

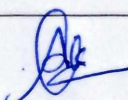
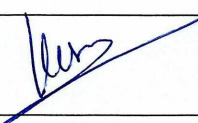
NTPC: DADRI: FGD: CERA: R00



EDC-FGD
BAP BHEL RANIPET

DADRI 2X490MW-FGD
FLUE GAS DESULFURIZATION SYSTEM

TECHNICAL SPECIFICATION FOR PNEUMATICALLY / MANUALLY OPERATED CONTROL VALVES

Prepared	Checked	Approved
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R-00		Date: 25-03-2019

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1.0	PROJECT INFORMATION	
	▪ Owner	NTPC
	▪ Buyer	BHEL, Ranipet
	▪ Process / application	Wet Lime Stone FGD system
1.1	SITE CONDITIONS	
	▪ Ambient temperature (Guarantee)	27 Deg C
	▪ Ambient temperature (Design)	45 Deg C
	▪ Relative Humidity	60 %
1.2	LOCATION AND APPROACH	
	▪ Project location	Dadri
	▪ State	Uttar Pradesh
	▪ District	Gautam Buddha Nagar

2.0 INTENT OF SPECIFICATION

This specification together with the attached Technical Data Sheet and other attachments to inquiry / order defines the minimum mandatory requirements governing the design, sizing and selection of control valves along with their accessories /auxiliaries for use in the process of Flue gas Desulphurization (FGD) system .

- 2.1 The design, material, construction, manufacture, inspection, testing and performance of valves shall comply with all currently applicable statutes, regulations and safety codes in the locality where the valves will be installed.
- 2.2 Compliance to this specification shall not relieve the Bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.
- 2.3 In case the Bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, he shall recommend the same along with reasons in a separate section along with his proposal and include the same in his scope of supply. The Bidder shall offer only proven design in successful operation.

3.0 STANDARDS AND CODES

The valves shall conform to the latest editions of applicable codes and standards as mentioned elsewhere. Valves in general shall conform to the requirements of the following standards:

ASME B 1.20.1	Pipe Threads, general purpose (Inch)
ASME B 16.5	Steel Pipe Flanges and flanged fittings
ASME B 16.10	Face to Face and End to End dimension of valves
ASME B 16.20	Ring – Joint Gaskets and grooves for steel Pipe flanges
ASME B 16.34	Valves – Flanged, Threaded and welding end
API-598	Valves inspection test.

4.0 GENERAL SPECIFICATION FOR DESIGN/ CONSTRUCTION/ MATERIAL PARTICULARS OF CONTROL VALVE

- a) All Control valves shall be designed based on the requirements of the application, process operating conditions and this specification.
- b) Vendor shall supply all interconnecting instrument tubing and fittings between the valve actuator , positioner and filter regulator.
- c) Any special tool required for assembly, disassembly & maintenance shall also be supplied by vendor.
- d) Valves to be installed outside shall be required to have the stem properly protected against atmospheric corrosion.
- e) All rising stem valves shall be provided with back seat to permit repacking (of glands) with valves in operation. All valves shall preferably be of outside screw and yoke type.
- f) All valves shall have indicators or direction clearly marked so that the valves opening/ closing can be readily determined.
- g) The valves shall be designed taking into consideration the abrasive nature of lime slurry. The maximum particle size in the slurry shall be in the order of 43 microns. The maximum specific gravity of limestone slurry shall be 1.23. Valves shall be designed suitable to take care of this specific gravity and particle size.
- h) Control will be used for regulation of slurry flow. Pneumatically operated valves shall be provided with the following accessories in addition to other standard items:
 - Pneumatic actuator
 - Electronic positioner to regulate the opening/closing of valve
 - Air filter, solenoid valve and limit switch
 - Draining arrangement wherever required.
- i) All control valves shall be provided with bonnet-back seating arrangement to enable on line changing of gland packing.

- j) All control valves shall be designed for reconditioning seating surfaces and replacement of stem and disc without removing the valve body from the line
- k) All valves shall be provided with embossed name plate giving details such as tag number (as indicated in Annexure I), type, size etc.
- l) For control valves wherever thickness of body/bonnet is not mentioned in the valves standards, thickness mentioned in IS- 1538 for fitting shall be applicable.
- m) All valves shall be provided with proper name plates indicating complete information about the valves.

