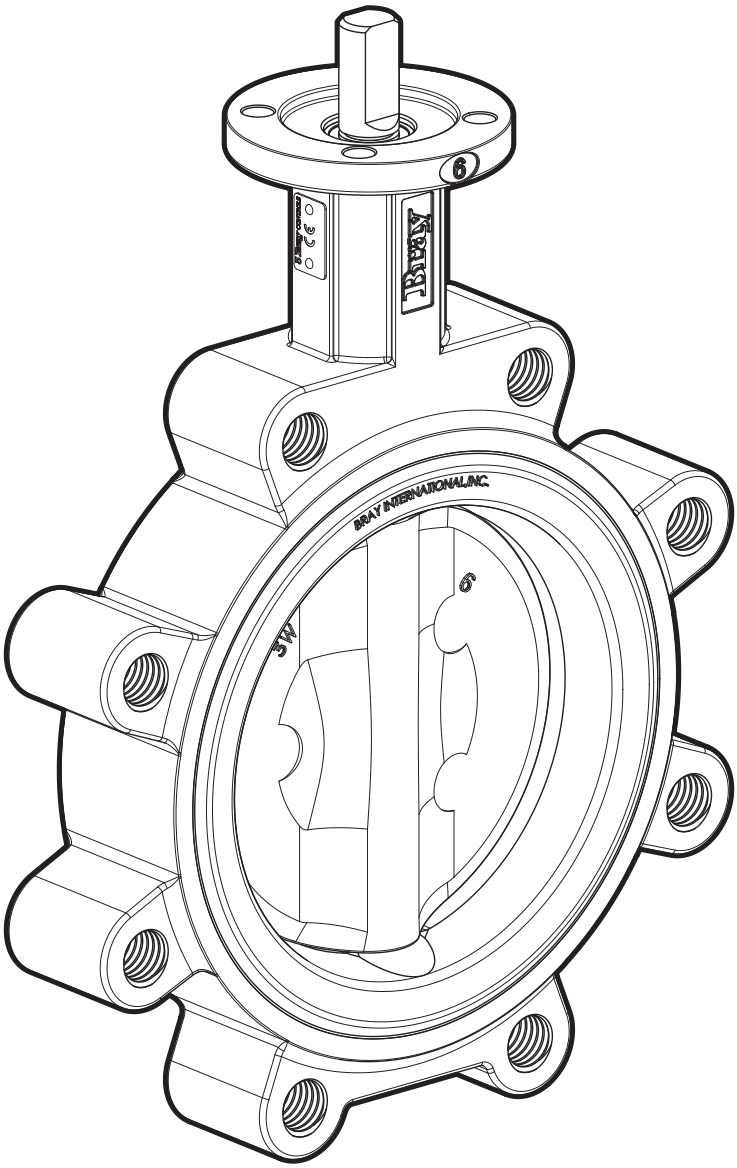
SERIES 3W/3L

RESILIENT SEATED BUTTERFLY VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



Bray®

BRAY.COM

THE HIGH PERFORMANCE COMPANY

CONTENTS

For information on this product and other Bray products please visit us at our web page - www.bray.com

READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY.
SAVE THIS MANUAL FOR LATER USE.

1.0 DEFINITION OF TERMS

⚠ 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.

2.0 INTRODUCTION

Historical Experience

Based on over thirty years experience in the butterfly valve industry, Bray can state without question the majority of all field problems for resilient seated butterfly valves are directly related to poor installation procedures. For this reason, it is very important all distributors educate their customers regarding proper installation of resilient seated butterfly valves.

Butterfly Valve Seat / Disc Function

Before reviewing the proper installation, maintenance, and repair procedures for resilient seated butterfly valves, let's discuss the seat-disc function of a butterfly valve. The seat in a resilient seated butterfly valve has a molded tear drop profile on its flange face. **As a result, no gaskets are required as this profile serves the function of a gasket.** The flange face and molded profile of the seat extend beyond the body face-to-face to ensure sealing at the flange faces.

The seat inside diameter (I.D.) of all resilient seated butterfly valves is smaller than the disc outside diameter (O.D.) This difference, the disc-seat interference, has been engineered so as to be the basis for pressure rating capability and the related seating/unseating torques.

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

⚠ CAUTION

It is very important before installation to ensure the critical chordal dimension of the disc at the full open position is less than the adjacent pipe flange I.D. (Refer to Series 3W/3L Technical Manual for chordal dimensions).

