



## KEYSTONE SERIES 60 BUTTERFLY VALVES INSTALLATION AND OPERATION MANUAL

Before installation these instructions must be fully read and understood



### Recommendations

1. Temperature: storage temperature below 25°C (77°F), above 0°C (32°F) preferable below 15°C (59°F)
2. Humidity: storage conditions should be such that condensation does not occur. Store in a dry environment. Maximum 50% relative humidity.
3. Light: valve elastomers should be protected from light, in particular direct sunlight or strong artificial light with high ultra violet.
4. Ozone: storage rooms should not contain any equipment generating ozone. E.g. lamps, electric motors.

### IMPORTANT

*Before valves are installed or used the following actions are recommended.*

1. Valves/parts have to be inspected and thoroughly cleaned if required.
2. Elastomer parts need to be greased with silicone grease if not present anymore.
3. All surfaces in contact with seats have to be thoroughly cleaned and greased with silicone grease if stored for more than 5 months.

### Intended valve use

The valve is intended to be used only in applications within the pressure/temperature limits indicated in the P/T diagram of the product manual.

When the valve is used in an end-of-line function, PED Cat-I applications are allowed only. For other categories, please contact the factory.

## 1 STORAGE AND HANDLING

### 1.1 Storage

When valves are to be stored for some time (2 months or more) before being fitted, storage should be in the original delivery crates or cases.

#### 1.1.1 Storage conditions

The valves should be stored off the ground in a clean, dry indoor area.

Protect the valve from temperature and humidity extremes, and exposure to excessive dust, moisture, vibration, deformations, sunlight and ozone.

### 1.2 Handling

To prevent damage during handling, the valves should be lifted by hand or using appropriate lifting equipment. Do not fasten lifting devices around the valve operating shaft, actuator or through the valve waterway. The valve should be lifted with chains or slings which are fastened to rods or bolts which go through the bolt holes in the body flanges. The valves should be protected from external events e.g. bumps, hitting and vibration during transport. Any flange protection caps need to be removed before the valve is mounted in the pipeline. Lift the valve with great care from the transport package (crate, pallet). While handling or installing the valve, ensure that no damage occurs to the valve, the pneumatic/electrical/-hydraulic actuator or other instrumentation.

## 2 SPARE PARTS

Only original Keystone spare parts are allowed to be used. Safe operation cannot be guaranteed if third party spare parts are used.

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### 3 INSTALLATION

#### WARNING!

For safety reasons, it is important to take the following precautions before you start work on the valve:

1. Personnel making any adjustments to the valves should utilize suitable equipment.
2. All required personal protection means should be worn.
3. The line must be depressurized before installing the valve.
4. Installation and handling of valves should be done only by personnel who are trained in all aspects of manual and mechanical handling techniques.
5. Misuse of the valve is not allowed. For example: the valve, handles, actuators or other parts may not be used as 'climbing tools'.
6. Ensure that valve pressure/temperature limitations marked on the identification tag are within the service conditions. The trim number on the valve's nameplate identifies the valve materials.
7. See Product Manual for valve specific P/T diagram and trim number definition.
8. Ensure that valve materials are compatible with the pipeline fluid.

#### 3.1 Visual valve inspection

1. Confirm that the materials of construction listed on the valve nameplate are appropriate for the service intended and are as specified.
2. Tag/name plate identification

Manufacturer:	Keystone
Model:	Series 60
Nominal size:	DN or NPS
M.P.W.P.:	Maximum permissible working pressure
Flange compatibility:	e.g. ASME 125/150
Temperature:	e.g. -28°/120°C (-20°/250°F)
Trim:	Materials of construction

#### 3.2 Flange and pipe compatibility

Check matching of flange drilling pattern of valve and pipe before assembly.

Flanges have to meet the following requirements (see Figure 1):

- The face inside diameter should be:
  - D min.: The valve Q-dimension + adequate disc clearance.
  - D max.: The optimum inside diameter (ID) is equal to the inside diameter of flange standard ASME B16.5, table 8, Weld Neck, dimensions B. For larger than D max inside diameters or other flange types please contact your local Emerson Sales organization, as larger inside diameters might result in reduced valve functionality.
- If the flange (or pipe) is provided with a raised face, the diameter of this shall be at least 8 mm larger than the YY-dimension of the valve.

