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	Purchase Specification of				CDE - 19 – 3438	
	Rubber (Ebonite) Lined Butterfly Valves				Rev. No. 00	Page : 1 of 8

This specification covers requirements of butterfly valves along-with electro hydraulic actuator which include design, material procurement, preparation of drawing & getting approval from BHEL and customer, vendor approval from customer, manufacturing, inspection & testing as per the approved QAP, packing & dispatch of butterfly valves complete with all accessories required for successful operation.

1) General Requirements

- a. Butterfly Valves shall be offered as per the specifications as mentioned herein.
- b. GA & cross sectional drawings showing dimensions and MOC of major items, valve datasheet along with applicable quality assurance plan (QAP), paint schedule, test procedure and actuator datasheet & wiring diagram (in case of electrical) drawing need to be submitted for approval after award of contract. Documents other than above if required by customer (end user) shall be submitted by bidder as and when asked.
- c. BHEL's/Customer's representative shall be given access to the shop in which butterfly valves are being manufactured and tested. All test records shall be made available to BHEL's/Customer's representative.
- d. Erection & commission of equipment at site are excluded from the bidder's scope without affecting the guarantee & warranty associated with the offered butterfly valves in all respect.
- e. Optional Price (Not part of bid evaluation) - Bidder to submit price schedule in open condition (i.e. not through sealed bid) in Technical bid for deputation of their service engineer afterwards for our reference. This price schedule for deputation shall not be used for bid evaluation however prices shall be negotiable with the bidder. This optional offer shall be valid up to 6 months from the actual delivery date of main equipment. (i.e. 6 months from the last date of supply of item)
- f. Any special tools, tackles & touch up paint etc. if required, for service action as spelt at S. No. 1(d) & (e) above shall be in bidder's scope.

2) Scope of supply

Butterfly valves are required as per the details and the requirements mentioned in this specification. Refer **Annexure-I** for technical details along-with other associated scope of butterfly valves.

BF Valve price shall be quoted for complete scope (i.e. BFV ready for use condition) which shall comprise of items mentioned at (a) below

Revision History	Rev.	Date		Name	Sign	Date
First Issue	00	28.08.19	Prepared	Sarvesh Asthana	--SD/--	28.08.2019
			Checked	Santosh Mahto	--SD/--	28.08.2019
			Approved	S. K. Biswas	--SD/--	28.08.2019

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a. List of items in the scope of supply:- (Use Price bid format)

1. BF Valve
2. BF valve Operator, i.e., Electrical/Manual/Manual with Limit Switch / Hydraulic Price)
3. Both side companion Flanges along-with associated Gasket & Hardware
4. Price for additional items if any (as mentioned in **Annexure-I**).
5. Mandatory spares.

Note:- Any items other than as listed above, if required “for ready to use for operation of BFV” shall be deemed to be included in above list along with their prices.

b. Price Schedule Spares –

b1. Mandatory Spares

- i) Gland packing – 2 Sets
- ii) Bearing – 2 Sets
- iii) Rubber seal - 2 sets

Note – 1 Set of quantity means, quantity applicable for 01 no. of B. F. Valve Assembly.

b2. Recommended Spares – These items to be listed by bidder along with item, unit rate, but will not be used for bid evaluation.

3) Design & Construction Requirements

- a) Butterfly valves shall be designed for the design pressure & temperature of the system where it is installed and in accordance with AWWA C504 / **C516**, EN-593 standard (Latest edition) and Valve Class rating shall be selected accordingly. Valve Class Rating is to be clearly mentioned in the offer. **Hydro test & seal leak test pressure shall be as per Annexure-I only.**
- b) In case of any contradiction between reference standard and this specification, the provisions of this specification will prevail.
- c) Butterfly Valves shall be of **bi-directional type with** double flanged construction (for welded neck piece if applicable – refer **Annexure-I**) and shall be complete with actuating mechanism, matching counter flanges (if any) and all associated bolts, studs, nuts, gaskets and lifting lugs. For additional item if any, refer **Annexure-I**.
- d) Butterfly Valves shall be suitable for the stated service conditions (i.e. flow, type of fluid, design temperature and pressure) as mentioned at **Annexure-I**.
- e) Butterfly valves shall be designed to ensure drop tight shut off at rated pressure.
- f) The Sealing ring on the disk shall be continuous type and easily replaceable. Shaft seal shall be designed such that replacement can be made without valve shaft removal.
- g) For all types of valves, the design with shaft eccentric to the disc is required. The shaft shall be solid type and shall pivot on bushings.
- h) Bearing / Bushing shall be self-lubricated type with low coefficient of friction and should not have any harmful effect on water and on valve components. The housing for bearing shall be rigidly attached to the valve body and shall be protected from dirt and sand particles by suitable seals.
- i) A thrust collar shall be provided to hold the disc secured in the center.
- j) Design of shaft shall be such that it will safely sustain maximum differential pressure across the closed valve. The shaft shall be connected to the disk through keys or taper pins or screws of stainless steel. The connections shall be designed so as to avoid looseness during the operation, moreover, they shall be provided with suitable disassembling systems.

