ANNEXURE-C TO TENDER BAP/FGD/2012/OT-2

BONGAIGAON– 3X250 MW
FLUE GAS DESULFURIZATION SYSTEM

TECHNICAL SPECIFICATION FOR PNEUMATICALLY OPERATED BALL VALVES FOR PROCESS WATER APPLICATION

CUSTOMER : NATIONAL THERMAL POWER CORPORATION LIMITED

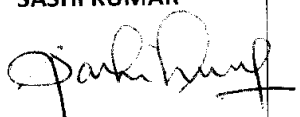
NTPC: BONG: FGD: WVALVES- BALL VALVE SPEC-023: REV-03

Flue Gas Desulphurization Group

Air Quality Control Systems

BAP::BHEL::Ranipet

TECHNICAL SPECIFICATION FOR PNEUMATICALLY OPERATED BALL VALVES HANDLING PROCESS WATER

Department	Prepared	Checked	Approved
FGD	ASHWIN R  Engineer Trainee-FGD	MANOJ KUMAR THAKUR  Engineer-FGD	SASHI KUMAR  Sr.Engineer-FGD
R03 dated 29 08 12			

CONTENTS

29/08/12

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)	50 Deg C
▪ Height above sea level	47 m
▪ Relative Humidity	60 %

1.2 LOCATION AND APPROACH

▪ Project location	
▪ State	Assam
▪ District	Kokrajhar
▪ Place	Kumkuri near Salakati, Bongaigaon
▪ Height above sea level	47 m

2.0 INTENT OF SPECIFICATION

- This specification together with the attendant Technical Data Sheet and other specifications/attachments to inquiry / order defines the minimum requirements for ball valves along with their accessories /auxiliaries for use in the process of Flue gas Desulphurization (FGD) system handling process water. Bidder shall make all possible efforts to comply strictly with the requirements of this specification and other specifications/attachments to inquiry/order.

- In case, deviations are considered essential by the Bidder (after exhausting all possible efforts), these shall be separately listed in the Bidder's proposal under separate section, titled as "List of Deviations/Exceptions to the Enquiry Document (Annexure-II)". Deviation shall be listed separately for each document with cross reference to Page No./Section/Clause No./Para etc. of the respective document supported with proper reasons for the deviation for purchaser's consideration. Any deviation, not listed under the above section, even if reflected in any other portion of the proposal, shall not be considered applicable. No deviation or exception shall be permitted without the written approval of the purchaser.

- 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. The valves shall conform to the latest editions of applicable codes and standards as mentioned elsewhere. Nothing in this specification shall be construed to relieve the Bidder of his responsibility.

- 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.

- 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:

- ANSI B 16.34 Standard for valves.
- BS 5351 Specification for steel ball valves for the petroleum, petrochemical and allied industries
- ANSI-B-16.10 Valves face to face and other relevant dimension.
- API-598 Valves inspection test.

4.0 SPECIFICATION FOR DESIGN/CONSTRUCTION OF BALL VALVES

4.1. All valves shall be suitable for the service conditions i.e. flow, temperature and pressure at which they are required to operate.

4.2. The valves as well as all accessories shall be designed for easy disassembly and maintenance.

4.3. Valves shall be stem properly protected against atmospheric corrosion.

4.4. The valves supplied shall be suitable for process water application

4.5. The valves shall be designed for the design pressure/temperature of the system on which it is installed and in accordance with AWWA-C-504, EN-593 or any other approved equivalent standard latest edition.

4.6. The seals, both on the body (sleeve) and on the ball shall be of the material specified. Necessary shaft seal shall be provided and adequately designed to ensure no leakage across the seal. This seal shall be designed so that they will allow replacement without removal of the valve shaft. The sealing ring on the disk shall be continuous type and easily replaceable.

4.7. For all types of valves, the design with shaft eccentric to the ball is preferred. The shaft shall be solid type and shall pivot on bushings. Bushings/sleeve type bearings shall be contained in the hub of valve body. The bearing shall be self-lubricated type with low coefficient of friction and should not have any harmful effect on water and on valve components.

4.8. The design of the shaft/stem shall be such that it will safely sustain maximum differential pressure across the closed valve. The shaft and any key (taper pin etc.) for transmitting the torque between shaft and ball shall be capable of withstanding the maximum torque required to operate the valve. However, the shaft diameter shall not be less than the minimum shaft diameter specified in relevant code. Necessary Torque Calculation and the torque class selected on the basis of the same shall be furnished to the Employer for information.