The use of the flange-gaskets is not allowed since it might damage the valve.

The Keystone seat-face design eliminates the need for the gaskets.

Use flange bolting in accordance with appropriate standard.

**Do not use flange gaskets, as this could lead to valve damage!**

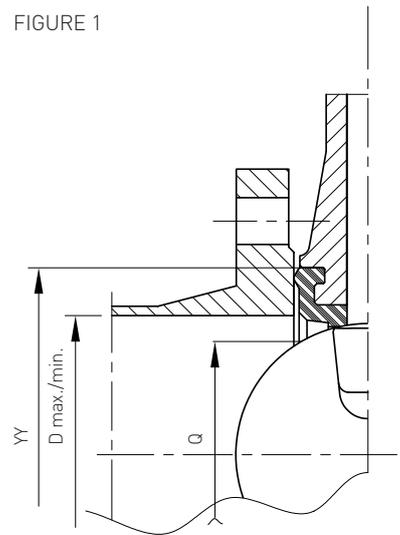
#### 3.3 Valve installation

The valves are bi-directional and may be installed in either direction relative to the flow. The valve will control flow equally in either direction.

The recommended installation position is shaft horizontal and the lower disc edge opening downstream (Especially for slurry service and media with a tendency for sedimentation). For optimum valve control and smooth performance, it is recommended to have a 10 to 20 pipe diameters of straight run inlet piping and 3 to 5 pipe diameters straight outlet piping.

A valve is not a crowbar. Do not use the valve to spread the flanges. Seat damage may result.

FIGURE 1



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### NOTES

- The valve can be installed in the pipe-line either with or without the actuator mounted on top of the valve. Make sure to turn the disc slowly in the event there is a mismatch causing the disc to touch the adjacent piping.
- It is the responsibility of the valve user and not the valve manufacturer to ensure that the pipeline system has been built professionally and the valve has been properly installed.
- Adjacent piping must be positioned so that minimal piping stresses are transmitted to the valve flanges during or after installation.
- Handling and lifting of the valves during installation MUST be performed following the same instructions described in previous section '1.2 Handling'.

### IMPORTANT

*Mating flange faces should be in good condition and free of dirt and/or inclusions and pipe insides should be well cleaned.*

#### 3.3.1 Existing system (see Figure 2)

1. Check whether the flange distance meets the valve face-to-face dimensions. Spread the flanges with adequate tooling for easy insertion of the valve.
2. In case of a wafer valve, insert some flange bolts in the pipe flanges, to help hold the valve after insertion.
3. Close the valve so that the disc edge is at least 10 mm (3/8") within the body.
4. Insert the valve between the flanges. Center the valve body, and insert all flange bolts. Tighten the flange bolts hand tight.
5. Slowly open the valve completely. (The disc is in line with parallel flats or keyway in shaft head. Keyway points towards disc edge.)
6. Maintain the valve flange alignment while gradually removing the flange spreaders, and tighten the flange bolts hand tight.
7. Slowly close and open the valve to check for adequate disc clearance.
8. Cross-tighten all bolting to the proper torque. Do not over tighten.

#### 3.3.2 New system (see Figure 2)

1. With the disc in the near closed position, center each mating flange with the valve body. Fix the body with some flange bolts and tighten the bolts.
2. Use the flange-valve-flange assembly for fit-up and centering to the pipe.
3. Tack weld the flanges to the pipe.
4. Remove the bolting and remove the valve from between the flanges.

### IMPORTANT

*Do not finish-weld the flanges to the pipe with the valve bolted between the flanges as this will result in serious heat damage to the seat.*

5. Finish-weld the flanges to the pipe and allow the flanges to cool completely.
6. Install the valve now according to the procedure for installing in existing systems.

### 3.4 Valve verification

Check the operation of the valve by operating it to 'full open' and 'full close'. To verify the valve operation, the disc position indicator on the actuator or the handle should rotate between the 'full open' and 'full close' indicators on the actuator or throttle plate. For normal installation the valve disc travels clockwise to close.

