 00	DATE 04/10/2013
	SHEET 2 OF 6	

[illegible]

- Bidder shall indicate “quoted” in cost of withdrawal column of schedule of technical deviation along with their technical offer.
- Bidder shall furnish priced schedule of technical deviation along with price bid in sealed envelope.

DATE: _____

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TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

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SHEET 3 OF 6

INSTRUMENT AIR REQUIREMENT*

S. No.	Description	Requirement (m ³ / min & Pressure)	Intermittent/ Continuous
01			
02			
03			
04			
05			
06			

SERVICE WATER REQUIREMENT*

S. No.	Description	Requirement (m ³ / min & Pressure)	Intermittent/ Continuous
01			
02			
03			
04			
05			
06			

EQUIPMENT WATER REQUIREMENT*

S. No.	Description	Requirement (m ³ / min & Pressure)	Intermittent/ Continuous
01			
02			
03			
04			
05			
06			

* Bidder shall furnish the instrument air, service water and equipment water requirement along with supporting calculation and reference document.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____



TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

SPECIFICATION NO. PE-TS-395-160-A001

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SECTION

REV 00

DATE 04/10/2013

SHEET 4 OF 6

COMPANY SEAL

DATE: _____

LIST OF START UP & COMMISSIONING SPARES

S.No.	ITEM DESCRIPTION	QUANTITY
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL



TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

SPECIFICATION NO. PE-TS-395-160-A001

VOLUME III

SECTION

REV 00

DATE 04/10/2013

SHEET 5 OF 6

LIST OF SPECIAL MAINTENANCE TOOLS & TACKLES*

S. No.	ITEM DESCRIPTION	QUANTITY
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		

* Bidders need to fill this list ONLY IF the Tools are SPECIAL in nature.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL



TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

SPECIFICATION NO. PE-TS-395-160-A001

VOLUME III

SECTION

REV 00

DATE 04/10/2013

SHEET 6 OF 6

LIST OF RECOMMENDED SPARES FOR 3 YEARS OF TROUBLE FREE OPERATION

S. No.	ITEM DESCRIPTION	QUANTITY
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

2X800 MW GADARWARA STPP - MILL REJECT SYSTEM

SUGGESTIVE PRICE FORMAT

S.No	Details of Works or Equipment/System	1 Ex-works price	2 ED	3 CST	4 FREIGHT	5=Sum(1 to 4) FOR SITE	6 E&C Charges	7 Service Tax on E&C	8=5+6+7 Total
1.1.0	Lumpsum prices								
1.1.1	Total lumpsum firm price inclusive of all taxes duties and other levies as applicable for design, engineering, manufacturing, inspection and testing, painting, supply/delivery duly packed at project site including freight , unloading, storage and handling at site, design & construction of structural and minor civil works at site etc.,erection and commissioning, trial run at site,PG Test and handing over to the customer of Complete Mill Reject System in line with drawings/documents/ test procedures approved by BHEL/Customer, inclusive of all prevailing taxes, duties and other levies for Mill Reject System complete with all accessories including Mandatory spares and erection and commissioning spares as required for the total scope defined as per technical specification PE-TS-395-160-A001 taking into account all clarifications, confirmations and agreements till date.								
	Notes:								
a)	Bidder to note that total price indicated above at 1.1.1 shall be considered for evaluation and hence should be complete in all respect for the full scope defined and considering all terms and conditions agreed including electrical and control & instrumentation.								
b)	Any item not included in the price quoted above and shown separately will not be taken cognizance of and the offer shall be liable for rejection.								
1.2.0	Break - up of Prices given at 1.1.1 above.								
1.2.1	Lumpsum firm price for supply of Conveying vessel with dome /butterfly/ vertical swing type valve and accessories inclusive of all taxes, duties and other levies as applicable .								
1.2.2	Lumpsum firm price for supply of Pyrite hopper with level probes, temperature switch, rupture disc inclusive of all taxes, duties and other levies as applicable .								