4.9. The ball shall rotate from the full open to the tight shut position. The ball shall be contoured to ensure the least possible resistance to flow and shall be suitable for throttling operation. While the ball is in the throttled position, valve shall not create any noise or vibration. The operating mechanism shall be mounted directly on or supported from the valve body.

4.10. All valves shall be complete with: position indicator (located in a visible place), arrow indicating the flow direction; adjustable mechanical stop limiting devices to prevent over travel of ball in open/close position; all valves shall be "tight shut off"

4.11. Limit and torque switches (if applicable) shall be enclosed in water tightenclosures along with suitable space heaters for motor actuated valves,which may be either for On-Off operation or inching operation withposition transmitter.

4.12. All valves shall be provided with embossed name plate giving complete details such as tag number, type, size etc.

4.13. The actuator-operated valves shall be designed on the basis of the following

(1) The internal parts shall be suitable to support the pressure caused by the actuators;

(2) The valve-actuator unit shall be suitably stiff so as not to cause vibrations, misalignments, etc.

(3) All actuator operated valves shall be provided with hand operated gearing mechanism also.

(4) All actuators operated valves shall open/ close fully within time required by the process but not later than 60 seconds after actuators starts.

5.0 MATERIAL OF CONSTRUCTION (BALL VALVES)

Materials and other design details shall be as indicated below:

VALVE TYPE	2-WAY , BALL , FULL BORE , 3 PIECE DESIGN, FLOATING MOUNTING
VALVE SIZE	ENCLOSED TABLE
BODY MATERIAL	CARBON STEEL A216 GR.WCB
BONNET TYPE & MATERIAL	Vendor to Specify
END CONNECTION	Flanged, ANSI B 16.34
RATING	Vendor to specify
BALL MATERIAL	SS 316
GLAND PACKING	GRAPHITE ASBE/ TEFLON
Disc	SS304
SEAT MATERIAL	PTFE / TEFLON
LEAKAGE CLASS	CLASS IV
MAX SOUND LEVEL	<80 dBA
STEM MATERIAL	SS 304

6.0 PROOF OF DESIGN TEST (TYPE TEST) FOR BALL VALVES

6.1 Proof of Design (P.O.D.) test certificates shall be furnished by the bidder for all applicable size-ranges and classes of Ball valves supplied by him, in the absence of which actual P.O.D. test shall be conducted by the bidder in the presence of Employer's representative.

6.2 All valves that are designed and manufactured as per AWWA-C-504 shall be governed by the relevant clauses of P.O.D test in AWWA-C-504. For Ball valves designed and manufactured to EN-593 or equivalent, the P.O.D. test methods and procedures shall generally follow the guidelines of AWWA-C-504 in all respect except that Body & seat hydro test and disc-strength test shall be conducted at the pressures specified in EN-593 or the applicable code. Actuators shall also meet requirements of P.O.D. test of AWWA-C-504

7.0 SPECIFICATION FOR PNEUMATIC ACTUATOR

a) Quantity : 01 No. for each valve
b) Type : Rotary actuator, Pneumatic (spring return)
c) Action : Air to Open
d) Failure position (air failure) : Close
e) Close/open at air Pressure : 4 to 6 kg/cm^{2}optg design for 4 kg/cm^2
e) Air Connection : ¼" NPT(F) drawn copper tubing

f) Local Position Indicator	: To be provided.
g) Hand wheel for manual operation	:Required (> 8 inch)
h) Actuator travel time	: Vendor to specify
i) Actuator Protection Class	: IP-65 (Min)
j) Actuator Thrust	: Vendor to specify
k) Spring range (kg/cm2)	: Vendor to specify
l) Speed adjustmentfor actuator operation	: Vendor to specify
m) 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.
n) 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. 2" Pressure gauge along with air filter to be provided.

8.0 LIMIT SWITCHES:

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

9.0 PAINTING OF VALVES:

As per enclosed Annexure-8. Bidder to note that If during transport, unloading/unpacking or erection at site any part of the painted surface gets damaged, the same shall be made good by the contractor by repainting with compatible painting primer and enamel to the satisfaction of the project manager.