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### 3.5 Sources of possible danger

This section contains some examples of possible foreseen danger sources.

#### 3.5.1 Mechanical

- A. When manual operators are used, available space should be checked in order to avoid hands being clamped.
- B. Mechanical sparks caused on impact of valve and e.g. tooling, are a potential source of ignition of surrounding atmosphere.

#### 3.5.2 Electrical

If static charges or stray electrical currents can initiate explosions, the valve should be grounded to earth.

#### 3.5.3 Thermal

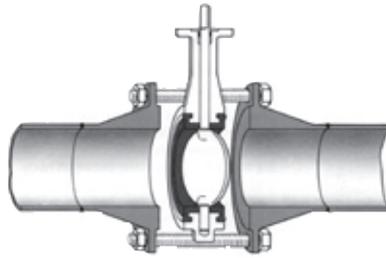
- A. Isolation should be used on valves with application temperatures  $> +40^{\circ}\text{C}$  ( $+104^{\circ}\text{F}$ ) and  $< -20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) to prevent them from being touched (to avoid burning).
- B. If the valve is used in hot gas/fluid applications that might give exothermic reactions, precautions must be taken so that the valve surface cannot lead to danger for people or the direct environment. In dust and possible explosion zones, the operation temperatures and ignition temperatures for dust should be reviewed.

#### 3.5.4 Operational

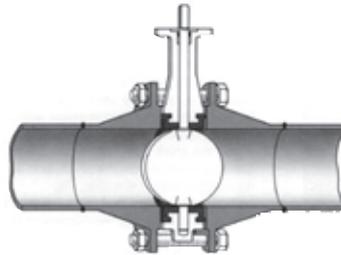
Closing a valve too fast may result in water hammer in the upstream part of the pipeline. Water hammer results in excessive stresses in the valve and will cause severe damage. Water hammer should be avoided in all circumstances.

Due to differential pressure across the valve disc, butterfly valves have the tendency to be closed by the flow. Take care when unlatching the valve operating mechanism.

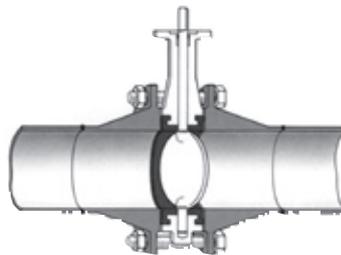
### EXISTING SYSTEM



1. Spread the flanges with the adequate tooling. Insert some flange bolts to hold the valve.

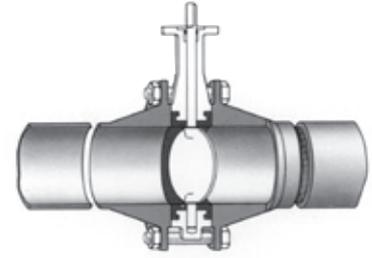


2. Open the valve and remove the flange spreads.

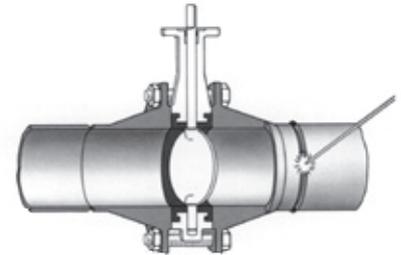


3. Close the valve clockwise, return to open position and cross-tighten all bolting.

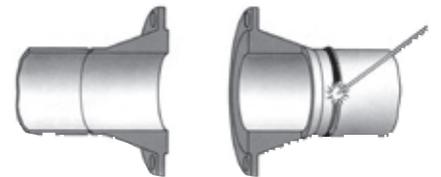
### NEW SYSTEM



1. Center a flange-valve-flange assembly between the pipes.



2. Tack weld the flanges to the pipes.



3. Remove the valve and finish weld. Install the valve according to the procedure in the left column.

FIGURE 2

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### 3.6 TROUBLESHOOTING GUIDE

Symptom	Possible cause	Resolution
Valve would not rotate	1. Actuator has failed 2. Valve packed with debris	1. Replace or repair 2. Flush or clean valve to remove debris
Valve leaking	1. Valve not fully closed 2. Debris trapped in valve 3. Seat is damaged	1. Close valve, check actuator stop settings 2. Cycle and flush (with valve open) to remove debris 3. Replace seat
Jerky operation	1. Extreme dry application 2. Air supply actuator inadequate	1. Put some silicone oil on seat or increase size of actuator 2. Increase air supply pressure and/or volume