2X800 MW GADARWARA STPP - MILL REJECT SYSTEM

SUGGESTIVE PRICE FORMAT

S.No	Details of Works or Equipment/System	1 Ex-works price	2 ED	3 CST	4 FREIGHT	5=Sum(1 to 4) FOR SITE	6 E&C Charges	7 Service Tax on E&C	8=5+6+7 Total
1.2.3	Lumpsum firm price for supply of pneumatic panel/ Air control module/ Solenoid box with accessories inclusive of all taxes, duties and other levies as applicable								
1.2.4	Lumpsum firm price for supply of storage bunkers, pressure relief valves, bag filters with pressure switch, terminal boxes, level probes, chain pulley blocks with accessories inclusive of all taxes duties and other levies as applicable.								
1.2.5	Lumpsum firm price for air compressors with drive etc inclusive of all taxes, duties and other levies as applicable								
1.2.6	Lumpsum firm price for Air receivers with accessories inclusive of all taxes, duties and other levies as applicable								
1.2.7	Lumpsum firm price of pipes for Mill reject conveying, Compressed air & cooling water services etc inclusive of all taxes, duties and other levies as applicable								
1.2.8	Lumpsum firm price for Air & Water line valves inclusive of all taxes, duties and other levies as applicable								
1.2.9	Lumpsum firm price for pneumatically operated knife gate valves for different application inclusive of all taxes, duties and other levies as applicable.								
1.2.10	Lumpsum firm price for Field instruments/controls etc inclusive of all taxes, duties and other levies as applicable.								
1.2.11	Lumpsum firm price for Alloy C.I bends/ fittings/laterals inclusive of all taxes, duties and other levies as applicable.								
1.2.12	Lumpsum firm price for special cables/ cable glands & lugs, cable trays inclusive of all taxes, duties and other levies as applicable.								
1.2.13	Lumpsum firm price of sump pump along with all its control, inclusive of all taxes, duties and other levies as applicable.								