10.0 INSPECTION

Inspection shall be done at vendors works by BHEL as per the approved Quality Plan (QP) submitted by the vendor.

11.0 DOCUMENTS AND 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- 5** in the enclosed format.
b. Duly filled up data sheet for each pneumatic actuator as per **Annexure- 6** in the enclosed format.
c. Detailed assembly drawing with overall dimensions.
d. Valve cross sectional drawings with Bill of Material including the material specifications.
e. Valve Regulation Characteristic Curve.
f. Cv calculation.
g. List of applicable standards for shop test.
h. Reference list for the offered model.
i. Typical Quality Plan (QP)for supply of the above equipments.
j. Valves Catalogues.
k. List of commissioning spares.
l. Recommended spares list for 3 year O&M along with item wise price.
m. Any deviation shall be specifically mentioned in the enclosed deviation format **Annexure- 7.**

In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in **Annexure - 7**. If there is no deviation "**NIL**" statement shall be furnished. In the absence of **Annexure- 7**, 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.

12.0 DOCUMENTS / SERVICE AFTER ORDER

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

- Duly filled up data sheet in the enclosed format (for both Valves and Actuator)
- Detailed assembly drawing with overall detail dimensions
- Valve cross sectional drawings with Bill of Material including the material specifications.
- C_v Calculation
- Final Quality Plan for approval

12.2. 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

13.0 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.

14.0 GUARANTEE:

Vendor to provide guarantee for a period of 12 months from the date of commissioning or 24 months from the date of supply whichever is earlier.

DETAILED LIST OF VALVES WITH OPERATING PARAMETERS

ANNEXURE - 1

INDENT NO.RFW 00071
MATERIAL CODE :RFW 000710002

Valve type	**Ball Valve**
Service	**Isolation**
Valve size	**1 inch**
Process Liquid	**Cooling water**
Mode of Operation	**Pneumatically operated Ball Valves**

Sl.No.	Valve / Instrument Tag No.(for instrument isolation)	Operating Conditions		Design Conditions		Material of Description			End Connection (FLD = Flanged Connection)	Quantity
		Temp (°C)	Pressure (Kg/cm^2)	Temp. (°C)	Pressure (kgf/cm^2)	Body Material	Disc	Stem		
1.	10HTQ30AA201	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1
2.	10HTQ30AA202	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1
3.	20HTQ30AA201	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1
4.	20HTQ30AA202	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1
5.	30HTQ30AA201	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1
6.	30HTQ30AA202	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1

ANNEXURE - 2

INDENT NO.RFW 00071

MATERIAL CODE :RFW 000710001

Valve type	Ball Valve
Service	Isolation
Valve size	4 inch
Process Liquid	Process water
Mode of Operation	Pneumatically operated Ball Valves

Sl.No.	Valve / Instrument Tag No.(for instrument isolation)	Operating Conditions		Design Conditions		Material of Description			End Connection FLD = Flanged Connection	Quantity
		Temp (°C)	Pressure (Kg/cm^2)	Temp. (°C)	Pressure (kgf/cm^2)	Body Material	Disc	Stem		
1.	10HTQ27AA218	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
2.	10HTQ27AA217	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
3.	10HTQ27AA216	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
4.	10HTQ27AA215	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
5.	10HTQ27AA214	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
6.	10HTQ27AA213	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
7.	10HTQ27AA212	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
8.	10HTQ27AA211	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
9.	10HTQ27AA210	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
10.	10HTQ27AA209	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
11.	10HTQ27AA208	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
12.	10HTQ27AA207	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
13.	10HTQ27AA206	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
14.	10HTQ27AA205	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
15.	10HTQ27AA204	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
16.	10HTQ27AA203	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1

29.05.12

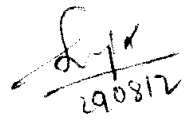
17.	10HTQ27AA202	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
18.	10HTQ27AA201	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
19.	20HTQ27AA218	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
20.	20HTQ27AA217	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
21.	20HTQ27AA216	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
22.	20HTQ27AA215	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
23.	20HTQ27AA214	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
24.	20HTQ27AA213	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
25.	20HTQ27AA212	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
26.	20HTQ27AA211	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
27.	20HTQ27AA210	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
28.	20HTQ27AA209	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
29.	20HTQ27AA208	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
30.	20HTQ27AA207	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
31.	20HTQ27AA206	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
32.	20HTQ27AA205	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
33.	20HTQ27AA204	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
34.	20HTQ27AA203	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
35.	20HTQ27AA202	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
36.	20HTQ27AA201	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
37.	30HTQ27AA218	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
38.	30HTQ27AA217	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
39.	30HTQ27AA216	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
40.	30HTQ27AA215	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
41.	30HTQ27AA214	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
42.	30HTQ27AA213	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
43.	30HTQ27AA212	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1

29/08/2...