### 4 MAINTENANCE FOR SERIES 60 RESILIENT SEATED BUTTERFLY VALVES SIZES DN 50 - 300 (NPS 2 - 12)

#### WARNING!

Depressurize and, if necessary in case of dangerous fluids, drain the line and flush with appropriate cleaning fluid before starting any maintenance. Failure to do so may cause serious personal injury and/or equipment damage. Before disassembling the valve, ensure the valve has been decontaminated correctly from any harmful gasses or liquids and that it is within a safe temperature range for handling. Personnel making any adjustments to the valves should utilize suitable equipment. All required personal protection means should be worn. We recommend that personnel should be trained in all aspects of these instructions before carrying out handling of any valve.

#### 4.1 Routine maintenance

The Keystone Series 60 butterfly valves are designed to require a minimum of maintenance. Routine maintenance or lubrication is not required, we recommend periodic (visual) inspection to ensure satisfactory operation and sealing to the environment.

#### 4.2 Removing the valve from the pipe system

- Turn the disc to nearly closed position. (The disc is in line with the parallel flats in the shaft).
- Loosen all flange bolts and remove the bolts, which prevent removing of the valve.
- Spread the flanges with adequate tooling, and remove the valve.

#### 4.3 Valve disassembly (see Figure 3)

- After removal of valve from the piping system, open the valve fully.
- Remove the handle or actuator.
- On sizes 50 mm - 300 mm (2" - 12"), remove the stem retaining pins (7).
- Pull out the upper shaft (4).
- Pull out the lower shaft (5).
- Remove the disc (3) from the liner (2). Do not damage the disc edge.

- Remove the liner (2).

**Note:** Liner can only be removed in the direction away from the retention lip in the body (1)

- If valve has bearings (6), remove by tapping with blunt instrument.
- Inspect all components for wear and replace as required.

#### 4.4 Valve assembly (see Figure 3)

- Clean all reusable parts.
- If valve has bearings (6), tap one in from top of valve neck flange until it is about 6 mm (1/4") from top surface. Tap the other in from inside the body seat bore into the bottom of the valve neck flange - about 6 mm (1/4") from the bottom surface.
- Apply a lubricant or soapy solution compatible with the elastomer to facilitate assembly.
- Insert liner (2) into body by pressing it into the body evenly. Be certain to line up the shaft holes and to place the elastomer free phenolic side of the liner so that it contacts the retention lip in the body when inserted on lug style bodies.
- Insert disc (3) in open position into liner. Make certain broached end of the disc with internal drive flats, is at the upper stem end of the body.
- Coat the upper shaft (4) with a general purpose elastomer compatible lubricant and install into body.
- Install lower shaft (5).
- Install retaining pins (7) to both shafts.
- Install the operator.
- Check assembly by opening and closing the valve several times.
- Follow installation instruction for reinstalling the valve in the piping system.

