

BONOMI
NORTH AMERICA



IOM | RUBBER-LINED BUTTERFLY VALVES

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SAFETY INSTRUCTIONS – DEFINITION OF TERMS

Read and follow these instructions - Save these instructions

	WARNING	indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION	indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	NOTICE	used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

Introduction

Expertise in the Industry

Bonomi North America can state with confidence based on experience that the majority of all field problems for rubber-lined butterfly valves are directly related to poor installation procedures. For this reason, it is very important all distributor salespeople educate their customers regarding proper installation of rubber-lined butterfly valves.

Butterfly Valve Seat / Disc Function

Before reviewing the proper installation, maintenance, and re-pair procedures for rubber-lined butterfly valves, first consider the seat-disc function of a butterfly valve. The seat in a rubber-lined butterfly valve has molded o-rings on its flange face. As a result, no gaskets are required as these o-rings serve the function of a gasket. The flange face and molded o-rings of the seat extend beyond the body face-to-face to ensure sealing at the flange faces. The seat material, which extends past the face is compressed in installation and flows toward the center of the valve seat I.D.

In essence, the elastomer seat acts as a liquid, and the displaced elastomer moves toward the point of least resistance. The seat I.D. of all rubber-lined butterfly valves is smaller than the disc O.D. This difference, the disc-seat interference, plus the increased interference due to the elastomer movement toward the seat center after installation, has been engineered so as to be the basis for pressure rating capability and the related seating/unseating torques.

Any change in this interference due to improper installation directly affects the pressure rating and seating/unseating torques.

Finally, unlike many valve types, the rubber-lined butterfly valve's disc actually extends beyond the face of the valve body at given angles of opening (e.g. 30° or more) when installed between flanges.



CAUTION

It is very important before installation to ensure the critical chord dimension of the disc at the full open position is less than the adjusted pipe flange I.D.

Shipment & Storage

- The seat, disc, stem and bushing of the rubber-lined butterfly valve should be coated with silicone lubricant unless specified otherwise as recommended by Bonomi North America.
- The disc should be positioned at 10° open. Note: See page 5 for special considerations for valves with spring return actuators.
- Valves should be stored indoors with a preferred temperature range from 40°F (4°C) to 85°F (29°C).
- When the valves are stored for a long time, open and close the valves once every 3 months.

FLANGE BOLTING RECOMMENDATIONS – WAFER STYLE

SIZE	THREAD SIZE	NUMBER REQUIRED	STUD LENGTH	FLANGE BOLT TORQUE
1-1/2"	5/8-11	4	4.746	30
2"	5/8-11	4	4.750	30
2-1/2"	5/8-11	4	5.250	30
3"	5/8-11	4	5.250	35
4"	5/8-11	8	5.750	35-40
5"	3/4-10	8	6.00	35-45
6"	3/4-10	8	6.250	35-50
8"	3/4-10	8	6.750	45-55
10"	7/8-9	12	7.250	55-75
12"	7/8-9	12	7.750	65-110

FLANGE BOLTING RECOMMENDATIONS – LUG STYLE

SIZE	THREAD SIZE	NUMBER REQUIRED	BOLT LENGTH	FLANGE BOLT TORQUE
1-1/2"	5/8-11	4	5.121	30
2"	5/8-11	4	5.125	30
2-1/2"	5/8-11	4	5.375	30
3"	5/8-11	4	5.375	35
4"	5/8-11	8	6.000	35-40
5"	3/4-10	8	6.375	35-45
6"	3/4-10	8	7.000	35-50
8"	3/4-10	8	8.000	45-55
10"	7/8-9	12	8.500	55-75
12"	7/8-9	12	9.750	65-110

INSTALLATION CONSIDERATIONS – PIPING AND VALVE ORIENTATION AND PLACEMENT

Piping and Flanged Capabilities

Piping

These valves have been engineered so that the critical disc chord dimension at the full open position will clear the adjacent inside diameter of most types of piping, including Schedule 40, lined pipe, heavy wall, etc.

Metal Flanges

Rubber-lined butterfly valves have been designed to be suitable for all types of flanges (ASME, DIN, JIS and other international flange standards), whether flat-faced, raised face, slip-on, weld-neck, etc. Proper alignment of any butterfly valve between flanges is critical to good performance of the valve. The flange bolts must also be evenly tightened around the circumference of the valve, providing consistent flange compression of the molded o-ring in the seat face.