44.	30HTQ27AA211	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
45	30HTQ27AA210	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
46	30HTQ27AA209	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
47.	30HTQ27AA208	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
48	30HTQ27AA207	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
49.	30HTQ27AA206	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
50.	30HTQ27AA205	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
51.	30HTQ27AA204	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
52.	30HTQ27AA203	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
53.	30HTQ27AA202	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
54.	30HTQ27AA201	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1

ANNEXURE - 3 - MANDATORY SPARES INDENT NO.RFW 20103 MATERIAL CODE :RFW 201030001	
Valve type	Ball Valve
Service	Isolation
Valve size	4 inch
Process Liquid	Process Water
Mode of Operation	Pneumatically operated Ball Valves

Sl.No.	Valve / Instrument Tag No.(for instrument isolation)	Operating Conditions		Design Conditions		Material of Description			End Connection FLD= Flanged Connection	Quantity
		Temp (°C)	Pressure (Kg/cm^2)	Temp. (°C)	Pressure (kgf/cm^2)	Body Material	Disc	Stem		
1.	M1-BV-PN-PW-4	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
2.	M2-BV-PN-PW-4	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1
3.	M3-BV-PN-PW-4	50	4.5	100	10	A216 WCB	SS304	SS304	FLD	1



ANNEXURE - 4 - MANDATORY SPARES

INDENT NO.RFW 20103

MATERIAL CODE :RFW 201030002

Valve type	**Ball Valve**
Service	**Isolation**
Valve size	**1 inch**
Process Liquid	**Cooling Water**
Mode of Operation	**Pneumatically operated Ball Valves**

Sl.No.	Valve / Instrument Tag No.(for instrument isolation)	Operating Conditions		Design Conditions		Material of Description			End Connection. FLD =Flanged Connection	Quantity
		Temp (°C)	Pressure (Kg/cm^2)	Temp. (°C)	Pressure (kgf/cm^2)	Body Material	Disc	Stem		
1	M1-BV-PN-PW-1	36	4	80	7.5	A216 WCB	SS304	SS304	FLD	1

ANNEXURE-5 DATA SHEET FOR VALVES (To be filled by the Vendor)

I. TECHNICAL PARAMETERS

A. 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 :
(whatever applicable) - Ball :
- Stem :
- Disc :
- Seat :
- Bushing :
- Handle :
- Fasteners :
b. End Connection / Rating / Standard :
c. Recommended minimum pipe ID mm :
d. Details of Gearbox if applicable :

III. GENERAL

a. Weight per valve :
b. Applicable standards :
c. Valve GA Drawing / Cross Sectional Drg. :
d. Enquiry reference :

29.08.12

ANNEXURE- 6 DATA SHEET FOR PNEUMATIC ACTUATOR (To be filled by the Vendor)

1) ACTUATOR

a) Make :
b) Model :
c) Type :
d) Torque rating :
e) Air consumption :
f) Operating time for opening :
Operating time for closing :
g) Accessories offered :
h) Type of stay put :
i) Air Connection :

2) LIMIT SWITCH

a) Make :
b) Type :
c) Quantity :
d) Contact rating :
e) Reset type :

NOTE:

Vendor shall fill up the data sheets and submit a signed copy of this specification along with his offer.

Vendor's Signature & Seal

FORM FOR TECHNICAL DEVIATIONS (If any)

ANNEXURE-7 - LIST OF TECHNICAL DEVIATION (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 - 8 PAINTING PROCEDURE

Primer Coat		Intermediate Coat		Finish coat			Total DFT µm (min)
Paint	No of Coats /DFT	Paint	No of Coats	Paint	No. of Coats	Shade	
HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50 µm per coat (Solid by Volume min 60%)	2	--	--	Chlorinated Rubber Based Finish paint DFT= 30 µm per coat (Solid by Volume min 60%)	2	Gray shade to R9002	160