ANNEXURE-C TO TENDER BAP/FGD/2012/ 01-7

BONGAIGAON– 3X250 MW
FLUE GAS DESULFURIZATION SYSTEM

TECHNICAL SPECIFICATION FOR
MANUALLY OPERATED BUTTERFLY
VALVES FOR DUCT CONDENSATE

CUSTOMER : NATIONAL THERMAL POWER CORPORATION LIMITED

NTPC: BONG: FGD: WVALVES-BUTTERFLY VALVE SPEC-040: REV-00

Flue Gas Desulphurization Group
Air Quality Control Systems
BAP: BHEL: Ranipet

TECHNICAL SPECIFICATION FOR MANUALLY OPERATED BUTTERFLY VALVES FOR DUCT CONDENSATE

Prepared	Checked	Approved
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R00 dated 07 09 2012		

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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)	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 Butterfly valves along with their accessories /auxiliaries for use in the process of Flue gas Desulphurization (FGD) system handling duct condensate.

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-III)". 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.

- API-600 Steel gate valves.
- AWWA-C-504 Rubber seated butterfly valves.
- BS-5155/EN-593 Cast iron and carbon steel butterfly valves for general purpose.
- ANSI-B-16.10 Valves face to face and other relevant dimension.
- API-594 Standard for Dual-check valves.
- API-598 Valves inspection test.

4.0 SPECIFICATION FOR DESIGN/CONSTRUCTION OF BUTTERFLY VALVES

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

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

3.3. Valves to be installed outside shall be required to have the stem properly protected against atmospheric corrosion

3.4. The valves supplied shall be suitable for duct condensate application

3.5. 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.

3.6. The valves shall be suitable for installation in any position (horizontal/ vertical etc.) and shall be of double-flanged construction. However for sizes 150 NB and below the valves may be lugged Wafer construction.

3.7. The seals, both on the body (sleeve) and on the disc 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.

3.8. For all types of valves, the design with shaft eccentric to the disc 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.

3.9. The design of the shaft 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 disc 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.

3.10. The disc shall rotate from the full open to the tight shut position. The disc shall be contoured to ensure the least possible resistance to flow and shall be suitable for throttling operation. While the disc 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.

3.11. 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 valve disc in open/close position; all valves shall be "tight shut off"

3.12. Hand operated valves shall have the following

3.12.1. Local hand controls

3.12.2. The hand controls shall close the valve with clockwise rotation.

3.12.3. The hand controls shall be dimensioned to guarantee an easy manoeuvre under most severe conditions.

3.12.4. The hand controls shall be provided with locking systems suitable to avoid the disc assuming a non-desirable position during the operation.

3.13. Hand wheel shall be made of malleable iron with arms and rims of adequate strength. The hand wheel of diameters 300mm or less shall be provided with handles for ease of operation. The pulling force required on the hand wheel rim shall not exceed 25 Kgf when operating the valve under full flow and operating pressure.

3.14. Valves-350Nb and above shall have pressure equalizing bypass valves, wherever system parameters warrant the same.

3.15. Valves-350Nb and above shall also be provided with gear operator arrangement suitable for manual operation. Manual operation of valve shall be through worm and gear arrangement having totally enclosed gearing with hand wheel diameter and gear ratio designed to meet the required operating torque It shall be designed to hold the valve disc in intermediate position between full open and full closed position without creeping or fluttering. Adjustable stops shall be provided to prevent over travel in either direction.

3.16. Fabricated steel (IS:2062 Gr B) butterfly valves instead of cast Iron body valves are also acceptable for size above 300 mm NB diameter for water application other than Sea-water / corrosive water. In such a case, however, the bidder will have to necessarily submit thickness calculations, in order to establish the integrity of the fabricated valve body under the system operating pressure condition.Bidder has to clearly indicate the material offered in the bid. No change shall be entertained during detailed engg.

5.0 MATERIAL OF CONSTRUCTION (BUTTERFLY VALVES)

Material of Gate valves for flue gas application shall be as per enclosed **Annexure – I** or its equivalent.

Material for counter flanges shall be the same as for the piping

6.0 END CONNECTIONS

End connection for Gate valves shall be as per enclosed **Annexure-I.**

7.0 PROOF OF DESIGN TEST (TYPE TEST) FOR BUTTERFLY VALVES

Proof of Design (P.O.D.) test certificates shall be furnished by the bidder for all applicable size-ranges and classes of Butterfly 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. 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 Butterfly 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

8.0 NAME PLATES

Each valve shall be marked with rating plate or nameplate or label designating the tag number and service of the item etc.

9.0 PAINTING OF VALVES:

The detailed painting procedure is enclosed in **Annexure-IV**.

10.0 INSPECTION

The valves shall be inspected at Vendor's works by BHEL Engineer as per the approved quality plan submitted by the Vendor.

11.0 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-III**.

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

statement shall be furnished. In the absence of **Annexure-III**, 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.
- Detailed assembly drawing with overall dimensions.
- Valve cross sectional drawings with Bill of Material including the material specifications.
- C_v Calculation
- Quality plan

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

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

ANNEXURE-I

15.0 DETAILED LIST OF VALVES WITH OPERATING PARAMETERS:

Indent no	RFW00086
Material Code	RFW000860001
Process Liquid	Duct Condensate Application
Service	Isolation
Type of valve	Butterfly Valve
Mode of Operation	Manual
Size	4 inch

S. No	Valve / Instrument Tag No	Operating Conditions		Design Conditions		Material of Construction				End Connection (WFR-Wafer)	QTY
		T (°C)	P (Kg/cm²)	T (°C)	P (Kg/cm²)	Body Material	Disc	Stem	Lining		
1	10HTA01AA005	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
2	10HTA01AA006	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
3	10HTA01AA007	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
4	10HTA01AA008	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
5	20HTA01AA005	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
6	20HTA01AA006	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
7	20HTA01AA007	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
8	20HTA01AA008	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
9	30HTA01AA005	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
10	30HTA01AA006	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
11	30HTA01AA007	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1
12	30HTA01AA008	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1

Mandatory Spares:

Indent no	**RFW20116**
Material Code	**RFW201160001**
Process Liquid	**Duct Condensate Application**
Service	**Isolation**
Type of valve	**Butterfly Valve**
Mode of Operation	**Manual**
Size	**4 inch**

S. No	Valve / Instrument Tag No	Operating Conditions		Design Conditions		Material of Construction				End Connection (WFR-Wafer)	QTY
		T (°C)	P (Kg/cm²)	T (°C)	P (Kg/cm²)	Body Material	Disc	Stem	Lining		
1	M1-BFV-DC-MN-4	50	ATM	100	7.5	A216 WCB	A216WCB	A182 Gr. 304	NATURAL RUBBER	WFR	1

Note:

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

ANNEXURE-II

16.0 DATA SHEET FOR VALVES

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 (whatever applicable)
- Body :
- 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 / PO reference :

NOTE:

Vendor should fill up data sheet and submit a signed copy of this with his offer.

Vendor's Signature & Seal

ANNEXURE-III

17.0 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-IV

18.0 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%)	3	Gray shade to R9002	160