Since Bonomi North America does not recommend the use of gaskets between flanges on rubber-lined butterfly valves, a uniform flange face is critical to proper valve sealing. Most weld-neck and slip-on flanges conforming to ASME specifications have an appropriate flange face. Types A and B butt-weld stub-end flanges also provide a suitable mating surface for the molded o-ring.

It should be noted that Type C butt-weld stub-end flanges have an “as formed” flange face. The varying surface of this flange face can create sealing problems between any resilient-seated butterfly valve and the flange face. For this reason, Type C flanges are not recommended for use with rubber-lined resilient seated butterfly valves.

Non-Metallic Flanges

When non-metallic flanges, such as plastic or PVC, are used with rubber-lined butterfly valves, care must be taken not to over-tighten the flange bolts. The inherent flexibility of these non-metallic flange materials allow them to be over-tightened relatively easily. Flexing caused by this over-tightening can actually reduce the compression of the valve between the flanges, causing leaks between the valve and the flange face. Proper alignment and firm, even, but not excessive tightening of flange bolts are especially important with non-metallic flanges. In some cases, non-metallic flanges of low quality will

not mate tightly with butterfly valves regardless of the care taken during installation.

Valves with Spring Return Actuators

1. Fail Closed Assemblies

If the valve is supplied with an actuator, the butterfly valve is shipped in the full closed position (as no air pressure is present to compress the springs and open the disc).



CAUTION

Installing the valve with the disc in the full closed position may create a compression set on the seat causing higher than expected torques or premature seat failure. It is recommended to:

- Remove the actuator. Be sure to scribe the valve and actuator to ensure the re-installed actuator is in the exact same quadrant as originally configured.
- Install the valve per the attached installation tag instructions
- Re-install the actuator ensuring it is in the proper quadrant.

2. Fail Open Assemblies

If the valve is supplied with an actuator, the butterfly valve disc is shipped in the full open position (as no air pressure is present to compress the springs and close the valve disc.) The sealing surface, or disc edge, is therefore exposed. Damage to that surface will cause premature seat failure.



CAUTION

Use caution installing the valve being careful not to damage the disc edge. It is recommended to:

- Remove the actuator. Be sure to scribe the valve and actuator to ensure the re-installed actuator is in the exact same quadrant as originally configured.
- Install the valve per the attached installation tag instructions
- Re-install the actuator ensuring it is in the proper quadrant.

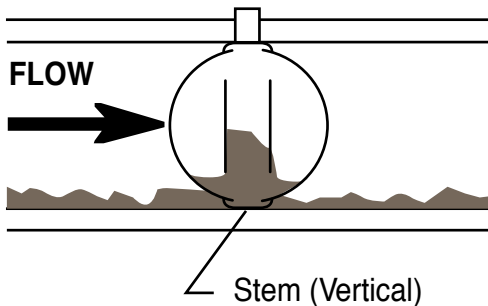
Valve Location

- a. Rubber-lined butterfly valves should be installed if possible a minimum of 6 pipe diameters from other line elements, i.e., elbows, pumps, valves, etc. of course, 6 pipe diameters are not always practical, but it is important to achieve as much distance as possible.
- b. Where the rubber-lined butterfly valve is connected to a check valve or pump, use an expansion joint between them to ensure the disc does not interfere with the adjacent equipment.

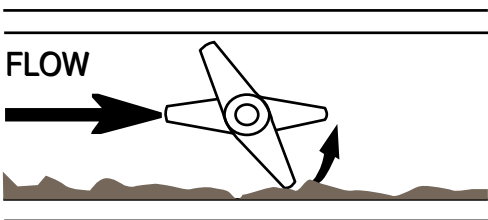
- b. For slurries, sludge mine tailing, pulp stock, dry cement, and any media with sediment or particles, Bonomi North America recommends the rubber-lined valve be installed with the stem in the horizontal position with the lower disc edge opening in the downstream direction.

Valve Orientation

- a. In general, Bonomi North America recommends the rubber-lined valve be installed with the stem in the vertical position and the actuator mounted vertically directly above the valve; however, there are those applications as discussed below where the stem should be horizontal. NOTE: BNA does not recommend valves be installed in an upside-down position.