5.0 MATERIAL OF CONSTRUCTION

5.1 Ball type Control Valve

Material of Control valves for slurry application shall be as per enclosed **Annexure I** or its equivalent. Vendor shall provide the counter flange along with necessary nuts, bolts, gaskets etc.

Note: All parts of the valve exposed to slurry shall be rubber lined of Ceramic material.

Valve Type	Control
Valve Size & Quantity	Refer Annexure I
Body Material	Refer Annexure I
Bonnet Type & Material	Refer Annexure I
End Connection	Refer Annexure I
Rating	Vendor to specify
Sleeve Material	Natural rubber
Sleeve Cone Size	Vendor to specify
Stroke Length	Vendor to specify

Leakage Class	CLASS V
Gland Packing	TEFLON/GRAPHITE
Max Sound Level	<85 dBA
Stem Material	Vendor to specify

5.2 Control VALVE Sizing

Each control valve shall be sized and selected to provide reliable operation and control at the specified operating and design conditions. Control valve sizing shall generally be based on ISA S75.01.

The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80 % of total valve stem travel. Further, the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50 % of the total valve stem travel.

5.3 Control Valve design

a. The control valve shall be rated to meet the design pressure and design temperature of the application.

For flanged valves, the valve body rating shall never be lower than the flange rating. The flange rating for valve bodies smaller than 16-inch nominal size shall be minimum ASME Class 300. Flange rating for valve bodies 16-inch nominal size and larger shall be minimum ASME Class 150.

b. Control valve body Material shall meet or exceed , the requirements of the application. Trim materials shall be selected to withstand corrosion, erosion and wear under severe service conditions.

5.4 Trim Design

Valve trim shall be of the quick change type for ease of maintenance. No internal components shall be screwed or welded into the valve bodies or bonnets. Trim shall be designed to provide equal pressurization around the plug in order to minimize vibration and prevent any potential for binding.

5.5 SPECIFICATION FOR PNEUMATIC ACTUATOR

a.	Quantity	01 No. for each valve
b.	Type	Rotary actuator, Pneumatic (spring return)
c.	Action	Refer Annexure 1
d.	Failure position (air failure)	Close
e.	Close/open at air Pressure	Vendor to decide . Preferably 4 to 6 Kg/sq.cm
f.	Air Connection	Vendor to decide . Preferably ¼" NPT(F)
g.	Local Position Indicator	To be provided.
h.	Hand wheel for manual open	Required (for valves greater than 8 inch)
i.	Actuator travel time	Vendor to specify
j.	Actuator Protection Class	IP-65 (Min)
k.	Actuator Thrust	Vendor to specify
l.	Spring range (kg/cm ²)	Vendor to specify
m.	Speed adjustment for actuator operation	To be provided to facilitate speed adjustments both during opening & closing by means of flow control valve
n.	Solenoid valve type	3/2 way, 24V DC power supply, ex. proof, 1/4" NPT pneumatic connection, 1/2" NPT Electrical connection. Solenoid Valve Energised for valve to open & Solenoid valve De-energised for valve to close.
o.	Air filter regulator	Size of filter shall be 5 Micron, Filter material shall be sintered bronze/equivalent, Body shall be aluminium, 1/4" NPT Pneumatic connection shall be envisaged

5.3 LIMIT SWITCHES (Proximity sensor based):

- a) Quantity /valve : One for Open & one for Close position
- b) No. of Contacts : Two normally open & two normally closed potential free contacts in each limit switch corresponding to open & close positions of the valve.
- c) Contact Rating : 24 V DC
- d) Protection : Weather proof IP 55.
- e) Limit Switch Box : Limit Switch terminals shall be brought out to a Terminal Box

6.0 ELECTRONIC POSITIONER:

MODEL	
TYPE	ELECTRO PNEUMATIC MICROPROCESSOR BASED, LOOP POWERED.
INPUT (mA)	4-20mA
VALVE POSITION SENSING OUTPUT	4-20mA O/P Signal for Control Syst
PROTECTION CLASS	IP-65 (MIN)
ELECTRICAL CONN PNEUMATIC CONN	1/2" NPT SIDE/BOTTOM ENTRY 1/4" NPT
INBUILT DISPLAY WITH PU BUTTON	Required for Configuration
PRESSURE GAUGE	Required
EMC OR CE COMPLIANCE	Required, EN50081-2 & EN50082 Or Equivalent
Positioner Transmitter	Applicable

7.0 NAME PLATES

Each equipment / instrument shall be provided with rating plate or nameplate or label designating the tag no., service of the item etc.

