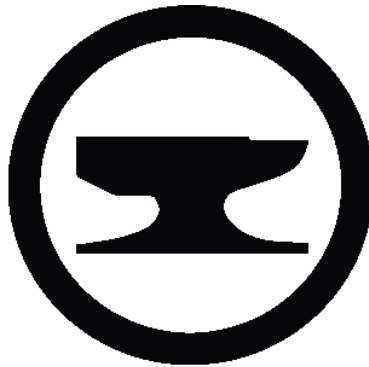




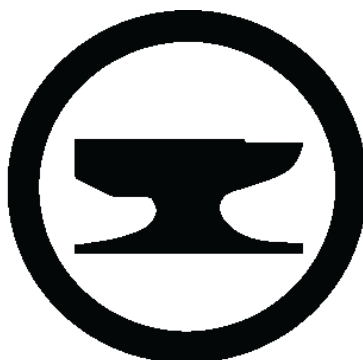
SMITH VALVES

Engineering Department

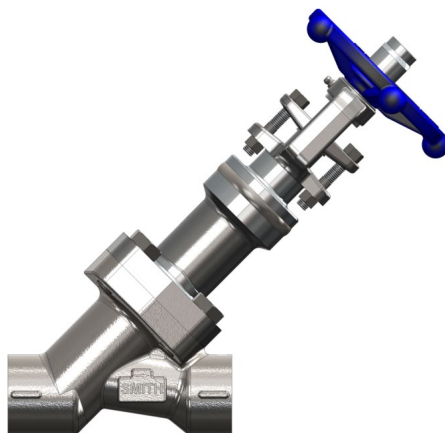
DWG:	Jaime Reddic	11/18/13	Smith Bellows Gate and Globe Installation, Operation, and Maintenance Manual		
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APPR:	John Nguyen	11/18/13			
APPR:			SIZE	EDC 323	REV.
APPR:			A		0
APPR:			PAGE 1		



Revision		
Rev.	Description	Approval/Date
0	Initial document release	Mani Pilla, 7/6/2021 Cody Hill: 7/6/2021



SMITH VALVES



Installation, Operation, and Maintenance Manual

Bellows Gate and Globe Valves

Gate Valve Series: B800/B870/B815/B830/B860/BT15/BT17

Globe Valve Series: BG80/BG87/BG15/BG17/BG81/BG83/BG86/BY80/BY15

EDC 323, Revision 0, Issued July 2021



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1.0 General

Most of this information is common knowledge to experienced forged steel valve users. This information applies to all standard Smith API Std 602 Forged valves. When properly installed in applications for which they were designed, Smith valves will give long, trouble-free service.



We do recommend however that this entire document be read prior to proceeding with any installation or repair.

1.1 Responsibility for Valve Application

The End User is responsible for ordering the correct valves. SMITH VALVES are to be installed in the observance of the pressure rating and design temperature. Prior to installation, the valves and nameplates should be checked for proper identification to be sure the valve is of the proper type, material, and is of a suitable pressure class and temperature limit to satisfy the application requirements.



Do not use any valve in applications where either the pressure or temperature is higher than the allowable working values. Also valves should not be used in service media if not compatible with the valve material of construction, as this will cause chemical attacks.

1.2 Receiving Inspection and Handling

Valves should be inspected upon receipt to determine:

- Compliance to purchase order requirements.
- Correct type, pressure class, size, body and trim materials and end connections. (This information may be found on the nameplate or may be stamped on the body of the valve.)
- Any damage caused during shipping and handling to end connections, handwheel or stem.



The End User is advised that misapplication of the product may result in injuries or property damage. A selection consistent with the particular performance requirements is important for proper application.

2.0 Installation

2.1 Installation



Piping should be properly aligned and supported to reduce mechanical loading on the end connections.

2.1 Installation Positions

Gate valves are usually bi-directional, and therefore may be installed in either direction. In some special cases, gate valves may be unidirectional, in which case the direction of flow will be indicated on the valve body.

Globe valves (standard T-pattern) and Y-pattern globe valves are unidirectional and have the direction of flow indicated on the valve body for installation direction.

2.2 Preparation for Installation

Remove protective end caps or plugs, and inspect valve ends for damage to threads, socket weld or butt weld bores.

Thoroughly clean adjacent piping system to remove any foreign material that could cause damage to seating surfaces during valve operation.

Verify that the space available for installation is adequate to allow the valve to be installed and to be operated.