2X800 MW GADARWARA STPP - MILL REJECT SYSTEM

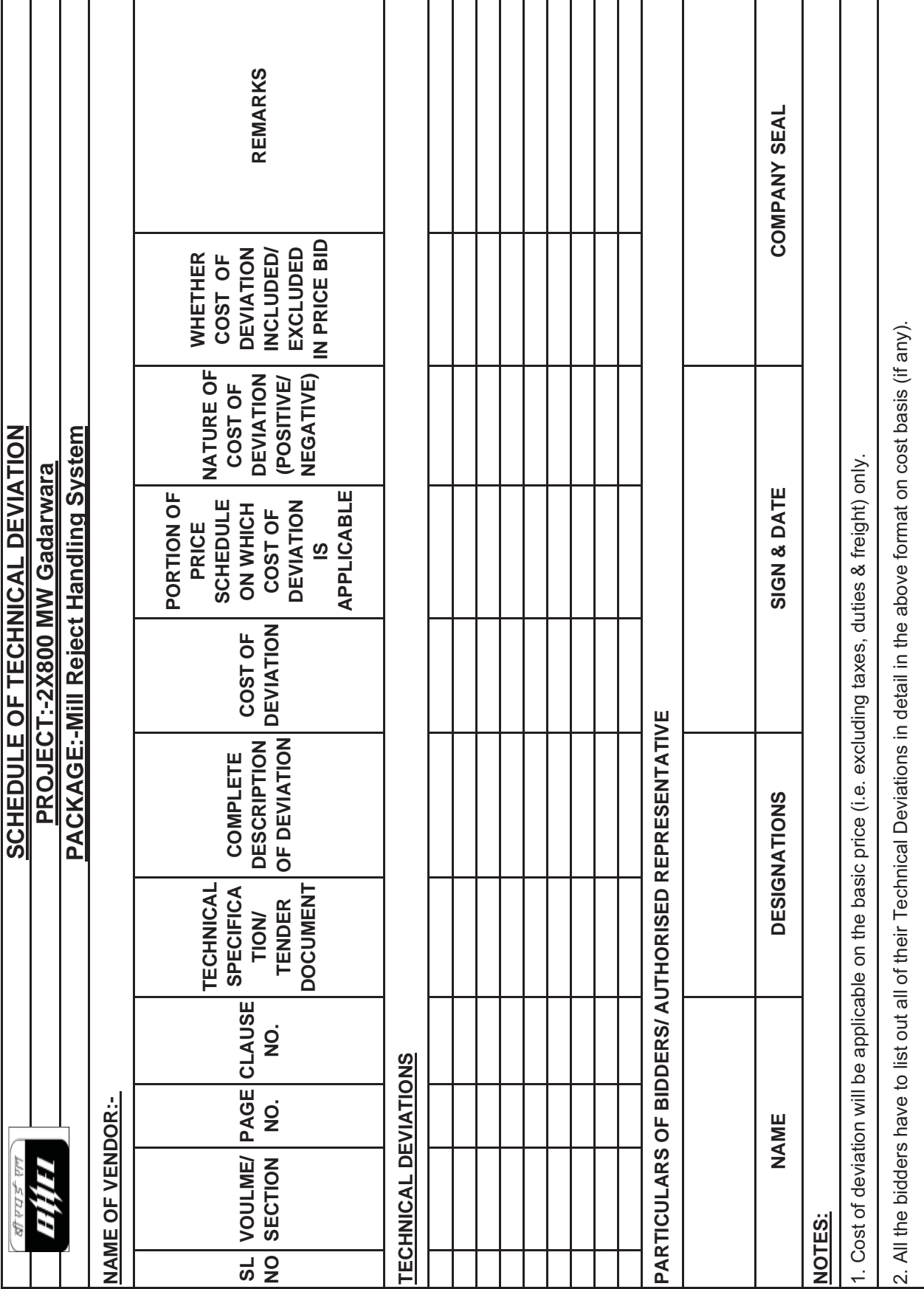
SUGGESTIVE PRICE FORMAT

S.No	Details of Works or Equipment/System	1 Ex-works price	2 ED	3 CST	4 FREIGHT	5=Sum(1 to 4) FOR SITE	6 E&C Charges	7 Service Tax on E&C	8=5+6+7 Total
1.2.14	Lumpsum firm price for Mandatory spares (Annexure III) as required inclusive of all taxes, duties and other levies as applicable .								
1.2.15	Lumpsum firm price for Start-up & commissioning spares (Annexure II) as required inclusive of all taxes, duties and other levies as applicable .								
1.2.16	Lumpsum price for special Maintenance tools and tacksels as per annexure I inclusive of all taxes, duties and other levies as applicable.								
1.2.17	Lumpsum firm prices of any other item under 1.2 inclusive of all taxes, duties and other levies as applicable (please specify quoted items)								
	Total of 1.2.1 to 1.2.17(Should match with 1.1.1). However , the break up prices indicated under this head are for internal use only & NOT for any comparison purpose & or making adjustment for scope variation.								
1.3.0	Unit Prices (To be used for adjustment against any scope variation and information)								
1.3.1	Unit price per meter with erection/ laying of conveying air Pipes inclusive of taxes, duties & other levies etc. (bidder to indicate the pipe size also)								
1.3.2	Unit price per meter with erection/ laying of Mill Reject conveying Pipes inclusive of taxes, duties & other levies etc. (bidder to indicate the pipe size also)								
1.3.3	Unit price of pneumatically operated knife gate valve along with actuator,size 200 NB, inclusive of all taxes, duties and other levies as applicable (The price will include all associated accessories ie, solenoid, Limit switch required etc required)								
1.3.4	Unit price of manually operated knife gate valve (size 200 NB) inclusive of all taxes, duties and other levies as applicable								
1.4.0	Optional price								
1.4.1	Price for three years of recommended spares- inclusive of all taxes, duties and other levies as applicable . Bidder to furnish list in the format as per Annex-III along with item wise prices for adjustment purpose.								

2X800 MW GADARWARA STPP - MILL REJECT SYSTEM										Annexure III
List of Mandatory Spares										
Sl.no	Description	Unit	Unit Ex-works price	Total ex-works price	ED	FREIGHT	INSURANCE	FOR SITE		
1	Mill Reject Handling System									
	A. Pneumatic Conveying System									
	1. Conveying System Spares									
	a) Pneumatic main valves	4 sets of each type								
	b) Pneumatic/Solenoid Two/ Three position control valve	4 sets of each type								
	c) Plate/Dome valve(including seals) with Actuators (pneumatic/hydraulic) s	6 nos.								
	d) Plate/Dome valve seals	6 sets								
	B. Compressors (Reciprocating type, if applicable)									
	1. Compressor with out motor	1 no of each								
2	MEASURING INSTRUMENTS									
	1. Electronic Transmitters									
	1.1 Transmitters of all types, ranges and model no. (for the measurement of Pressure,differential pressure flow, level, etc.)	10% or 1 no. of each type and model whichever is more								
	1.2 Level Transmitters (Ultrasonic/ radar type)	50% of each type and length, including sensors								
	2. Temperature elements									
	2.1 RTD's* of each type and length(with head assembly, terminal block & nipple)	10% or 2 nos. of each type and length, whichever is more								
	2.2 Thermocouples of each type like K-type, R-type, metal etc. * (with head assembly, terminal block & nipple)	10% or 2 nos. of each type and length which ever is more								
	2.3 Thermowell for application like mill outlet temperature and SH/RH/Eco/ flue gas temp. in furnace	10% or 2 nos. of each type and length whichever is more								