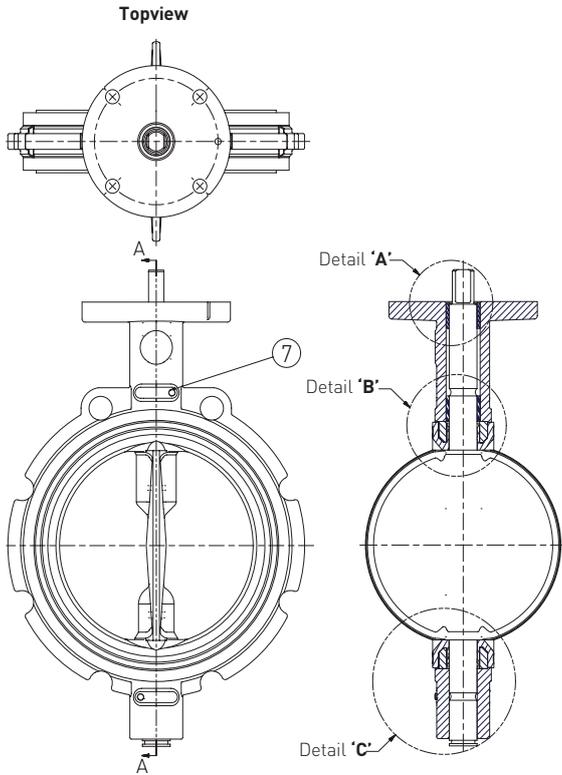
#### 4.5 Re-installing the valve

See section 3.3.1

# KEYSTONE SERIES 60 BUTTERFLY VALVES

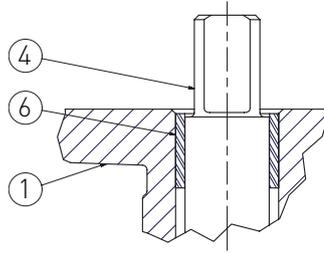
## INSTALLATION AND OPERATION MANUAL

SERIES 60 (WAFER)  
DN 50 - 300 (NPS 2 - 12)

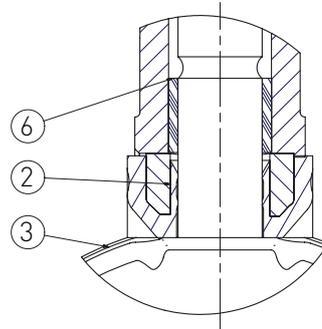


### PARTS LIST

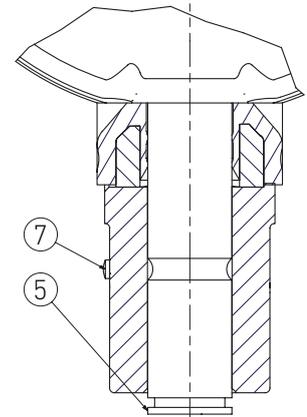
Item	Description
1	Body
2	Liner
3	Disc
4	Upper shaft
5	Lower shaft
6	Bearing
7	Retaining pin



Detail 'A'

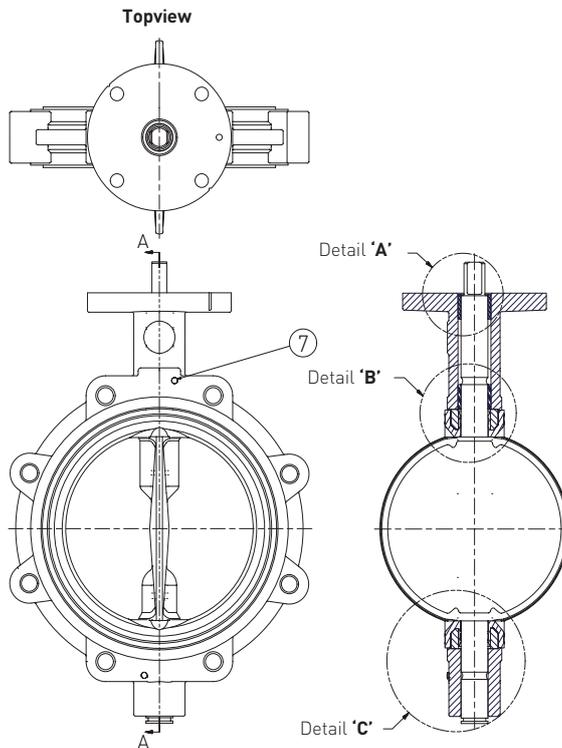


Detail 'B'



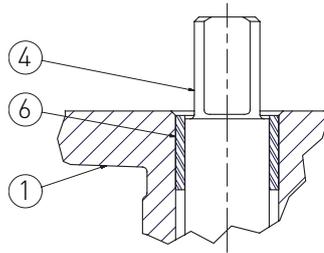
Detail 'C'

SERIES 60 (LUG)  
DN 50 - 300 (NPS 2 - 12)