3.0 SHIPMENT AND STORAGE

1. The seat, disc, stem and bushing of the resilient seated butterfly valve should be coated with silicone lubricant unless specified otherwise.
2. The disc should be positioned at 10° open.
   Note: See page 6 for special considerations for valves with spring return actuators.
3. Valves should be stored indoors with a preferred temperature range from 40°F (4°C) to 85°F (29°C).
4. When valves are in storage, they should be opened and closed once every 3 months.
5. Ship and store valves so that no heavy loads are applied to the bodies
6. Polymer and elastomer parts should not be stored in the presence of sunlight or artificial light with high ultraviolet content, or any source of radiation as these are primary causes of aging.
7. If a component is cooled below 59°F (15°C), the entire valve assembly should be allowed to rise above 68°F (20°C) before installing into service.
8. Valve end protectors should only be removed at the time of valve installation.

4.0 INSTALLATION CONSIDERATIONS, PIPING AND VALVE ORIENTATION AND PLACEMENT

4.1 Piping and Flanged Compatibilities

4.1.1 Piping

These valves have been engineered so that the critical disc chordal 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.

4.1.2 Metal Flanges

Bray's resilient seated 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 profile on the seat face.

Since Bray does not recommend the use of gaskets between flanges on resilient seated 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. Type A and B butt-weld stub-end flanges also provide a suitable mating surface for the molded tear drop profile on the flange face."

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 resilient-seating butterfly valves.

4.1.3 Non-Metallic Flanges

When non-metallic flanges, such as plastic or PVC, are used with resilient seated 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.

4.2 Valves with Spring Return Actuators

4.2.1 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).

4.2.2 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:

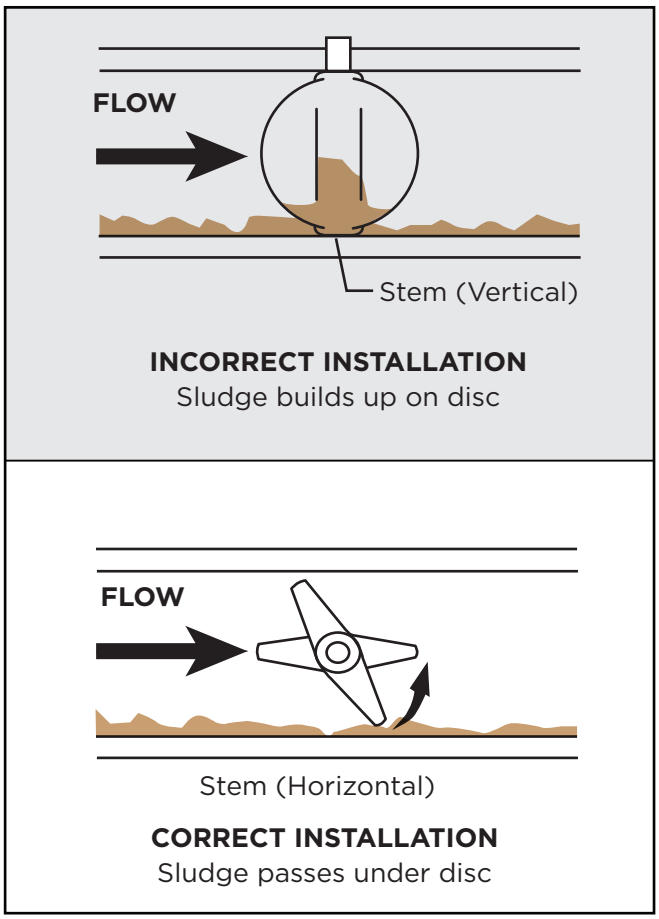
> Remove the actuator. Be sure to scribe the valve and actuator to ensure the re-installed actuator is in the exact same quadrant as originally configured
> Install the valve per the attached installation tag instructions
> Re-install the actuator ensuring it is in the proper quadrant

4.3 Valve Location

1. Resilient seated 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.
2. Where the resilient seated 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.