	2.4 Temperature transmitters	10% of each type and length							
	3. Local Indicators like temperature gauges, pressure gauges, differential pressure gauges, flow gauges, flow meters etc.,	5% or 1 no. of each make, model and type whichever is more (to be divided to various ranges in proportion to main of all make, model, type population)							
	4. Process Actuated Switch Devices Includes all types of Pressure, differential pressure, flow, temperature, differential temperature, level switch Devices	5% or 1 no. of each type and model whichever is more							
	5. PD Type Flow Transmitters	1 no. of each type and model							
	6. Flue gas Analyzer instruments for oxygen (i) Electronic card Assemblies of each type (ii) Sets of gaskets/"O" rings (iii) Temperature Sensor & heater assembly (iv) Complete Probe with shield assembly (v) Consumables like filter elements etc	1 no. Each complete instrument 10% 2 sets 20% 2 nos 100%							
3	PROCESS CONNECTION PIPING (FOR IMPULSE PIPING/TUBING, SAMPLING PIPING / TUBING AND AIR SUPPLY PIPING AS APPLICABLE)								
	1. Valves of all types and models	10% or 1 no. of each type, class, size and model whichever is more.							
	2. 2 way, 3way, 5way valve manifolds	10% or 1 no. of each type, class, size and model whichever is more.							
	3. Fittings	10% or 1 packet of each type, class, size and model whichever is more.							
	4. Purge meters	5% of each model or 1 no. whichever is more.							

	5. Filter regulators	20% of each model or 2 nos. whichever is more.								
4	INSTRUMENTATION CABLE, INTERNAL WIRING & ELECTRICAL FIELD									
	1. Pre fabricated cable of each type.	10% of installed quantity								
	2. Pre fabricated cable connector of each type	10% or 1 no. of each type and model, whichever is more.								
	3. Other cables	5% of each type, pair and size of actual installed quantity								
5	CONTROL VALVES, ACTUATORS & ACCESSORIES									
	1. Pneumatic and electro-hydraulic actuator assembly	10% or 1 no. of each type, model and rating, whichever is more								
	2. Valve trim (including cage, plug, stem, seat rings, guide bushings etc.)	1 set for each type of control valve,								
	3. Diaphragms, O' rings, seals etc. of all types, make etc.	200%								
	4. Pressure Gauges of all types, make, rating etc.	10% or 2 nos. of each type whichever is more.								
	5. Positioner units (complete unit)	10% or 1 no. of each type whichever is more.								
	6. Solenoid Valve(if Applicable)	10% or 2 nos. of each type whichever is more.								
	7. Pneumatic air-filter/Regulator of each type,make,rating etc.	10% or 2 nos. whichever is more.								
	8. Air Lock Relays	10% or 2 nos. of each type whichever is more.								



3. Any deviation not mentioned above and shown separately will not be taken cognizance of and the offer shall be liable for rejection.
4. Bidder shall indicate "quoted" in cost of deviation column of the schedule above along with their Techno-commercial offer.
5. Bidder shall furnish priced schedule of technical deviation along with price bid.
6. The final decision of acceptance/ rejection of the deviations quoted by the bidder along with its cost shall be at discretion of the Purchaser.
7. Bidders to note that any deviation not listed above and asked after Part I Bid opening shall not be considered.
8. Bidders to note that no Price Impact will be acceptable after Part I Bid opening subject to if there is any change in Technical Specification/NIT terms from BHEL side.
9. Deviation listed above without any cost of deviation, if found acceptable to BHEL, will be considered without any price implication.