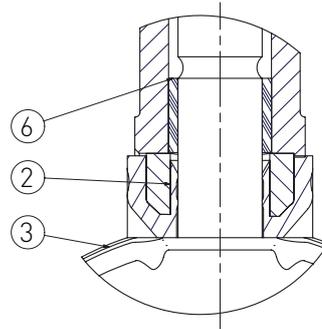


### PARTS LIST

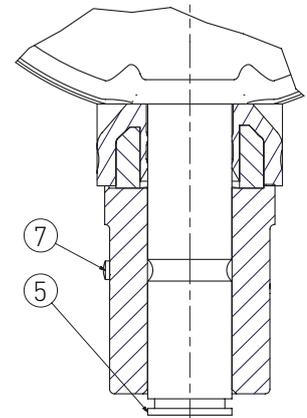
Item	Description
1	Body
2	Liner
3	Disc
4	Upper shaft
5	Lower shaft
6	Bearing
7	Retaining pin



Detail 'A'



Detail 'B'



Detail 'C'

FIGURE 3

# KEYSTONE SERIES 60 BUTTERFLY VALVES

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### 5 MAINTENANCE FOR SERIES 60 RESILIENT SEATED BUTTERFLY VALVES SIZES DN 350-600 (NPS 14-24)

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**WARNING! See section 4!**

#### 5.1 Routine maintenance

See section 4.1

#### 5.2 Removing the valve from the pipe system

See section 4.2

#### 5.3 Valve disassembly (see Figure 4)

1. Remove the valve from piping system.
2. Fully open the valve.
3. Remove the actuator.
4. Remove the adjusting screw / plug (6).
5. Remove the thrust washer (10).
6. Remove the retaining screw (9).
7. Pull out the lower shaft (5).
8. Pull out the upper shaft (4).
9. Remove the disc (3).
10. Inspect the bearings (7 and 8) for wear. Remove if necessary.
11. Inspect the liner (2) for wear. Remove if necessary by tapping it out using a soft drift.  
**Note:** Liner can only be removed in the direction away from the retention lip in the body (1)
12. Inspect all components for wear and replace as required.

#### 5.4 Valve assembly (see Figure 4)

1. Clean all reusable parts.
2. Install the bearing (7 and 8) in the body.  
Note: the upper shaft bearing is longer of the two bearings, drill the appropriate size hole through the upper shaft bearing at the retention screw hole in the body (1) for the retaining screw (9).
3. Install liner (2) in the body (1) by locating the alignment rib on the liner with the alignment guide in the body and tapping the liner into the body.
4. Lubricate the sealing surfaces and the shaft holes of the liner with silicone lubricant.
5. Install the disc (3) in the open position. Make certain broached end of disc with internal drive flats, is at the upper stem end of the body.

6. Lubricate and install the upper shaft (4).
7. Lubricate, and install the lower shaft (5).
8. Install the thrust washer (10).
9. Put a small amount of Loctite® #242 or equivalent on the threads of the adjusting screw / plug (6) and install the screw by turning it into the body until the bottom shaft contacts the disc. Do not over tighten.
10. Install retaining screw (9).
11. Follow installation instruction for reinstalling the valve in the piping system.

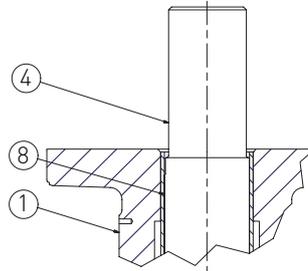
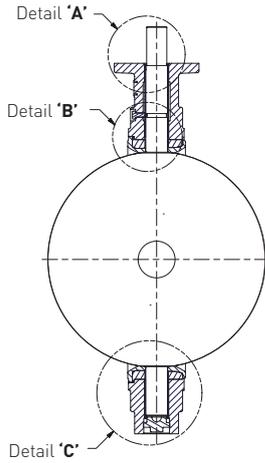
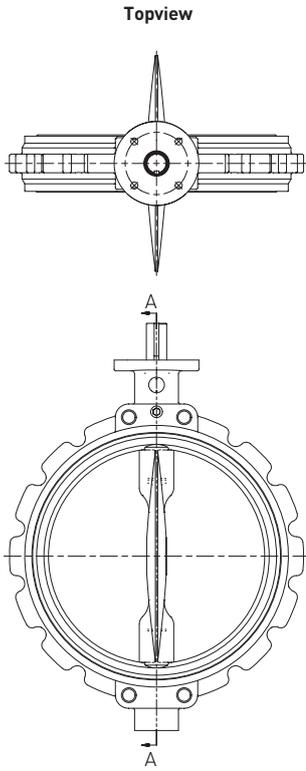
#### 5.5 Re-installing the valve