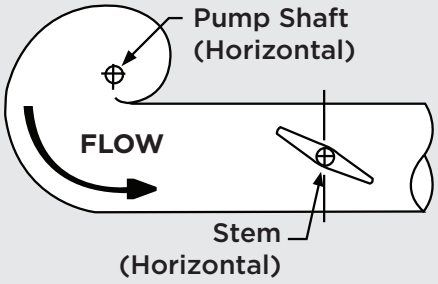
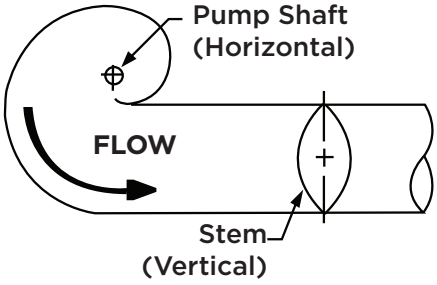
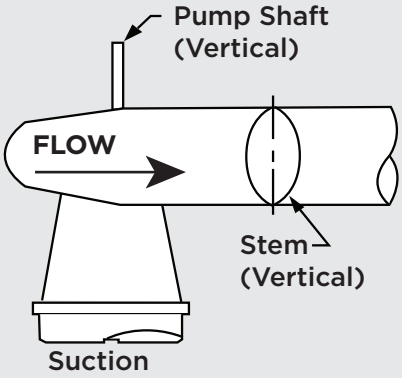
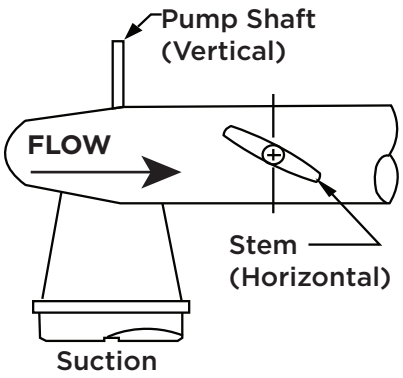
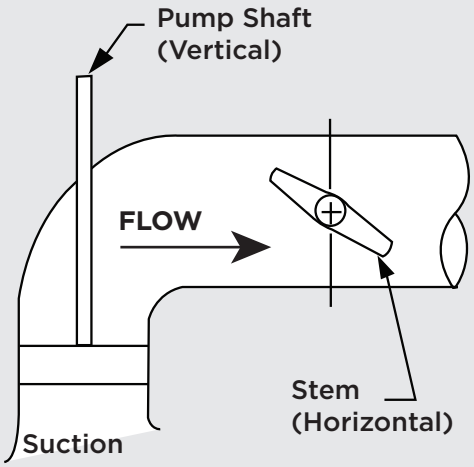
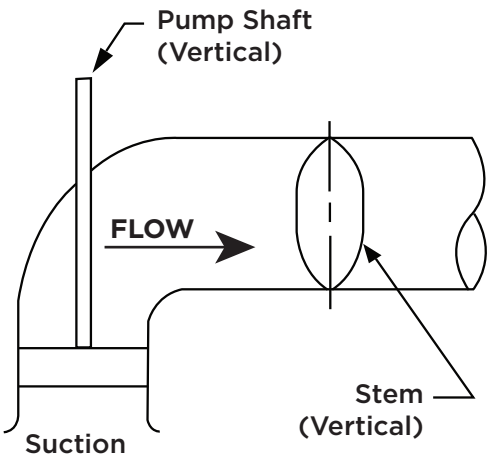
4.4 Valve Orientation

1. In general, Bray recommends the resilient seated valve be installed with the stem in the vertical position and the actuator mounted directly above the valve; however, there are those applications as discussed below where the stem should be horizontal. **NOTE:** Bray does not recommend valves be installed in an upside-down position.
2. **For slurries, sludge, mine tailing, pulp stock, dry cement, and any media with sediment or particles, Bray recommends the resilient seated valve be installed with the stem in the horizontal position with the lower disc edge opening in the downstream direction as illustrated below.**



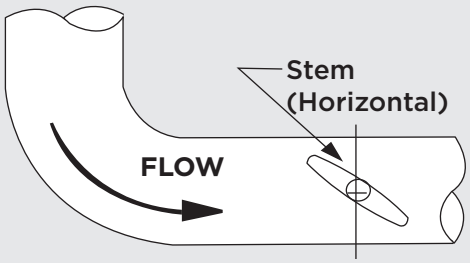
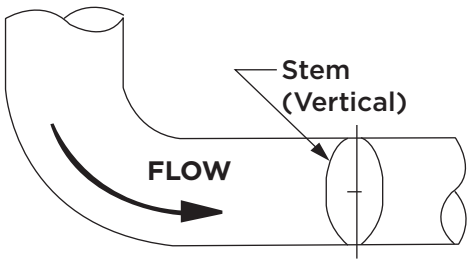
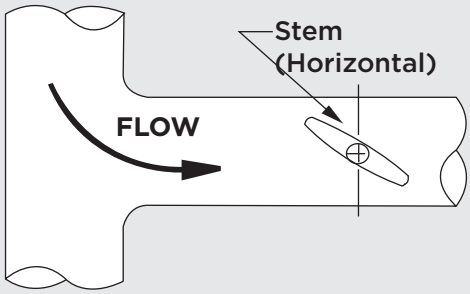
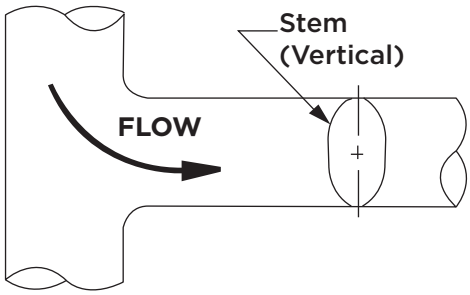
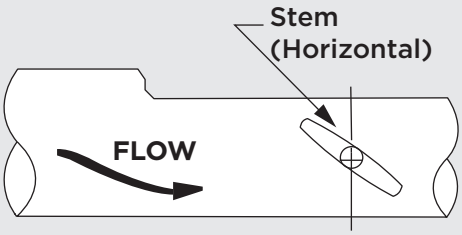
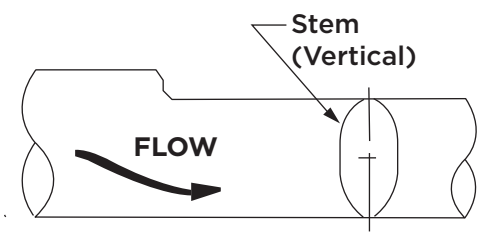
4.4 Valve Orientation (Continued)

