

Butterfly Valve Manual

This valve is used to service medium of water, sea-water and oil product.

1. Working Theory and Design Standard

1.1 Standard

Design and Fabrication	API 6D
Face-to-Face Dimension	ASME B16.10
Flanges	API 609, ASME B16.34
Inspection and Test Standard	API 598

1.2 Butterfly valve is made of body, disc, stem, seat, stuffing box, gear etc..

1.3 Working Theory

Butterfly valve reduces turning speed by gear and brings the turns of stem in 90-degree scope, thus realizing open/close function.

2. Structure Brief

2.1 Butterfly valve adopts rubber or Teflon material as sealing face, which is able to reduce leakage.

Butterfly valve is able to be used on various pipes, which shares many advantages: such as its compact structure, fast closure, tightened sealing capacity, easy operation, long life extension, and small abrasion at the process of closure.

Since the valve is designed as a double offset structure, when the valve is fully open, disc

sealing is in a state of loosen. When the valve is fully close, the seal ring is compressed by the body and disc, thus causing the deformation. This kind of flexible sealing maximizes sealing capacity. The advantages are as below:

Sealing face precisely cooperates with body, which sufficiently avoids medium flushing, and prolongs valve's life extension.

2.2 Fast closure.

2.3 Double offset design, less abrasion, excellent sealing capacity.

2.4 Disc sealing material is made of high grade rubber or Teflon, which successfully resist against abrasion.

2.5 Limit switch device ensures right position of open/close.

2.6 Body, disc and stem have sufficient strength and flexibility, sealing can be changed inside the valve.

3. Shipment and Storage

3.1 Prepare before Transportation

Medium touching pars and stem are the key party of a valve, following measures are adopted.

- (a) Internal side of valve shall be cleaned with no dregs and stains to keep cleanness and dryness.
- (b) Valve closure parts shall be in the state of closing.

3.2 Lifting

Be cautious when lifting, throwing or falling down is utterly forbidden, especially hand-wheel and stem shall not be the lifting point.

3.3 Stocking

Problems when stocking is almost the same with preparation of delivery. Time is the key

factor, usually the butterfly valve stocking period is decided by its sealing material. If the valve has to be stocked for several weeks or months, better stocking conditions are needed. Valve usually stocked indoors need higher stocking ambient temperature than dew point. Valves stocked outdoors need support to make sure no contact with the earth, at the same time, water-proof cover shall be added to the valve.

4. Usage and installation

4.1 This valve is used in pipe with water-medium.

4.2 At any time pay attention to the sealing surface and shaft seal. When the sealing surface has abrasion or leakage, generally, pressed seal of the screw plate should be used to resolve, when the leakage occurred larger, the inner ring can be adjusted by adding one chip to be resolved, if there is damage to seals, plate seals can be removed and replace the seals, when the seal leakage occurs, packing gland can be adjusted or seal ring can be replaced.

4.3 Valve installation is the key factor to affect valves' life extension. Improper installation will reduce the valve performance. Following instructions shall be confirmed before installation:

(a) Carefully unpacking the cases, read the material, specification, tags and so on to make sure the valve is qualified to install.

(b) Do pay attention to the warnings on a valve tag, and follow instructions.

(c) Check the flow direction mark. If the valve is marked with flow direction, valve must be installed as per this direction.

(d) Check and find if the valve tunnel is clean, safe and without any corrosive substances. Get rid of packing and stuffings which blocks movement of a valve.

(e) Check if the pipings to connect valve are clean. If not, clean before installation.

4.4 Flanged Valve Installation

The capacity of piping flanges and valve depends on the deformation of gaskets. Acting force of bolting not only resists force to loosen the connection but also keeps necessary compressing stress. Take note that the force does not exceed the gasket load and pressure load. In order to ensure a good connection, the following instructions shall be noted.

(a) Check flange surface, if any defect appears leakage, groove or impress, repair before installation.

(b) The installation requests of Cast iron flange are more than the ductile cast iron. It is recommended that low-strength steel bolted connections be used to reduce the possibility of exceeding the specified stress in the flange due to excessive pre-compression forces. Flat flanges should be equipped with flat flange gaskets to prevent the flanges from being damaged due to excessive bolt torque. Raised face flanges should not be confused with raised face flanges. In cast iron flange connections, the top should be installed as tight as possible to ensure that the bolts and gaskets have appropriate compression force without excessive load.