Insufficient clearance for the stem in the fully open position may cause the valve to be inoperable. Inadequate clearance for valves may add mechanical loading to the valve ends. Sufficient clearance should be allowed for threaded valves to be “swung” during installation.

2.3 End Connections

2.3.1 Threaded Ends

Check condition of threads on mating piping. Apply joint compound to the male end of joint only. This will prevent compound from entering the valve flow path.

Smith valves have wrenching lugs forged onto the body ends. Wrenches should be used on the valve end closest to the joint being tightened.

2.3.2 Socket Weld Ends

Remove all grease, oil or paint from the pipe that is to be welded into the valve and from the valve end connections.

Insert the pipe into the valve end connection until it bottoms out in the socket weld bore. Withdraw the pipe 1/16" so that a gap remains between the pipe and the bottom of the socket weld bore to prevent cracks (ASME B16.11). Tack the pipe into the valve and complete the fillet weld.



Gate and Globe valves should be lightly closed to prevent damage to the seating surfaces and stem caused by thermal expansion during the socket welding process.



Valves with PTFE packing and gasket which have temperature limitations lower than the valve base material, may require special welding and stress relieving procedure to be followed based on end-user requirements.

2.3.3 Butt-Weld Ends

Remove all grease, oil or paint from the pipe that is to be welded into the valve and from the valve end connections.

2.3.4 Flanged Ends

Check to see that companion flanges are dimensionally compatible with the flanges on the valve body and make sure sealing surfaces are free of dirt.

Install the proper studs and nuts for the application and place the flange gasket between the flange facings.



Stud nuts should be tightened in a criss-cross pattern in equal increments to ensure proper gasket compression.

2.4 Post-Installation Procedures

After installation, the line should be cleaned by flushing to remove any foreign material. When caustics are used to flush the line, additional flushing with clean water is required. The valve should be opened and closed after installation to ensure proper operating function.

With the line pressurized, check the valve end connections, body to bonnet/cover joints and stem packing area for leaks. The packing may have to be tightened to stop packing leakage at the system pressure.



3.0 Operation

Gate valves should be used only in the fully opened or fully closed position.

Globe valves should not be used continuously at openings less than 25%.



Gate and Globe valves should not be left in the fully back seated position under normal operating conditions. The packing may dry out under these conditions and leak as the valve is closed.

A cool valve may leak through the gland when opened to hot fluid. Wait before tightening the packing as the problem may go away.

4.0 Maintenance

Proper PPE should be worn when preparing to service a valve. Observe the following general warnings:



- ***A valve is a pressurized device containing energized fluids and should be handled with appropriate care.***
- ***Valve surface temperature may be dangerously too hot or too cold to the skin.***
- ***Upon disassembly, attention should be paid to the possibility of releasing dangerous and/or ignitable accumulated fluids.***
- ***Adequate ventilation should be available for service.***

4.1 Tools Required

Aside from standard wrenches (for bonnet cap screws and packing gland nuts) the only tool needed for Smith valve maintenance is a packing hook.

4.2 Packing

Function of packing and backseat in bellows seal valve is to prevent leakage in the event when a bellows leakage occurs. If adjustment of packing is needed, follow bellow procedures.

Special care is to be placed in the tightening of gland nuts during maintenance in order to get the proper packing adjustment and functionality.

The packing gland should be checked periodically in service and tightened as necessary to stop leakage around the stem. Tighten in a manner to develop uniform loading on the gland. Tighten only enough to stop the leak. See Table 11.b in Section 11 for recommended packing gland stud torque values.

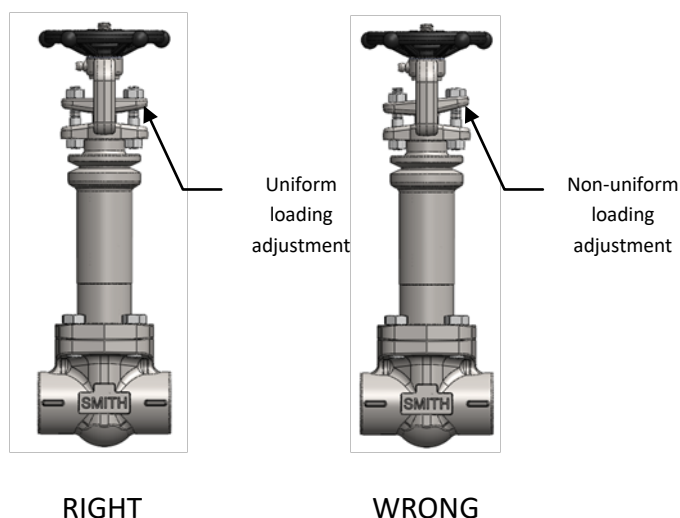


FIG. 1



Over tightening will cause the packing to fail prematurely as well as increasing the force required to operate the valve.