Resilient seated butterfly valve, located at the discharge of a pump should be oriented as follows:

	INCORRECT INSTALLATION	CORRECT INSTALLATION
1. Centrifugal Pump – Pump shaft horizontal and stem vertical		
2 Centrifugal Pump – Pump shaft vertical and stem horizontal		
3. Axial Pump – Pump shaft vertical and stem vertical		

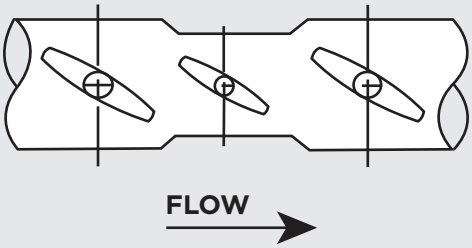
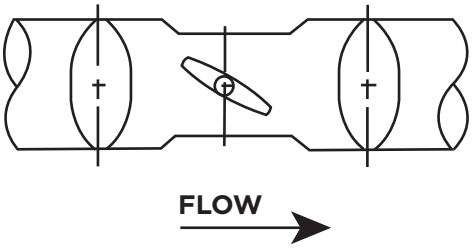
4.4 Valve Orientation (Continued)

Butterfly valves located downstream of a bend or pipe reducer should be oriented as follows:

	INCORRECT INSTALLATION	CORRECT INSTALLATION
1. Bend		
2. Tee		
3. Pipe Reducer		

4.4 Valve Orientation (Continued)

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

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

5.0 INSTALLATION PROCEDURE

5.1 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 Bray elastomer seat has a molded tear drop profile on the face of the seat. **As a result, no gaskets are required as this profile serves 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 13)**.
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 13) Note: See page 6 for special consideration for valves with spring return actuators.**
5. Insert the valve between the flanges as shown in **Figure 1 on page 13**, 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.

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** (page 13). 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** (page 13). Finally, repeat a full close to full open rotation of the disc to ensure proper clearances **(See Figures 3 & 4 page 14).**
7. For additional flange bolting information please reference the Series 3W/3L Technical Sales Manual found at www.bray.com.

Figure 1 – Insert Resilient Seated Butterfly Valve Between Flanges

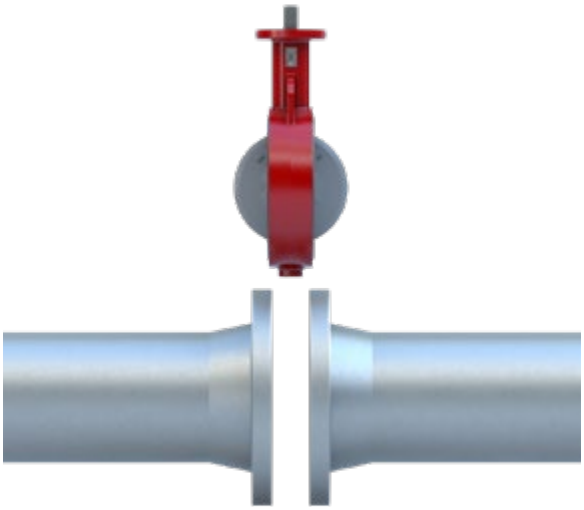
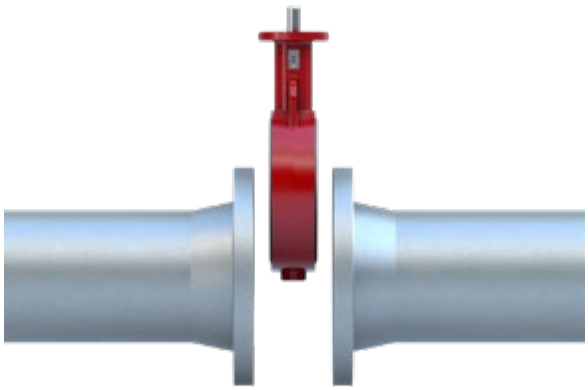
INCORRECT INSTALLATION	CORRECT INSTALLATION
	