Sludge builds up on disc

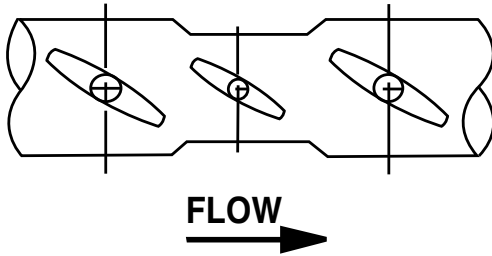


CORRECT INSTALLATION

Sludge passes under disc

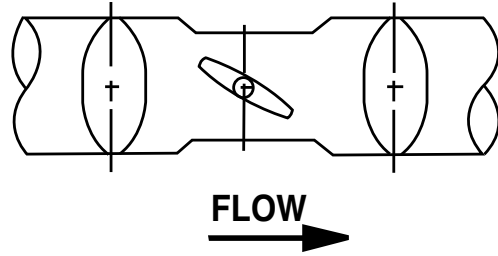
Valve Orientation (Continued)

c. Butterfly valves in combination for control/isolation applications should be installed as follows:



INCORRECT INSTALLATION

Combination with all valve stems in the same direction accelerates possible noise, vibration, & erosion problems.



CORRECT INSTALLATION

Combination with the stem of the control valve at right angle to those of other valves tends to cancel the drift of the fluid, and reduces noises, vibration, and erosion.

Introduction

A. General Installation

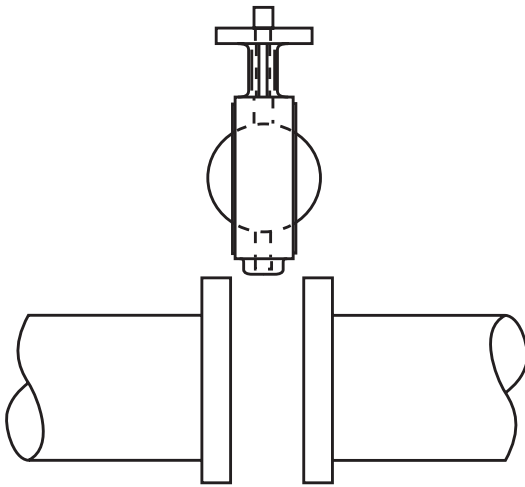
1. Make sure the pipeline and pipe flange faces are clean. Any foreign material such as pipe scale, metal chips, welding slag, welding rods, etc., can obstruct disc movement or damage the disc or seat.
2. The elastomer seat has molded o-rings on the face of the seat. As a result, no gaskets are required as these o-rings serve the function of a gasket.
3. Align the piping and then spread the pipe flanges a distance apart so as to permit the valve body to be easily dropped between the flanges without contacting the pipe flanges (see figure 1 page 6).
4. Check to see that the valve disc has been positioned to a partially open position, with the disc edge about 1/2 inch to 3/8 inch inside the face of the seat, (approximately 10° open) (see figure 1 page 6) Note: See page 2 for special consideration for valves with spring return actuators.
5. Insert the valve between the flanges as shown in figure 1 of page 6, taking care not to damage the seat faces. Always pick the valve up by the locating holes or by using a nylon sling on the neck of the body.



WARNING

Never pick up the valve by the actuator or operator mounted on top of the valve.

Figure 1 - Insert Rubber-lined Butterfly Valve Between Flanges

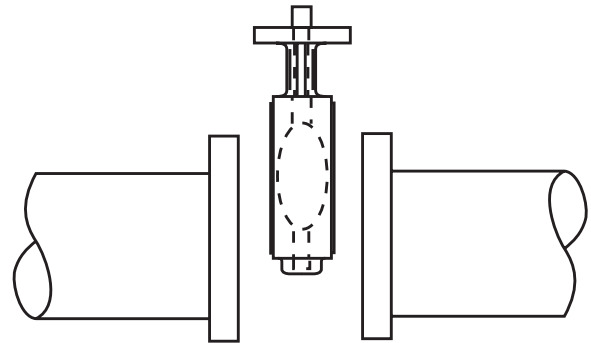


INCORRECT INSTALLATION



WARNING

Pipe not spread, disc opened beyond valve body face;
Results; Disc edge damaged when it hits flange.