If the leak cannot be stopped by tightening the gland nuts, it is necessary to add additional packing rings or completely repack the valve. While Smith gate and globe valves are equipped with a back seat feature, it is NOT RECOMMENDED TO REPACK THEM UNDER PRESSURE.



Back seating the valve and attempting to repack under pressure is hazardous and is not recommended. Rather than attempting to repack under pressure, it is preferable to use the backseat to control the stem leakage until a shutdown provides safe repacking conditions.

The end rings (top and bottom) of the standard Smith graphite packing set have a diagonal cut that will allow them to be installed around the stem of an assembled valve. However, the factory installed intermediate graphite packing rings are die formed and have no end cut. As a result, these rings cannot be replaced without removing the valve bonnet. If the valve is to be repacked without removing the bonnet (see repacking the valve in line below), care must be taken not to scratch the valve stem sealing surfaces and stuffing box when removing the original packing.

Where it is necessary to repack the valve in line, a compatible ribbon packing system or equivalent braided packing stock should be used. The joints in the packing rings (8) should be diagonally cut. When installing the rings, care should be taken to stagger the ring joints.

Other specialty packing such as V ring Teflon will require the valve to be disassembled if repacking is required.



4.3 Stem Thread Lubrication

For Smith OS&Y Gate and Globe valves, the yoke nut/stem threads and thrust bearing chambers requires lubrication for a smooth valve operation. For enclosed bearing at the yoke nut chamber, use the grease fitting to add more lubrication as needed.

The operating yoke nut (14) of Smith OS&Y Gate and Globe valves requires proper lubrication to stem threads and/or to bonnet. The recommended grease to be applied is Loctite 77164 or equivalent. The following is the proper grease application method:

- If valve is CLOSED:
 - Apply grease below the yoke nut onto stem threads
 - Open valve to the full open position
 - Apply grease to the stem thread protruding above the yoke nut
 - Close valve to the full close position
 - Cycle 1 additional time full open to full close to evenly apply grease inside yoke nut
- If valve is OPEN:
 - Apply grease above the yoke nut onto stem threads
 - Close valve to the full close position
 - Apply grease to the stem thread below the yoke nut
 - Open valve to the full open position
 - Cycle 1 additional time full open to full close to evenly apply grease inside yoke nut

4.4 Repairs

Any damage to the bellows seal cannot be repaired and the valve needs to be replaced immediately for safety. It is usually less expensive to replace the complete valve than to have repairs done. Generally, the only justifiable repairs are replacement of packing and gaskets as previously described.

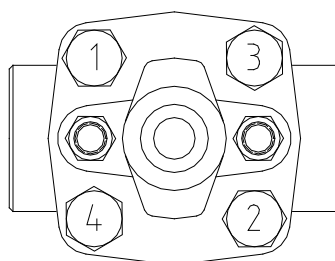
Always replace the bonnet gasket whenever a valve is disassembled. Gasket seating surfaces should be scraped clean (avoid radial marks). Body bolts (7) should be tightened (in the order as shown in Section 5) at several different increasing torque settings (30%, 70%, 100%) until the final recommended torque value is attained. See Table 11.a in Section 11 for recommended torque values.

5.0 Body-Extension Tube Bolting



- ***Only proceed to this operation once the valve has been depressurized.***
- ***Upon disassembly, attention should be paid to the possibility of releasing dangerous and/or ignitable accumulated fluids.***

Body bolts (7) should be tightened (in the sequence as shown in Figure 2) at several different torque increments until the final recommended torque value is attained. See Table 11.a in Section 11 for recommended torque values.



BOLTING SEQUENCE

FIG. 2

6.0 Maintenance on Bolted Bonnet Gate Valves

6.1 Wedge

- Proceed by completely opening the valve assuring that the stem (5) is brought to the backseat position.
- Loosen the body bolting (7).
- Remove the bonnet/stem/bellows assembly (which includes the stem (5), bellows (39), bellows end fitting (41), and wedge (4)) from the body (1). Take note of wedge (4) sealing surfaces relative to each valve seat. Faces should be matched during re-assembly. Extract wedge (4) from the stem T-head.