Pipe not spread, disc opened beyond valve body face; **Results:** Disc edge damaged when it hits pipe flange.	Pipe spread and aligned, disc rotated; **Results:** No undesirable beginning seating/unseating torque, disc edge protected.

Figure 2 – Flange Bolt Tightening Pattern

Figure 3 – Initial Centering & Flanging of Valve

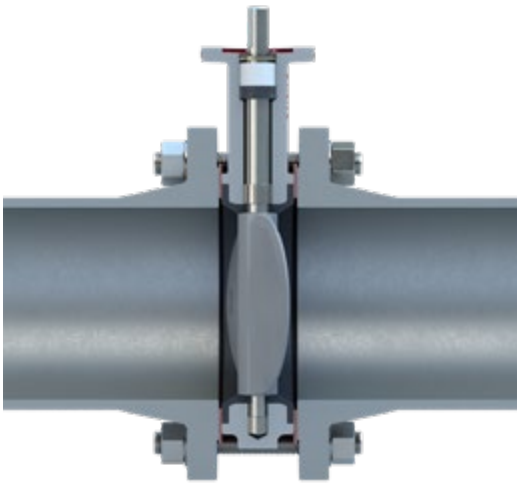
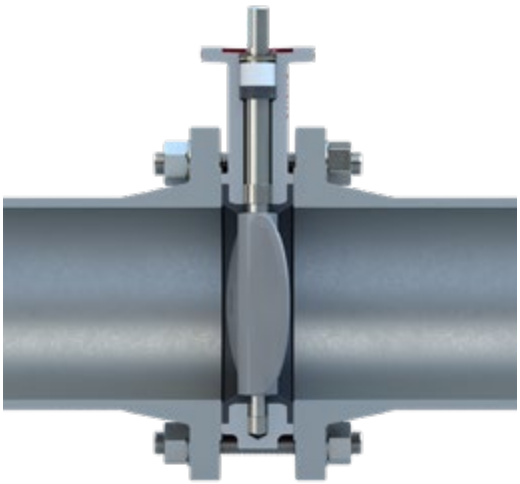
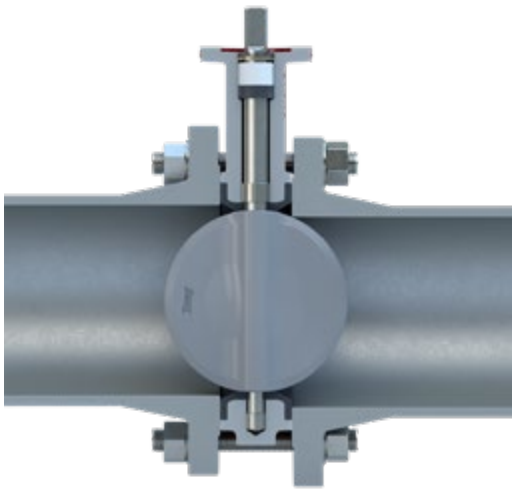
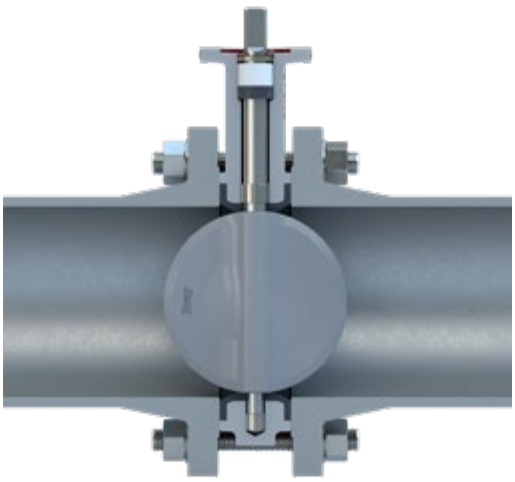
INCORRECT INSTALLATION	CORRECT INSTALLATION
	
Disc in closed position; gaskets used; **Results**: Seat distorted and over-compressed causing high initial unseating torque problems.	Nuts snugged, not torqued tight, disc edge within body face-to-face but not fully closed, no flange gaskets; **Results**: No disc edge damage, proper sealing allowed.