2 x 800 MW GADARWARA STPP - Mill Reject Handling System						ANNEXURE -V
Mode: Pneumatic Conveying						
Sl.No.	Description / Item	Working	Standby	Power Consumption (KW) (at motor input terminal)	Duty Factor	Total Power Consumption (KW)
1	2	3	4	5	6	7 = 3 x 5 x 6
1	Conveying Air Compressor	1	1		0.50	
Total KW						
Notes						
1 If the actual power consumption exceeds the guaranteed power consumption, liquidated damages shall be payable by the Contractor at the rate of 2845 USD per KW excess power consumption, over the base guaranteed figure indicated by him in his bid. Such liquidated damages may be recovered by the Owner by deduction from the contract price or by enforcing the contract performance guarantee or in any other manner deemed fit by the Owner. For this purpose, the drives of standby equipment shall not be considered.						
2 Power consumption (KW) of air compressors shall be measured at motor input terminals when operating at the rated capacity and pressure and performed on test rig at the vendor's works and actual motor shall be used for this purpose.						
3 For bid evaluation purpose on account of guaranteed auxiliary power consumption, the same shall be loaded at the rate of 2845 USD per KW for the differential power consumption.						
4 The total aux.power at column 7shall be compared with the base power i.e.85KW for loading purpose						



TITLE

TECHNICAL SPECIFICATION FOR
MILL REJECT HANDLING SYSTEM

SHEET

SPECIFICATION NO. PE-TS-395-160-A001

VOLUME - III

SECTION

REV 0

DATE

OF 11

ANNEXURE-VI**DRAWINGS/ DOCUMENTS TO BE SUBMITTED WITH THE BID**

Bidder shall submit the following drawings / documents along with their bid

- a) Major process/equipment related details in the format given under Vol-III
- b) Utility requirement in the format given under Vol-III
- c) List of special maintenance tools & tackles, if any in the format given under vol-III.
- d) Copy of Electrical Scope between BHEL & Vendor duly stamped
- e) Electrical Equipment Specification for Mill Reject Handling System duly stamped
- f) Electrical load list
- g) **Deviation schedule** with reference to specific clauses of the specification along with reason for such deviation in the format given under Vol-III
- h) Un priced copy of price format indicating quoted/ not quoted against each row/column
- i) Copy of pre-bid clarifications, if any, duly signed & stamped
- j) Signed/Stamped copy of Compliance cum Confirmation Certificate (Vol-III)

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSECE OF ANY OF ABOVE DOCUMENTS. P& I DIAGRAM TO BE FURNIHSED WITH THE BID WILL BE REVIED ONLY FOR UNDERSTANDING THE SCOPE OF WORK & OPERATION PHILOSPPHY. THIS SHALL BE FINALIZED DURING DETAIL ENGINEERING WITHOUT ANY COMMERCIAL. DELIVERY IMPLICATION.