CORRECT INSTALLATION

Pipe spread and aligned, disc rotated; Results; no undesirable beginning seating/unseating torque, disc edge protected

6. Place the valve between the flanges, center it, and then span the valve body with all flange bolts, but do not tighten the bolts. Carefully open the disc to the full open position, making sure the disc does not hit the adjacent pipe I.D. Now systematically remove jack bolts or other flange spreaders, and hand-tighten the flange bolts as shown in Figure 2.

below. Very slowly close the valve disc to ensure disc edge clearance from the adjacent pipe flange I.D. Now open the disc to full open and tighten all flange bolts per specification as shown in Figure 2. Finally, repeat a full close to full open rotation of the disc to ensure proper clearances (See figures 3 & 4 page 7).

Figure 2 - Flange Bolt Tightening Pattern

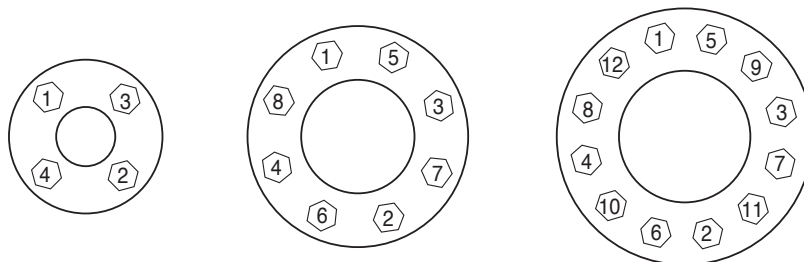
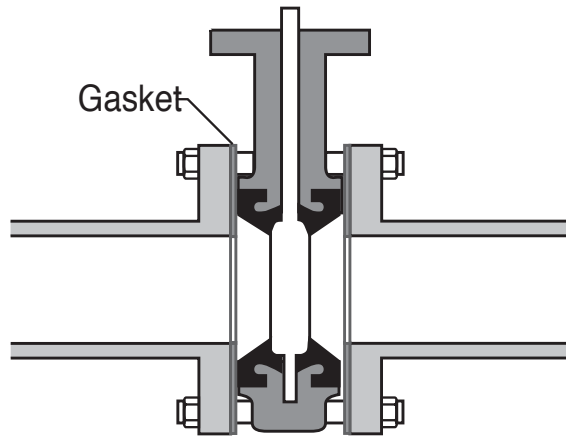
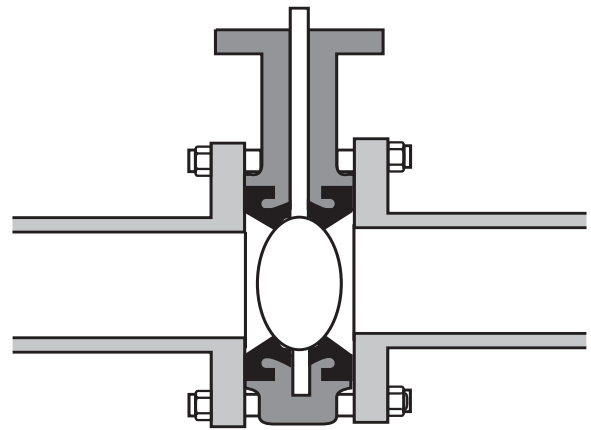


Figure 3 - Initial Centering & Flanging of Valve



INCORRECT INSTALLATION

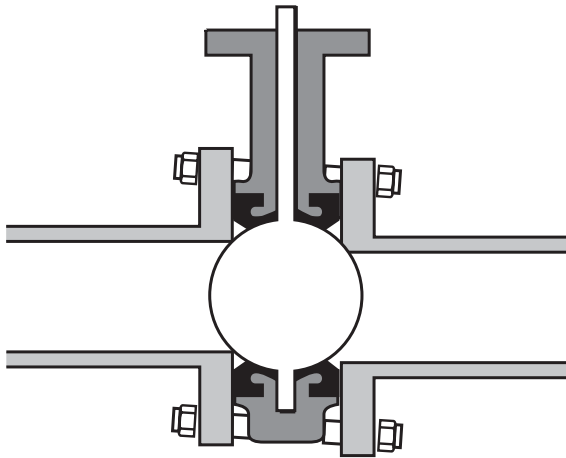
Disc in closed position; gaskets used; Results – Seat distorted and over-compressed causing high initial unseating torque problems.