Figure 4 – Final Aligning & Tightening of Flange Bolts

INCORRECT INSTALLATION	CORRECT 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.	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 resilient seated butterfly valves are to be installed between 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.

⚠ CAUTION

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

6.0 MAINTENANCE AND REPAIR

No routine lubrication is required. **All components – stem, disc, body/seat, bushing, stem seal, etc., are field replaceable, no adjustment is required**. If components require replacement, the valve must 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.

7.0 DISASSEMBLY/ASSEMBLY INSTRUCTIONS NPS 2-20 (DN 50-500)

Note: The molded-in seat and stem bearings are not removed from the valve body during disassembly.

7.1 Disassembly

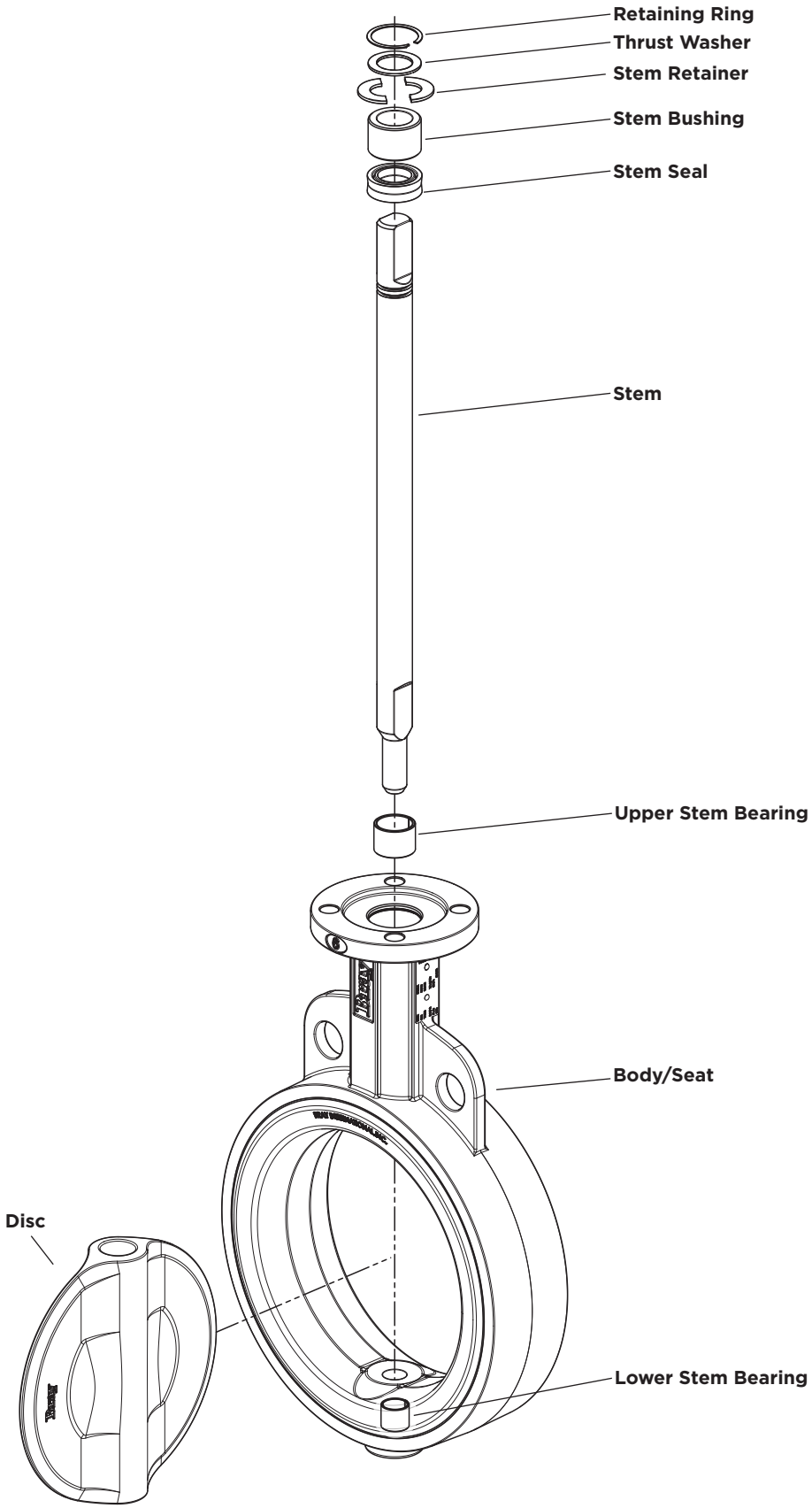
1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the Spirolox® retaining ring, the thrust washer and the two C-ring stem retainers from the stem hole.
3. Then remove the stem, bushing and seal.
4. Remove the disc from the seat, protecting the disc edge at all times.