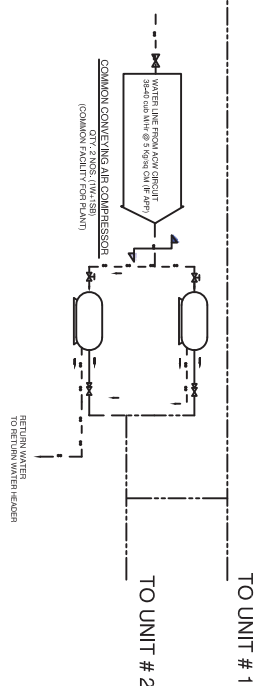
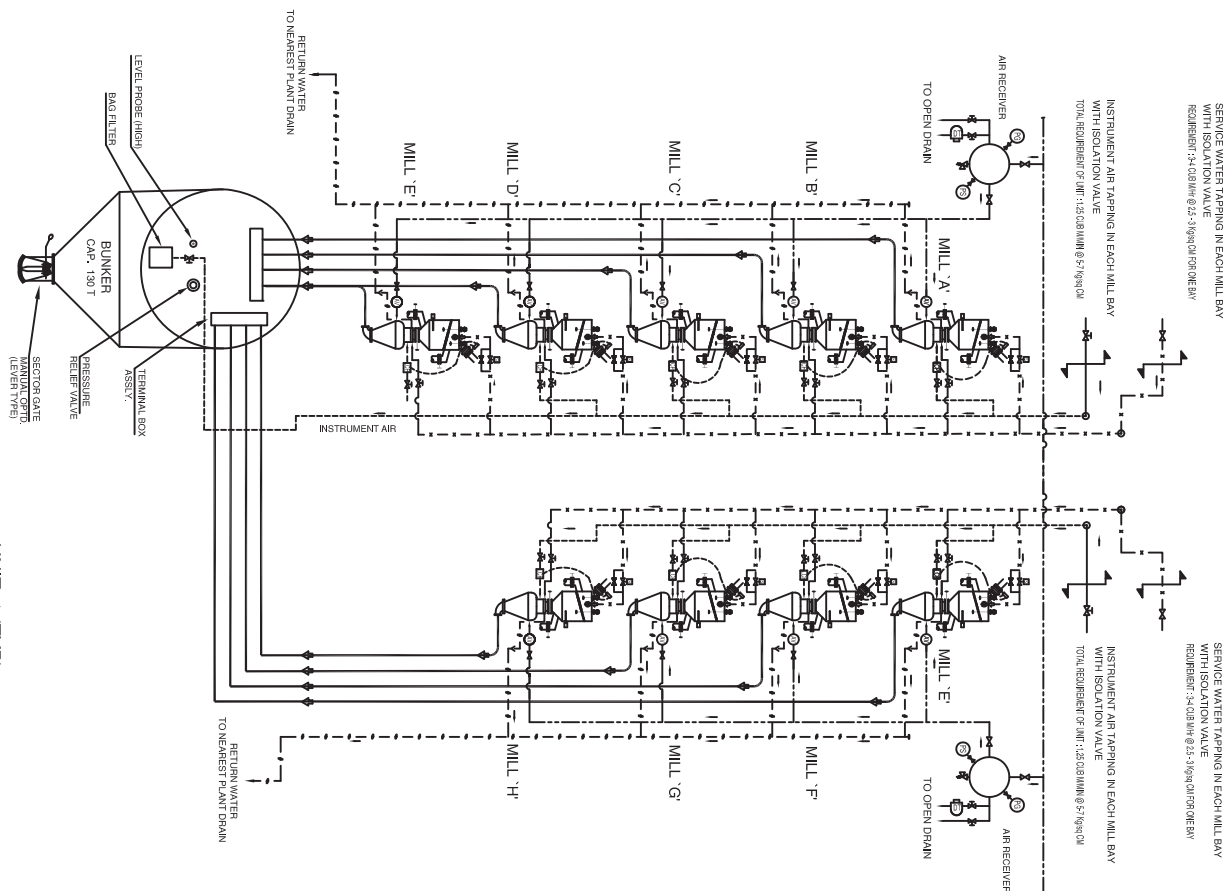
DOCUMENT OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND ACCORDINGLY WILLNOT BE CONSIDERED FOR BID EVALUATION.