CORRECT INSTALLATION

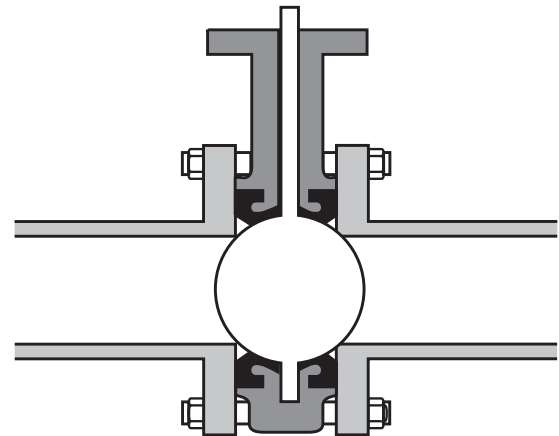
Bolts snugged, not torqued tight, disc edge within body face-to-face but not fully closed, no flange gaskets; Results: No disc edge damage, proper sealing allowed.

Figure 4 - Final Aligning and Tightening of Flange Bolts



INCORRECT INSTALLATION

Piping misaligned; Results Disc O.D. strikes pipe I.D. causing disc edge damage, increased torque & leakage. Seat face o-rings will not seal properly with incorrectly aligned piping.



CORRECT INSTALLATION

Piping aligned properly when bolts tightened, disc in full open position; Results – disc clears adjacent pipe I.D., seat face seals properly, no excessive initial torque.

When rubber-lined butterfly valves are to be installed between ASME welding type flanges, care should be taken to abide by the following procedure to ensure no damage will occur to the seat:

1. Place the valve between the flanges with the flange bores and valve body aligned properly. The disc should be in the 10° open position.
2. Span the body with the bolts.
3. Take this assembly of flange-body-flange and align it properly to the pipe.
4. Tack weld the flanges to the pipe.
5. When tack welding is complete, remove the bolts and the valve from the pipe flanges and complete the welding of the flanges. Be sure to let the pipe and flanges cool before installing the valve.



WARNING

Never complete the welding process (after tacking) with the valve between pipe flanges. This causes severe seat damage due to heat transfer.

Installation of Butterfly Valves in Plastic Flanges

Bonomi North America recommends the following guidelines when PTFE Seated Valves are installed between plastic flanges:

1. The valve body should be coated with epoxy, not nylon. The extra thickness of the nylon coating slightly reduces the seat compression, and every advantage to maximize seat compression should be taken with plastic flanges.

2. The plastic flange can be either one piece construction, or two piece construction comprised of a stub end and a backup ring.
3. The plastic flange style can be butt-weld, socket or slip-on, but butt-weld and socket are preferred.
4. The plastic flange face must be flat. Concave and convex flange faces are not acceptable. This includes flange faces that were originally flat but later distorted into a concave shape by over tightening the flange bolts.
5. The plastic flange face surface may have grooves or serrations, provided the grooves do not exceed .100" (2.54 mm) in width or .020" (.508 mm) in depth. If the grooves are less than .100" (2.54 mm) in width, the groove depth must not exceed the width. However, fine concentric or "phonograph record" grooves are acceptable regardless of the groove depth.
6. Flange gaskets must not be used with PTFE seats, since they create an uncontrolled over compression that can buckle the PTFE and damage the seat. If a damaged face, a flange gasket can appear to cure the leak to atmosphere, while simultaneously damaging the PTFE seat and creating a second leak across the disc or up the stem hole. Leaks across the plastic flange must be cured without the use of gaskets, by proper selection and installation of the flange.
7. The bolts holding plastic flanges should be installed in strict conformance to the recommended practices of the plastic flange manufacturer. This usually involves aligning the flanges accurately, using lubricated bolts, and tightening the bolts in the proper sequence and to the specified torque. Uniform stress across the flange prevents leakage.

Maintenance and Repair

Bonomi North America Rubber-lined Butterfly valve features minimize wear and maintenance requirements. No routine lubrication is required. All components – stem, disc, seat, bushing, stem seal, etc., are field replaceable, no adjustment is required. If components require replacement, the valve may be removed from the line by placing the disc in the near closed position, then supporting the valve and removing the flange bolts.



WARNING

No valve maintenance, including removal of manual or power actuators, should be performed until the piping system is completely depressurized.

BONOMI
NORTH AMERICA

CORPORATE OFFICE

750 IMPERIAL CT.
CHARLOTTE, NC 28273
PH: (704) 412-9031
FAX: (704) 412-9032
sales@bonominorthamerica.com