8.0 INSPECTION

Inspection shall be carried out by BHEL Engineers at vendor works.

9.0 DOCUMENTS / DETAILS ALONG WITH BID

The following information / documents shall be submitted along with the offer

- a. Duly filled up data sheet for each valve type as per **Annexure-II** in the enclosed format.
- b. Detailed assembly drawing with overall dimensions.
- c. Valve cross sectional drawings with Bill of Material including the material specifications.
- d. Valve Regulation Characteristic Curve.
- e. Cv calculation.
- f. List of applicable standards for shop test.
- g. Reference list for the offered model.
- h. Typical Quality plan for supply of the above equipments.
- i. Valves Catalogues.
- j. List of commissioning spares.
- k. Recommended spares list for 3 year O&M along with item wise price.
- l. Any deviation shall be specifically mentioned in the enclosed deviation format **Annexure-IV**.

In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in **Annexure-IV**. If there is no deviation "**NIL**" statement shall be furnished. In the absence of **Annexure-IV**, it will be construed that the bid confirms strictly to the specification. Acceptance or rejection of the offer with or without deviations (either fully or partially) is sole discretion of the purchaser without seeking further clarification from the bidder.

NOTE: Bidders to note that failing to submit the above documents, the bid shall be considered as incomplete and liable for rejection.

10.0 DOCUMENTS / SERVICE AFTER ORDER

10.1. The following documents are to be submitted for BHEL's approval.

- Duly filled up data sheet in the enclosed format.
- Detailed assembly drawing with overall dimensions.

- Valve cross sectional drawings with Bill of Material including the material specifications.
- C_v Calculation
- Quality plan

10.2. The following are to be submitted to BHEL's review and acceptance.

- Material test certificate
- Hydraulic & Leak test certificates
- Performance guarantee certificate
- Erection manual
- O&M manuals

11.0 DOCUMENTATION

- a. The documentation during bid and post order stage shall meet the following requirements.
- b. All documents and drawings shall be submitted in English.
- c. Hard copies of all documents and drawings during bid stage to be submitted in duplicate.
- d. Hard copies of all documents for approval to be submitted in triplicate.
- e. Hard copies of all final documents, drawings, manual etc., shall be submitted in bound folder in duplicate.
- f. Soft copies of all final documents in MS office in the form of CD-1 set.
- g. Soft copies of all final drawings in AutoCAD, latest version in the form of CD-1 set

12.0 PACKING

Valves to be packed based on the sizes and each package or shipping units shall be clearly marked or stenciled on at least two sides as follows.

**BHEL SITE OFFICE,
2 X 490 MW, FGD PACKAGE (STAGE 2)
NCTPS — NTPC DADRI
GAUTAM BUDH NAGAR, UP — 201008
INDIA**

In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.

Imported Supply: All imported supply should be packed as per Sea worthy packing standards Annexure – VIII: PE-TS-888-100-A001. All imported items should have Sea worthy packing. Liberal packing materials and struts shall be provided to arrest rolling and to protect from transit damages.

ANNEXURE-I

List of Control Valves

S. No	TAG No	Drawing No	Service	Quantity (No's)	Process Condition				Trim			Actuator		Accessories			Slurry concentration	Max Pressure across the Valve	From	To					
					Press. Temp. (kPag)(degC)	Flow (m3/hr)	Head in Meter of water	Spec gravity	Vapour pressure kg/cm2	Process Connection	Body / Bonnet	Ball & linear - Stem Material	Chara .	Material	Seat Leak	Type					opening	Fail Action			
1	10HTD 2AA101	6130-109-PVM-F-005	pH meter Analyser (re-circulation) line Valve	1	320/270 / 58	20	17	1.225	0.215	B16.5 CL 150	Vendor to DN 50 specify	Ceramics / C22 or C 276	Hastelloy-c EQ% Ceramics FCI Class IV	ANSI /	Manual	0 to 90 Deg	Stayput at any position 0 to 90 deg	Mechanical position indicator with locking device at any position 0 to 90 deg	Manual ceramic lined spool after divergent conic portion	Limestone slurry/Gypsum Slurry	<0.5Bar	RC pump	Absorber		
2	20HTD 2AA101	6130-109-PVM-F-005	pH meter Analyser (re-circulation) line Valve	1	320/270 / 58	20	17	1.225	0.215	B16.5 CL 150	Vendor to DN 50 specify	Ceramics / C22 or C 276	Hastelloy-c EQ% Ceramics FCI Class IV	ANSI /	Manual	0 to 90 Deg	Stayput at any position 0 to 90 deg	Mechanical position indicator with locking device at any position 0 to 90 deg	Manual ceramic lined spool after divergent conic portion	Limestone slurry/Gypsum Slurry	<0.5Bar	RC pump	Absorber		