2X800 MW GADARWARA STPP					
MILL REJECT HANDLING SYSTEM (PNEUMATIC CONVEYING SYSTEM)					
Sl. No	Description	NTPC DRG.No.	BHEL DRG. NO.	Category	Submission schedule in weeks from LOI
1	DESIGN PHILOSOPHY AND SYSTEM SIZING CALCULATION OF MILL REJECT SYSTEM		PE-V0-395-160-A100	APPROVAL	3
2	P & I DIAGRAM OF MILL REJECT HANDLING SYSTEM		PE-V0-395-160-A101	APPROVAL	3
3	P & I DIAGRAM OF COMPRESSOR		PE-V0-395-160-A102	APPROVAL	9
4	EQPT AND PIPING LAYOUT OF MILL REJECT SYSTEM AND PIPING LAYOUT FROM COMPRESSOR HOUSE		PE-V0-395-160-A150	APPROVAL	7
5	LAYOUT OF COMPRESSOR HOUSE		PE-V0-395-160-A151	APPROVAL	9
6	CABLE TRAY, EARTHING LAYOUT		PE-V0-395-160-A152	APPROVAL	9
7	TRENCH AND INSERT DETAIL OF MRS		PE-V0-395-160-A154	APPROVAL	7
8	DESIGN CALCULATION AND STRUCTURAL ARRANGEMENT OF BUNKER AND LOAD DATA OF BUNKER		PE-V0-395-160-A155	APPROVAL/ INFORMATION	9
9	G.A OF BUNKER		PE-V0-395-160-A200	APPROVAL	5
10	GA AND DATA SHEET OF SELF MANUFACTURED ITEMS e.g. CONVEYING VESSEL , PYRITE HOPPER, BUNKER DISCHARGE GATE, PRESSURE RELIEF VALVE, ACI BEND, PNEUMATIC PANEL, AIR RECEIVER		PE-V0-395-160-A201	INFORMATION	5
11	GA OF KNIFE GATE/PLATE VALVE		PE-V0-395-160-A202	INFORMATION	7
12	G.A OF BAG FILTER		PE-V0-395-160-A203	INFORMATION	7
13	G.A. OF METALLIC EXPANSION BELLOWS		PE-V0-395-160-A204	INFORMATION	7
14	G.A. OF RUPTURE DISC.		PE-V0-395-160-A205	INFORMATION	7
15	GA OF CHAIN PULLEY BLOCK		PE-V0-395-160-A206	INFORMATION	7
16	G.A., TECHNICAL DATA SHEET AND FOUNDATION DETAILS OF AIR COMPRESSOR, GA AND WIRING DIAGRAM FOR LOCAL PANEL OF CONVEYING AIR COMPRESSOR		PE-V0-395-160-A207	APPROVAL	9
17	GA OF WATER AND AIR LINE VALVES		PE-V0-395-160-A208	APPROVAL	11
18	GA, TECHNICAL DATA SHEET AND WIRING DIAGRAM OF SUMP PUMP		PE-V0-395-160-A209	INFORMATION	9
19	ELECTRICAL LOAD LIST		PE-V0-395-160-A210	INFORMATION	5
20	TECHNICAL DATA SHEET OF TEMPERATURE SWITCH, TEMPERATURE GAUGE, PRESSURE SWITCH, PRESSURE GAUGE, SOLENOID VALVE , LEVEL SWITCH , AIR FILTER REGULATOR		PE-V0-395-160-A211	INFORMATION	9
21	G.A., TECHNICAL DATA SHEET OF AIR COMPRESSOR MOTOR		PE-V0-395-160-A212	APPROVAL	9
22	CONTROL WRITE-UP & INTERLOCK & PNEUMATIC CIRCUIT OF CONVEYING VESSEL, BLOCK LOGIC DIAGRAM/CONTROL SCHEME WITH HMI SCREEN & I/O		PE-V0-395-160-A213	APPROVAL	9
23	TECHNICAL DATA SHEET OF CABLE TRAY		PE-V0-395-160-A214	APPROVAL	9
24	TECHNICAL DATA SHEET OF CABLES(IF APPLICABLE)		PE-V0-395-160-A220	APPROVAL	11
25	CABLE INTERCONNECTION DIAGRAM		PE-V0-395-160-A221	INFORMATION	13
26	PAINTING SCHEDULE		PE-V0-395-160-A250	INFORMATION	7
27	PIPING AND VALVE SCHEDULE		PE-V0-395-160-A251	INFORMATION	7
28	INSTRUMENT SCHEDULE		PE-V0-395-160-A252	INFORMATION	9
29	CABLE SCHEDULE -POWER, SIGNAL AND CONTROL		PE-V0-395-160-A253	INFORMATION	11
30	DETAILED BOM		PE-V0-395-160-A254	INFORMATION	18
31	P G TEST PROCEDURE		PE-V0-395-160-A255	APPROVAL	18
32	OPERATION AND MAINTENANCE MANUAL		PE-V0-395-160-A256	INFORMATION	23
QUALITY PLANS					
33	SUB VENDOR LIST WITH INSPECTION CATEGORY		PE-V0-395-160-A300	APPROVAL	3
34	WPS		PE-V0-395-160-A301	APPROVAL	5
35	MS STRUCTURAL STEEL/ PLATES		PE-V0-395-160-A303	APPROVAL	5
36	SELF MANUFACTURED-CONVEYING VESSEL , PYRITE HOPPER, BUNKER DISCHARGE GATE, PRESSURE RELIEF VALVE, TERMINAL BOX , ACI BEND, AIR RECEIVER , PNEUMATIC PANEL		PE-V0-395-160-A304	APPROVAL	7
37	MS ERW PIPE		PE-V0-395-160-A305	APPROVAL	5
38	COMPRESSOR		PE-V0-395-160-A306	APPROVAL	9
39	KNIFE GATE/PLATE VALVE		PE-V0-395-160-A307	APPROVAL	9

