



BHPAL

Condenser & Heat Exchanger Engg. Division

Purchase Specification of

Rubber (Ebonite) Lined

Butterfly Valves with Electro Hydraulic Actuator

Document No.

CDE - 19 – 3442

Rev. No. **00**
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a. List of items in the scope of supply:- (Use Price bid format)

1. BF Valve
2. BF valve Operator (power pack unit, hyd. Cylinder, hyd. Oil, Control panel, etc.)
3. Both side companion Flanges along-with associated Gasket & Hardware
4. Complete foundation items (e.g. foundation plate, associated fasteners, etc.) required for erection of valves.
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 and shall be complete with Electro Hydraulic Actuating mechanism along-with power pack unit (for successful operation of the valve at site), matching counter flanges and all associated bolts, studs, nuts, gaskets and lifting lugs.
- 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 standard BS EN-1092-1. 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 with all associated items for successful operation of B.F. Valves to be procured from NTPC approved vendors (e.g. M/s BOSCO REXROTH (India) Ltd. / Hydac (India) Pvt. Ltd. / Parker Hanifin India Pvt. Ltd. / Yuken India Ltd.) / etc. These are for reference purpose only. Butterfly Valve supplier to confirm regarding having NTPC approval from whom the Hydraulic Operator shall be procured and same is required to be submitted along-with the enquiry documents.

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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COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	- External / Internal Hardware including the hardware for counter flange. - <u>SS 316L</u> - Counter Flanges (if any) [Refer Note under Cl. 3.c also] - <u>Carbon Steel to IS 2062 Gr B</u> - 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) <u>Quality Assurance Plan (QAP)</u> 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) <u>Proof of Design Test (Type test) for Butterfly valves & Valve Operators</u> a) All valves that are designed and manufactured as per AWWA C-504 / <u>C-516</u> shall be governed by the relevant clauses of POD test in AWWA C504 / <u>C516</u>. For Butterfly Valves designed and manufactured to EN-593, the POD test methods and procedures generally follow the guidelines of AWWA C504 / <u>C516</u> in all respect except that Body, seat hydro test and disc-strength test shall be conducted at the pressures specified in EN-593. b) <u>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).</u> 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 / <u>C516</u>. Actuators shall also meet the requirements of POD test of AWWA C504 / <u>C516</u>. POD test reports & certificates for valve operators shall also to be submitted along with offer for verification.			

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COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	7) <u>Inspection and testing</u> 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) <u>Operation test (at the works of valve manufacturer)</u> : The complete valve assy. along-with the actuator 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) <u>Performance Guarantee</u> 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) <u>Protection & Paint</u> a) <u>Exterior / External Surface</u> 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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COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	b) <u>Interior / Internal Surface</u> Minimum 4.5mm TK Rubber (Ebonite) Lining. 10) <u>Packing & Dispatch</u> a) After testing, each valve shall be drained, cleaned, dried completely and suitably protected in sturdy wooden box so as to avoid damage during transit and storage. Following details shall be mentioned on each box as bare minimum. • Name of the manufacturer. • BHEL P.O. No. – on box and valve both. • Month and year of manufacture. – on box only. • Valve size with Tag No. - – on box and valve both. b) BF Valve is to be dispatched as per the shipping schedule (already furnished to BHEL) in assembled condition with sec. gearbox / Actuator with Gear Box without any risk of damage to disc, seat, mating surfaces, and painting. Accessories such as companion flanges, gasket (cut-proof condition), elec. actuators and loose hardware (in rustproof condition) can be dispatched separately. 11) <u>Deviation</u> Deviation from our requirement (if any), needs to be clearly mentioned & listed in separate sheet during enquiry stage only. It is BHEL's prerogative to accept such deviation during offer evaluation. 12) <u>Drawing/Documents to be submitted along with the bid</u> a) Complete cross-sectional arrangement of valve showing MOC of major parts, hydraulic operator assembly (power pack unit, hyd. Cylinder) & all accessories with dimensions, valve weight, actuator assembly weight, O/C timing, design & test pressure and other technical details. b) Test Certificates (test results) of POD test for offered valve as per AWWA C504 / <u>C516</u> along with test procedure and test set up. c) Painting schedule. d) Actuator sizing calculation, torque & shaft sizing calculation, valve characteristic & pressure drop curves applicable for offered valves. e) List of sub-vendors for BOIs. f) Deviation (if any) to be mentioned in separate deviation sheet in totality. Else to be mentioned as "Nil". g) This specification duly signed and stamped as acceptance of all technical parameters.			

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13) Drawing/Documents to be submitted for approval after award of contract

- a) GA drawing & BF Valve datasheet.
- b) Detail QAP & Test Procedure.
- c) Companion flange drawing with detail of gasket & hardware.
- d) Datasheet, drawing (power pack with foundation details, servomotor, control panel, etc.), schematic & hydraulic control diagram, control logic diagram, etc. (as applicable).
- e) Shipping/Packing schedule for dispatch of valve and accessories.
- f) O&M Instruction Manuals
- g) **For power Pack Unit :**
 - g.1 A quality plan covering all the above test and other test normally shall be carried out by the supplier shall require to be furnished along-with the offer.
 - g.2 Following test shall be carried out and test certificates shall be accordingly furnished.
 - a) Material test for components for all the devices mounted on the power pack unit.
 - b) Hydraulic pressure test for all the hydro mechanical devices.
 - c) 4.3 Type and routine test for electric motors.
 - d) 4.4 Performance test for power pack unit.
 - e) 4.5 Hydraulic pressure test for inert gas accumulator.

Note –

- 1. Material is required to be dispatched as per shipping/packing schedule.
- 2. Material test certificates, shop test reports & certificates along with other inspection reports as per QAP (duly approved by BHEL) shall be furnished before dispatch.
- 3. Soft Copy of As built drawing and O&M Instruction Manuals are also required to be furnished before dispatch.
- 4. Heat Treatment to be carried out in furnace duly calibrated by NABL approved agency.
- 5. After Heat Treatment, proper surface cleaning / machining, items need to be DPT by ISNT / ASNT approved Level-II NDT Person only.
- 6. Any kind of weld repair is not permitted without prior permission from BHEL.
- 7. Chemical / Mechanical testing need to be carried out at lab having accreditation by NABL. In house instruments / machine can also be used for such testing subject to having valid calibration record (calibration done by any NABL approved agency). Own Spectrometer (duly calibrated using master calibration block in presence of BHEL-IA) can also be used for chemical testing.
- 8. Complete valve needs to be machined at the works of valve manufacturer. Hence valve manufacturer should have suitable in-house machining facilities. Minimum capacity of turn table for machining & overhead crane should be of 07 MT.

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