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- k) The shaft and any key for transmitting the torque between shaft and disc shall be capable of withstanding the maximum torque required to operate the valve. However, shaft diameter shall not be less than the minimum shaft diameter specified in relevant code.
- l) The disc shall rotate from 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 disc is in throttled position, valve shall not create any noise or vibration.
- m) Lifting arrangement provision i.e., lifting lugs, eye bolts for handling of valve shall be provided.
- n) **Flange shall comply with the design standard as already mentioned in para 3.a. Face to face dimension of the complete butterfly valves shall be as per applicable AWWA C504 / C516, EN-593 standard only.**
- o) Hydraulic operation of valve shall be designed to meet the required operating torque. It shall be designed to hold the valve disc in intermediate position between full open and full close position without creeping or fluttering.
- p) Adjustable mechanical stops shall be provided to prevent over travel in either direction.
- q) Hydraulic Operator (if any) with all associated items for successful operation of B.F. Valves to be procured from BHEL approved Vendor M/s BOSCO REXROTH (India) Ltd. / Hydac (India) Pvt. Ltd. / Parker Hanifin India Pvt. Ltd. / Yuken India Ltd. only.

4) **Material of Construction (Butterfly valves)**

Material of construction (MOC) for major components of butterfly valve shall be as as mentioned below. MOC for the remaining parts shall be as per relevant standard governing the valves and to suit the service condition. Material used in manufacturing shall be of tested quality and suitable for the operating fluid as mentioned herein.

Items	Material description
Butterfly Valve Body & Disc	Grey Iron Casting to IS 210 Gr 260 with Rubber (Ebonite) Lined 4.5mm TK (minimum) for Valve of size 1200NB and below.
	Fab. IS 2062 Gr B with Rubber (Ebonite) Lined 4.5mm TK (minimum) for Valve of size above 1200NB.
Valve Shaft	Duplex SS forging to A-182 Gr.F51/53 or A-479 UNS32205
Seat ring*	Duplex SS
	*(Seat Ring Integral to body is not acceptable)
Valve Seal	EPDM
Seal Retaining Ring SS	SS 316L
Bearing	Self-Lubricating type (SS backed PTFE is also acceptable)



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- External / Internal Hardware including the hardware for counter flange. - **SS 316L**
- Counter Flanges (if any) [Refer Note under Cl. 3.c also] - **Carbon Steel to IS 2062 Gr B**
- Actuators/Sec. gear box - as per attached Actuator Specification
(Suitably painted as per the approved Painting scheme)

Note Above mentioned requirements are the bare minimum requirement for butterfly valves and no deviation to above be acceptable in any case to BHEL Bhopal. However better or equivalent material can be used subjected to prior approval from BHEL.

5) Quality Assurance Plan (QAP)

QAP shall be complete in all respect and including of all stage inspections from raw material, BOIs, in process, assembly & testing, painting, packing & dispatch. Wherever mentioned is the minimum requirement, however, bidder to take due care for relevant checks & testing requirement while submitting the QAP & test procedure with offer. It is to be mentioned that the QAP shall be submitted to customer for approval. Comment (if any) shall be incorporated without any price implication.

6) Proof of Design Test (Type test) for Butterfly valves & Valve Operators

a) All valves that are designed and manufactured as per AWWA C-504 / **C-516** shall be governed by the relevant clauses of POD test in AWWA C504 / **C516**. For Butterfly Valves designed and manufactured to EN-593, the POD test methods and procedures generally follow the guidelines of AWWA C504 / **C516** in all respect except that Body, seat hydro test and disc-strength test shall be conducted at the pressures specified in EN-593.

b) **Proof of design (POD) test certificates as per AWWA standard for each size group and class of offered butterfly valves with offered seat design & MOC (duly certified by third party) along with test report consisting of test procedure etc. shall require to be done and to be furnished after award of contract (before delivery of the item).**

Note

In case POD test to be conducted as new, same is required to be done successfully preferably within maximum 03 months from the date of document / drawing approval from BHEL.

c) No separate charges shall be payable by BHEL against any such testing to be carried out by bidder to the offered valves.

d) Valve operator shall also be designed & tested in accordance with latest edition of AWWA C504 / **C516**. Actuators shall also meet the requirements of POD test of AWWA C504 / **C516**. POD test reports & certificates for valve operators shall also to be submitted along with offer for verification.

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7) Inspection and testing All inspection and testing for valve and valve operators shall be as per approved QAP. However, in case of award of contract, final inspection and testing shall be carried out by customer (end user) / customer appointed inspection agency / BHEL appointed inspection agency / Jointly by Customer & BHEL/BHEL appointed TPA - as per approved quality plan, drawings and other approved documents without any price implication. In case of inspection by both BHEL and customer, joint inspection can be carried out at bidder's works. Bidder to give minimum 15 (Fifteen) days prior intimation for joint inspection. a) Operation test (at the works of valve manufacturer) : The complete valve assy. along-with the valve operator shall be shop operated keeping the door in horizontal position as follows. Under no pressure condition : The valve to be operated for 25 cycles from fully closed to fully opened and vice versa. Checks shall be for free movement of valve door, open / close timings, operation of limit / torque switches and operation of position indicator. 8) Performance Guarantee The bidder shall guarantee the material & workmanship of all the components as well as operation of equipment as per the requirements of this specification. The valves and all accessories shall be designed so as to guarantee an easy disassembling and maintenance. All valve components and accessories shall be interchangeable. Supplier should give performance guarantee of the complete BF Valve Assembly for 36 months from the date of supply or 24 months from the date of commissioning whichever is earlier. 9) Protection & Paint a) Exterior / External Surface After surface preparation, all exterior & interior surfaces shall be painted as per the painting scheme (duly approved by BHEL). Surface preparation includes removal of grease, dirt, rust & scale followed by blast cleaning. Machined surface shall be protected suitably while blast cleaning and shall be applied with temporary oil based rust preventive. Primer and intermediate paint shall be chemical resistance epoxy type, finish paint shall be of Polyurethane type. Total minimum DFT = 290 microns (Primer = 90 microns, intermediate – epoxy high solid = 150 microns and Finish = 50 microns).				

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