See section 3.3.1

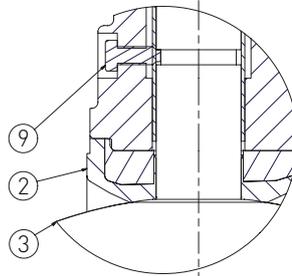
# KEYSTONE SERIES 60 BUTTERFLY VALVES

## INSTALLATION AND OPERATION MANUAL

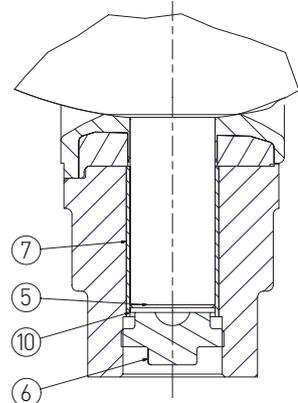
SERIES 60 (WAFER)  
DN 350 - 600 (NPS 14 - 24)



Detail 'A'



Detail 'B'

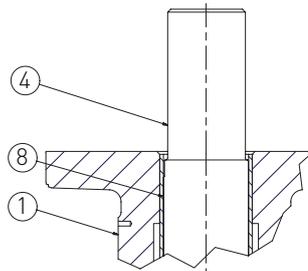
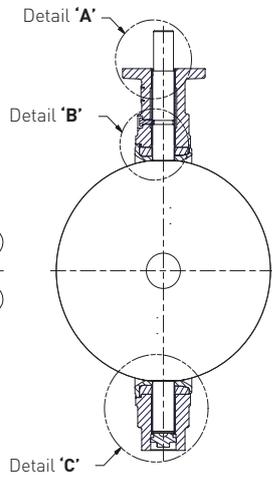
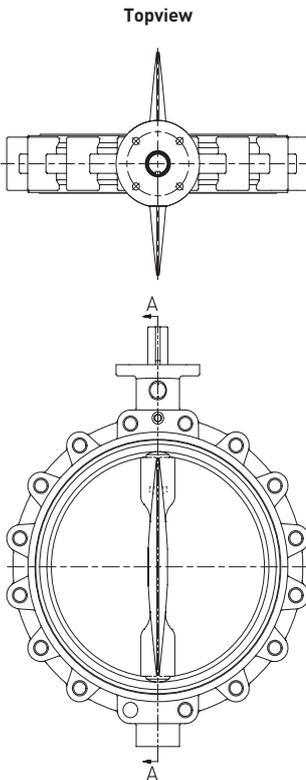


Detail 'C'

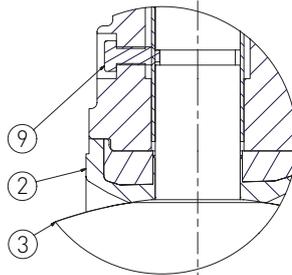
### PARTS LIST

Item	Description
1	Body
2	Liner
3	Disc
4	Upper shaft
5	Lower shaft
6	Plug
7	Lower bearing
8	Upper bearing
9	Retaining screw
10	Thrust washer

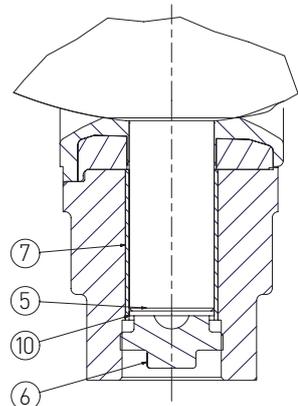
SERIES 60 (LUGGED)  
DN 350 - 600 (NPS 14 - 24)



Detail 'A'



Detail 'B'



Detail 'C'

### PARTS LIST

Item	Description
1	Body
2	Liner
3	Disc
4	Upper shaft
5	Lower shaft
6	Plug
7	Lower bearing
8	Upper bearing
9	Retaining screw
10	Thrust washer

FIGURE 4

