

SUPPLY AND DELIVERY OF BUTTERFLY VALVES

1 General Requirements

- (1) All the valves and fittings to be supplied shall be sized and fabricated to suit the existing set up. The Contractor shall take into consideration the space constraints at the site. All mechanical and civil modification works necessary to install the new valves and fittings shall be included in the contract sum.
- (2) Butterfly valves shall conform to BS 5155 or BS EN 593 unless otherwise specified herein. It shall be manufactured according to ISO 9001 Standards or its equivalent, and shall be at least PN 16.
- (3) All valves with pin holes passing completely through the disc or with disks constructed with shaft-pin holes exposed to the conveying medium will not be accepted. The valve stem and disc shall be firmly or solidly connected together by some mechanical means, preferably be connected together via spline shaft, however key-way design is also acceptable.
- (4) **Butterfly valves shall be of the centerline vulcanized rubber lined type design. The liner must be formulated and manufactured by the same valve manufacturer.**
- (5) The valves shall be equipped with internal body lining. The internal body resilient lining shall isolate the complete body interior surface from the water conveyed by ensuring leak tightness around the pipe flange and at the shaft. The protruding lips of the liner shall be thick and used as gaskets between the valve and the adjoining pipe flanges. Valve connections shall be made without the necessity of flange gaskets.
- (6) The liner must have bossings moulded at the back of the shaft passages to prevent deformation of the hole at the shaft passages.
- (7) The rubber liner must also have a moulded spherical concave at the shaft passages to achieve a permanent spherical contact with the disc hub.
- (8) The disc hub must have a spherically machine surface to match that of the spherical concave of the liner.
- (9) To have proper displacement of the liner during flanging, the rubber lined butterfly valve must have clearance on the circumference between the liner and the body on both sides of the valve.
- (10) The shaft and disc shall be on the same axis and the valve be fully bi-directional, i.e. capable of complete tight shut off under the full differential pressure (valve rating) in both directions. The sealing between the body liner and the disc at the shaft area will be fully leak tight and no leakage of water is allowed. The valve and the shaft shall be constructed without any packing gland. However, the shaft, bearing, internal part of the body shall remain unexposed to the water.
- (11) The valve shall not only provide a positive tight shut off at the fully closed position (90 degrees) but also at an angular allowance of a minimum ± 4 degrees off the fully closed position.
- (12) A mechanical position indicator shall be incorporated at the valve gearbox for the valves. The above indicator shall give a direct read-out of the spindle position. Lifting lugs on the body shall be provided for ease of installation and removal.
- (13) The valve must be so designed that there is no need for periodical or regular maintenance. The valve connection shall be double flanged type.

2 Valve Material

- (1) Body: Ductile iron to BS 2789/BS EN 1563 “Specification for spheroidal graphite or modular graphite cast iron”.
- (2) Disc: Stainless steel to BS 970/ (BS EN 10084 or BS EN 10085) stainless steel Type 316 or better
- (3) Shaft: Stainless steel to BS 970 420 S45
- (4) Body Lining: EPDM with WRA approval for potable water
- (5) External Coating: Two part liquid epoxy or fusion Epoxy. Minimum of 200 µm dry film thickness. The finishing color code shall be RAL 5005 (bleu)

3 Bolts and Nuts

- (1) Bolts shall be made of stainless steel Type 316 and provided with hexagon nuts.
- (2) The threads on bolts, stud bolts and nuts shall be of the coarse pitch series similar to that specified in BS 4504, PN16 or BS EN 1092.

4 Valve Testing

All butterfly valves shall be hydrostatically tested to BS 5155 or BS EN593 as follows:

- (1) Body Test
 - (a) Test to be carried out with water, the valve being mounted between two unrestrained flanges.
 - (b) The valve shall be fully assembled with the disc in the opened position. The hydrostatic test shall be performed at 1.5 times the rating pressure of the valve. The sealing between the disc and the liner at the shaft area shall be designed to withstand this pressure. No visible leakage from inside to outside shall be allowed.
- (2) Disc Strength and Seat Test

Test to be carried out with water, the valve shall be blanked on one side; the upper part being visible in order to see any eventual leak. This test is done at 1.1 times the rating pressure of the valve and conducted in 4 phases:

 - (a) The valve is fully closed and the test pressure is applied behind the disc: no visible leakage allowed.
 - (b) In order to demonstrate the positive sealing of the valves, the operator will re-open the disc to the minimum 4 degrees and keep the valve in this position: no visible leakage allowed.
 - (c) To demonstrate the valve is fully bi-direction the valve shall be refitted and tested on the opposite side in the fully closed position: no visible leakage allowed.
 - (d) Similar to phase (II), the operator shall re-open the disc to a minimum 4 degrees and keep the valve in this position: no visible leakage allowed.
- (3) Duration of maintaining the valve under test pressure shall be in accordance with BS 5155 or BS EN593.
- (4) The above tests shall be performed at the manufacturer’s premises. Two copies of test certificates shall be submitted to the S.O. for approval before the valves are dispatched. Should the valves fail the above tests, the Contractor shall either replace or rectify the defective valves at his own expense.
- (5) The Contractor shall also carry out hydrostatic tests on the valves at site before installation

and in the presence of the S.O. Test procedures phase (II) and phase (IV) can be omitted at the site test. If the valves fail in the site test, the Contractor shall either replace or rectify the defective valves at his own expense.

- (6) Butterfly valves shall meet the following test pressures:
 - (a) Leak Tightness Test (Seat Test) = 1.1 x Maximum Working Pressure
 - (b) Body Strength Test (Shell Test) = 1.5 x Maximum Working Pressure
- (7) The Contractor shall supply all necessary labour, material and equipment such as blank flanges, gauges, pump, bolts, nuts, etc. to carry out the valve tests. The cost of such tests shall be deemed to be included in the tendered price.
- (8) The Contractor shall submit valve test certificate with results of factory tests and inspection data for all the valves to be supplied under this Contract. Factory test certificates (2 copies) shall be forwarded to the S.O. before the valves are delivered to the site.

5 Dismantling Joint (Flange Adaptor) and Valve Installation

- (1) The Contractor shall supply dismantling joint (flange adaptor) for all the valves which are to be installed in the valve chambers.
- (2) The valve spindle shall be extended so that it can be operated from the top of the valve chamber.
- (3) The valve shall be mounted onto a support footing directly below the underside of the valve.
- (4) The Contractor is required to provide a deckstand for hand wheel operation.
- (5) Both the deckstand and spindle shall be properly supported.

6 Valve Marking and Identification

- (1) Each valve shall bear a stainless steel name plate with the following information engraved on it:
 - (a) Name of Manufacturer.
 - (b) Date of Manufacture.
 - (c) Manufacturing Standard – BS number etc., and internal/ external diameters
 - (d) Body Test Pressure.
 - (e) Seat Test Pressure.
 - (f) Disc Strength Test Pressure.
 - (g) Arrow showing the direction of water flow.
 - (h) Arrow showing the direction for opening/closing of valve.
- (2) The pressure rating and flow direction shall be cast onto the valve body. Direction of opening shall be engraved on the handwheel.

7 Valve Drawings

- (1) The Contractor shall submit typical detailed and dimensioned drawings of valves in duplicate, together with details of the types of materials used for various components of the valves offered, to the S.O. for approval. Such drawings shall be prepared entirely at the expense of the contractor and shall become the property of the Board.
- (2) The Contractor shall state the number of turns for full opening of each size of valves.
- (3) Failure to submit the required drawings will be treated as non-compliance with the specifications.

8 Manufacturer's Certificate and Test Reports

- (1) The Contractor shall submit to the S.O., a signed certificate from the manufacturer stating that all the valves supplied and delivered, comply in all respects with the provisions of BS 5155 or BS EN 593 and ISO 9001 together with the following test certificates/reports:
 - (a) Dimension check
 - (b) Type tests, including pressure, strength and functional tests
 - (c) Tensile test
 - (d) Chemical analysis
 - (e) Brinell hardness test
 - (f) Production pressure tests
- (4) (2) The original certificates and reports shall be submitted to the S.O. within 2 weeks from date of delivery of the valves.

9 Warranty

- (1) The Contractor shall ensure that that all the butterfly valves are installed in accordance with the recommendations of the valve manufacturer, to ensure the best performance of the valves, and to avoid damage and water leakage.
- (2) The Contractor shall ensure that the valves supplied in this Contract comply with the Specifications.
- (3) The Contractor is also required to confirm with the valve manufacturer that the lining and coating of the valves are of good material for protecting the valves against corrosion by the medium. The valves with their linings must be suitable for the medium application.

10 Rejection

- (1) Any valve which is damaged or is otherwise defective shall be rejected, and disposed of immediately, and the Contractor shall replace such defective or damaged valve.