7.2 Assembly

1. Insert stem seal.
2. Push stem into the stem hole of the body until the bottom of the stem is flush with the inner top edge of the seat.
3. Install a light coating of silicone or grease on the I.D. of seat. Insert the disc into the seat by lining up the disc holes with the stem holes of the seat.

   Note: The broached double "D" flats in the disc must be toward the bottom of the valve body.
4. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.

   NOTE: The Spirolox® retaining ring must be installed into the groove cut into the stem hole I.D. in the body to perform it's function properly.
5. Replace handle, manual gear operator or power actuator on the actuator mounting flange.



Series 3W - NPS 6 (DN 150)

8.0 DISASSEMBLY/ASSEMBLY INSTRUCTIONS NPS 24 (DN 600)

8.1 Disassembly

1. Remove the gear operator or power actuator from the actuator mounting flange.
2. Secure the valve in a horizontal position.

⚠ CAUTION

Prior to removal of the valve stems the valve disc must be secured and supported to insure it does not drop out of the valve body once the stems are removed. Lay the valve down with two wood blocks located under the disc at the 6 o'clock and 12 o'clock positions making sure the blocks are in close contact with the disc but not supporting the valve.

3. Removal of the lower valve stem:
   a. Remove the bottom plate screws, bottom plate, bottom plate gasket and thrust bearing.
   b. Remove the locking nut from the tie bolt
   c. Remove the stem retainer..
   d. Secure a hoist to the lower stem (end is imperial threaded).
   e. Then use the hoist to remove the lower stem from the valve body.
   f. Remove the stem bearing.
4. Removal of the upper valve stem:
   a. Remove the packing gland by removing the retaining screws and sliding the gland off the top of the stem.
   b. Secure a hoist to the upper stem (end is imperial threaded).
   c. Then use the hoist to remove the upper stem including the tie bolt from the valve body.
5. Removal of the valve disc:
   a. Remove the wood blocks noted above from below the disc.
   b. Using a rubber hammer, pound one area of the disc (ex. 12 o'clock position) repeatedly until the disc clears the face of the valve body.
6. Removal of packing and bearings:
   a. Remove the stem packing.
   b. Use a slotted screwdriver to carefully remove the upper and lower stem bearings.

8.2 Assembly

1. Installation of the valve disc:

Note: Before installing the disc, check to assure the upper and lower stems are matched to the upper and lower stem holes in the disc.

   a. With the valve still in the vice in a vertical position, hoist the upper stem with the splined end or the double keyed end pointing upward.
   b. Push the upper stem into the stem hole of the upper body until the bottom of the stem exceeds the upper stem hole of the seat by 20-50 mm.
   c. Apply a light coating of silicone or grease on the I.D. of the seat.
   d. Insert the disc into the seat with the splined end or the double keyed end up.
   e. Push the disc into the seat while inserting the upper stem into the upper stem hole in the disc.
   f. Adjust the disc to assure the lower stem hole of the disc is properly aligned with the lower body stem hole.

2. Installation of the lower stem:
   a. Close the valve so that the disc is inside the edge of the seat.
   b. Carefully place the valve in a horizontal position assuring that there is no damage to the body and disc coatings and disc edge.
   c. Insert the stem bearing into the bottom stem hole of the body.
   d. Insert the lower stem into the body and disc.

Note: The cone-shaped end of the lower stem should be toward the center of the disc.