(c) Check the gasket material. For low strength bolting connected flanges, iron flanges or low pressure steel flanges, metal gasket shall not be used.

(d) Gasket has the capacity of resisting deformation and damage.

(e) Check the concentration of assemble-part flanges. Lubricate the threads of bolts. Bolts shall be fasten sequential to make sure level contact between flange and gasket.

Additionally, as described above, bolts shall be fastened by a torque wrench. If the torque changes when fastening, bolts must be deformed and is must be abandoned.

5. Test and Adjust

After strict check and installation, valve shall be in a good state and ready to be operated. However, valve and the whole service system are under the last phase of danger. Only testing can testify its performance.

At this time, stem sealing and packing shall be checked. Stuffing cover shall be at the initial position.

6. Operation and Maintenance

6.1 Valve is the special product that has regular movement and frictions. In order to get satisfactory performance, some parts of machine parts shall be carefully protected.

In the proper state of pressure, medium, temperature, consecutive life-extension of a valve will be no less than 6 years.

For most valves operated by hand-wheel, wrench and handles, pay attention to the operation speed, neither too fast nor too slow, and exert force at proper position. End position is vital important to valve performance.

In a Close position, ball shall be at right position to seat.

When the closure parts of the valve seat are closed to the campaign and leave the valve seat, the valve sealing performance partly depends on the relative pieces of stem-driven closure of the valve seat to remain sealed and the resulting mechanical force. This force is necessary if the closing pressure acting in the direction of the closure parts in a particular event causes the closure parts to leave the valve seat. Most of the internal closure of the sliding piece in the valve seat does not rely on force stem seals, but this type of valve position to close the right thing or not is very important. In some cases, when the closure parts close to the final closed position, the driving force required for the closure parts may be greatly increased to reach the required position which has been shut down parts of an auxiliary compression. If the closure parts cannot be approached or does not stop in the closed position, it will cause leakage and damage to the seal.

Butterfly valve requires right position to guarantee sealing. When the indicator shows a Close position, movement shall be stopped.

6.2 Maintenance

Valve has the complex structure for a pressure vessel and operational machine, when maintaining the valve, occasional open/close shall be put into consideration. At the same time, static pressure state of valve shall also be considered.

When keeping the valve to a certain position, operational capacity of valve may be reduced. This is caused by accumulation of corrosive substances on moving parts. Under some circumstances, valve shall be circulated open/close periodically.

The intactness of pressure boundary requires the intactness of pressure-bearing parts, pressure-bearing shall be checked regularly.

The leakage of stem sealing usually caused by packing abrasion, which can make up for tightening the packing gland. Too large packing force may increase the stem friction, and make stem to be hard-operated and accelerate the abrasion of packing. The good sealing performance of the valve can also be affected by damage or normal abrasion. For the harsh working conditions, the estimation and repairment are beyond the scope of this manual. Due to the different types of structures, if prior knowledge is required, work with the manufacturer to find a suitable method.

The external construction of valve is easy to check and maintain, therefore, reasonable measures should be taken to prevent mechanical damage to the valve and to prevent the valve from being corroded by atmospheric sediment, chemicals or moisture, which may cause its quality to deteriorate. Working interfaces such as threads, bearings or gears should be lubricated regularly.

7. Possible Failure, Reason and Maintenance

Possible Failures	Reasons	Methods to Repair
1. Packing leakage	<ol style="list-style-type: none">1. Stem packing is not fastened2. Packing Consumption3. Packing failure because of overlong usage or bad stocking	<ol style="list-style-type: none">1. Fasten the bolts evenly2. Add more packing3. Renew packing

2. Seal leakage	4. Dregs adhered on sealing face or sealing damaged	4. Clean dregs or renew sealing parts
3. Dumb movement or trim not moved	5. Packing over-tightened 6. Stuffing cover deflection. 7. Actuator or connection parts damaged 8. Stem curved	5. Loosen bolts of stuffing box 6. Proofread stuffing box cover 7. Repair actuator or connection parts 8. Proofread stem