ANNEXURE-II**13.0 DATA SHEET FOR VALVES (Separately for each type of valve)****I. TECHNICAL PARAMETERS**

SI No	DESCRIPTION	TO BE FILLED BY VENDOR
I	Valve Size	
a.	Make	
b.	Model/ Type	
c.	Fluid details - Medium handled	
	Temperature range (°C)	
d.	Rated flow (m ³ /hr.)	
e.	Design Cv of the valve	
f.	Valve rating	
g.	Valve operation- (Lever/ Gear box)	
h.	Pressure Drop for rated flow (bar(g))	
i.	Design pressure (bar(g))	
j.	Hydraulic test pressure	
	➤ Body (bar(g))	
	➤ Seat (bar(g))	
k.	Max. Shut off pressure (bar(g))	
II	CONSTRUCTION DETAILS	
a.	Material of construction	
	Body	
	➤ Stem	
	➤ Disc	
	➤ Seat	
	➤ Bushing	
	➤ Handle	
b.	Fasteners	
c.	End Connection / Rating / Standard	

d.	Recommended minimum pipe ID mm	
e.	Details of Gearbox if applicable	
III	GENERAL	
a.	Weight per valve	
b.	Applicable standards	
c.	Valve GA Drawing / Cross Sectional Drg.	
d.	Enquiry / PO reference	

ANNEXURE-III

14.0 DATA SHEET FOR ACTUATOR (TO BE FILLED SEPARATELY FOR EACH TYPE OF VALVE)

1)	Actuator	
	➤ Make	
	➤ Model	
	➤ Type	
	➤ Torque Rating	
	➤ Air Consumption	
	➤ Operating Time For Opening	
	➤ Operating Time For Closing	
	➤ Accessories Offered	
	➤ Type Of Stay Put	
	➤ Air Connection	
2)	Limit Switch	
	➤ Make	
	➤ Type	
	➤ Quantity	
	➤ Contact Rating	
	➤ Reset Type	
3)	Electronic Positioner	
	➤ Make	
	➤ Type	
	➤ Quantity	
	➤ Connection	

14.1 Requirement of manually operated ball valve

- a) Hand operated lever
- b) Valve position indicator- 0- 90 degree
- c) Valve locking feature at any position between 0-90
- d) Ceramic Short spool piece as per Annexure-VI
- d) position transmitter – not required
- e) Limit switch not required
- f) actuator – not required

Vendor's Signature & Seal

ANNEXURE-IV

15.0 FORM FOR TECHNICAL DEVIATIONS (If any)

SL. NO	SEC / CLAUSE NO.	SPECIFICATION	STATEMENT OF DEVIATIONS/VARIATIONS	REASON FOR DEVIATION	COST OF WITHDRAWAL

Date:

Signature & seal of the Bidder

ANNEXURE-V

16.0 SLURRY PARAMETERS:

Sl.No	Parameter	Lime slurry characteristics
1.	Maximum solid particle size	150mesh (140 micron)
2.	Normal solid particle size,d50	325 Mesh (43micron)
3.	Solid to be handled	Absorbers and other impurities
4.	Sp Gravity of Slurry	1.215
5.	PPM of heavier particle (Silica, Aluminum Oxide, Ferric Oxide and Columbium)	20000
6.	Hardness of particle	5-7 (Mho scale)
7.	Concentration of slurry	30% by weight
8.	Sp Gravity of Lime Stone	2.80
9.	Sp gravity of heaviest particles (Columbium and Iron oxide)	5.9
10.	Concentration of Chlorine	20000 ppm
11.	Viscosity of Slurry	20-30 cp
12.	Maximum operating temperature of Slurry	65 deg C