40	BAG FILTER		PE-V0-395-160-A308	APPROVAL	9
41	METALLIC EXPANSION		PE-V0-395-160-A309	APPROVAL	9
42	BELLOWS		PE-V0-395-160-A310	APPROVAL	9
43	RUPTURE DISC		PE-V0-395-160-A311	APPROVAL	9
44	CHAIN PULLEY BLOCK		PE-V0-395-160-A312	APPROVAL	9
45	WATER AND AIR LINE VALVES		PE-V0-395-160-A313	APPROVAL	9
46	COMPRESSOR MOTOR		PE-V0-395-160-A314	APPROVAL	9
47	INSTRUMENTS (PG/PS/PT/TS/TG/SV)		PE-V0-395-160-A315	APPROVAL	11
48	CABLE TRAY		PE-V0-395-160-A316	APPROVAL	11
49	TYPE TEST CERTIFICATE/PROCEDURE FOR MOTORS(IF APPLICABLE)		PE-V0-395-160-A318	APPROVAL	9
50	TYPE TEST CERTIFICATE/PROCEDURE FOR CABLES(IF APPLICABLE)		PE-V0-395-160-A319	APPROVAL	9
51	QAP OF CABLES(IF APPLICABLE)		PE-V0-395-160-A320	APPROVAL	11
52	SUMP PUMP WITH MOTOR		PE-V0-395-160-A321	APPROVAL	9

NOTES:

- The above drawing list is tentative and shall be finalized with the successful bidder after placement of order. While some of the drawings indicated above may not be applicable, some additional drawings may also be required based on scope of work.
- Drawings shall be prepared in Auto-Cad latest edition. Required no. of hard and soft copies (editable) of the drawings shall be furnished as per requirement specified elsewhere in the specification.
- Only manual calculation with authentic supporting literature (e.g. extracts of hand Book/ standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.
- Bidder to note that all values/dimensions/elevations etc. without supporting back up data adopted/assumed by the successful bidder (during contract stage) in the design calculation/drawings shall be taken by the customer/owner to be correct unless they are stipulated in the specification. Any problem arising later in this regard shall be made good by the successful bidder at his cost and no extension of time shall be granted for the same.
- All the drawings and documents including general arrangement drawing, data sheet, calculation etc. to be furnished to the customer during detailed engineering stage shall include / indicate the following details for clarity w.r.t. Inspection, construction, erection and maintenance etc.:-
 - All drawings and documents shall indicate the list of all reference drawings including general arrangement.
 - All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view; all major self-manufactured and bought out items shall be labelled and included in BOQ / BOM in tabular form.
 - Painting schedule shall also be made as a part of general arrangement drawing of each equipment / items indicating at least 3 trade name.
 - All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.
 - Drawings/ documents to be submitted for purchasers review/ approval shall be under Revision A, B, C... etc. while drawings /documents to be submitted thereafter for customer's approval after purchaser's approval shall be under R-0, 1, 2, 3etc.
- Drawings and documents not covered above but required to check safety of machines/system, shall be submitted during detailed engineering stage without any commercial implication.
- All drawings shall include "B.O.M" and indicate quantity, material of construction, make along with IS/BS No., Technical parameters, dimensions, hardness, machining symbol and tolerance, requirement of radiography and hydraulic tests, painting details, elevation, side view, plan, skin section and blow-up view for clarity.
- All drawings shall be prepared as per BHEL's title block and bear BHEL's drawing No.
- Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- Bidder to follow the following the drawing submission schedule:
 - ☐ 1st submission of drawings from date of LOI as per the submission schedule.
 - ☐ Every revised submission incorporating comments – within 10 days.
 - ☐ Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.



- NOTES
1. THE DRG INDICATES BROAD SCOPE & WORKING PRINCIPAL OF THE SYSTEM. FLOW DIAGRAM SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. THE DRG INDICATES SCOPE OF WORK FOR SINGLE UNIT. TYPICAL ARRANGEMENT SHALL BE PROVIDED FOR SECOND UNIT ALSO.

[illegible][illegible]