3. Installation of the upper stem:

⚠ CAUTION

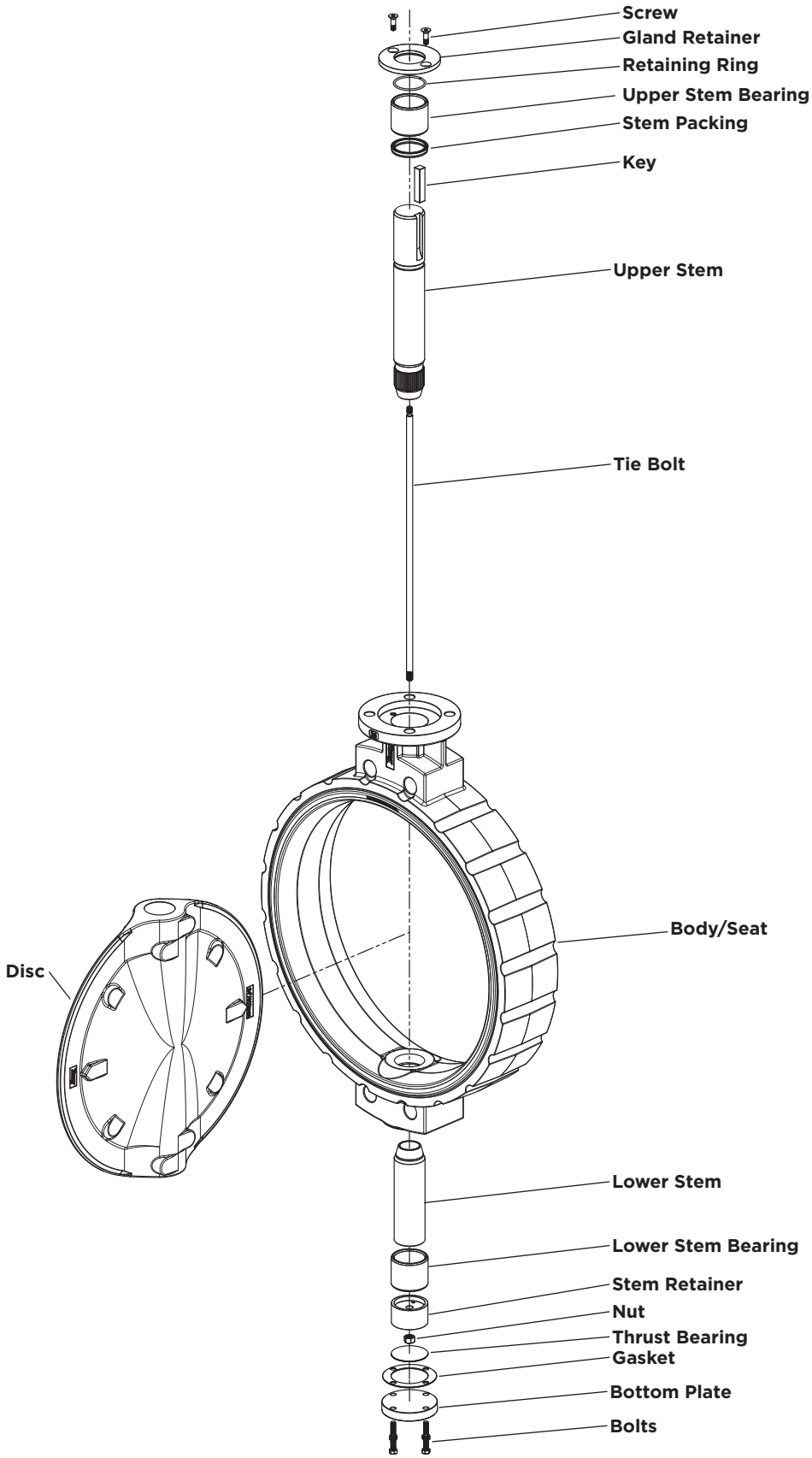
a. Hoist the valve to an angle and secure it (be careful not to go too high so the lower stem does not drop out).
b. Remove the upper stem from the valve.
c. Screw the tie bolt with lock nut to the splined or the double keyed end of the upper stem, tighten the lock nut and insert the upper stem into the valve with the tie bolt end first.

Note: The tie bolt will go through the disc and reach to the bottom of the valve

Note: During this step, the keyway of the upper stem should be vertical to the front face of the valve.

4. Installation of packing and bearings (upper valve stem):
   a. Insert the stem bearing into the top hole of the body followed by the stem packing and packing gland follower.
   b. Use two hexagon bolts to fasten the packing gland

5. Installation of packing and bearings (lower valve stem):
   a. Insert the stem retainer into the bottom hole of the body using a nut to fasten it.
   b. Install the locking nut on the tie bolt.
   c. Install the thrust bearing, bottom plate gasket and bottom plate follower.
   d. Use four hexagon bolts to fasten the bottom plate tightly.



Series 3W - NPS 24 (DN 600)

SINCE 1986, BRAY HAS PROVIDED FLOW CONTROL SOLUTIONS
FOR A VARIETY OF INDUSTRIES AROUND THE WORLD.

VISIT **BRAY.COM** TO LEARN MORE ABOUT
BRAY PRODUCTS AND LOCATIONS NEAR YOU.

HEADQUARTERS
BRAY INTERNATIONAL, INC.
13333 Westland East Blvd.
Houston, Texas 77041
Tel: 281.894.5454

EN_GBL_IOM_3W-3L_20220929

Bray®

THE HIGH PERFORMANCE COMPANY

BRAY.COM