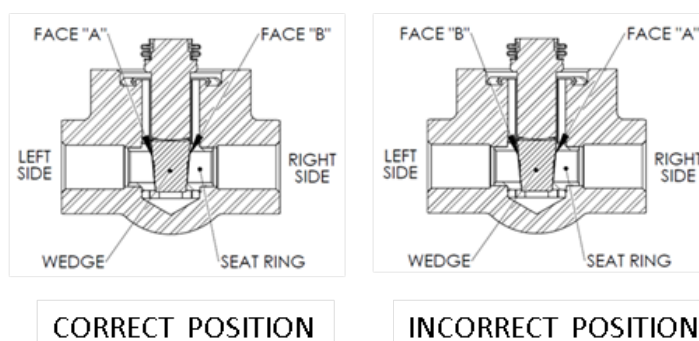


FIG. 3

- Do a visual check of all sealing surfaces to ensure that there are no incisions or marks.
- If there are any, use fine sandpaper or emery cloth to eliminate them, assuring that the original planarity of these surfaces is not modified.
- Replace the gasket (6) between body (1) and extension tube (40). Insert wedge (4) in the stem T-head making sure that the faces are matched as noted above.
- Insert stem assembly into body (1).



- h. Reassemble the extension tube (40) to the body (1) and tighten the body bolts (7) as described in Section 5.

6.2 Bonnet Assembly

The bonnet (2), stem (5) and bellows (39) are welded as one part. Maintenance isn't possible on any of the individual parts except stem thread/yoke nut lubrication.

6.3 Seats

No repairs are possible on seats (3) of gate valves. Replacement of seat (3) is possible, provided the right tools are available.

Blunt chisels and a hammer can be used to remove the old seats (3) after removal of the bonnet-stem and wedge assembly. New seats (3) must be assembled by expanding the ends. We recommend that this process be carried out only in our factory where proper tooling is available or call us for a replacement valve.

7.0 Maintenance on Bolted Bonnet Globe Valves

7.1 Disc and Seat

The body seating surface is integral. To check the seal characteristics between the disc and body seating area, we suggest the "BLUING TEST":

- a. Proceed by completely opening the valve, assuring that the stem (5) is brought to the backseat position.
- b. Loosen the body bolting (7).
- c. Remove the extension tube (40) and the stem assembly (which includes the stem (5), bellows (39), bellows end fitting (41), and disc (4)). Apply some prussian-blue on the body seating surface.
- d. Place the stem assembly in the original position and tighten the body bolts (7) as described in Section 5.
- e. Bring the valve to the closed position, wait 20 seconds, and repeat steps "a" and "b" above.
- f. Remove the extension tube (40) and stem assembly again, and check that the blue trace on the disc (4) and the body (1) is uniformly present on the contact surfaces. If this has not occurred there are two possibilities:
 - There are incisions or marks on sealing surfaces, either the disc (4) or the body (1). Check, and if any, use fine sandpaper or emery cloth to eliminate them, taking care that the original planarity of these surfaces is not modified.
 - Repair is not possible because great damage has occurred. Contact our sales department to receive a new stem/disc assembly and replace it.
- g. Insert stem assembly into body (1).



- h. Reassemble the extension tube (40) to the body (1) and tighten the body bolts (7) as described in Section 5.

7.2 Bonnet Assembly

The bonnet (2), stem (2) and bellows (39) are welded as one part. Maintenance isn't possible on any of the individual parts except stem thread/yoke nut lubrication.

8.0 Maintenance on Gate and Globe Valve Welded Bonnet

As the valve has a weld between body (1) and bonnet (2) maintenance is limited only to the packing area per Section 4.2 and lubrication for stem threads per Section 4.3.

9.0 PWHT (Post Weld Heat Treatment)

9.1 PWHT Responsibility

Smith is responsible for all valve fabrication PWHT during manufacture of valve. The end user is responsible for any PWHT required after welding the valve in line.

9.2 PWHT Requirements/Recommendations

PWHT shall be performed in accordance with the appropriate user's WPS-PQR instructions.

Do not wrap the entire valve body with heating element. All heating shall be performed with localized heating equipment to minimize adverse effects to the rest of the valve. The heat band shall be extended to include the weld HAZ (heat affected zone) of the joints.

The gate valve to undergo PWHT shall be in slight open position, approximately opened 1/16 turn from completely closed position. This will allow material expansion and help hold the gate valve seats in place.

Globe valve has integral body seat and so PWHT would not affect the seat becoming loose.

We recommend allowing the part to cool down after each weld pass to avoid excessive heat build-up. Allow the heated valve assembly to cool before actuating it. Make sure that no adverse effect has taken place during heating and the valve can be cycled open-closed for proper operation.

In the absence of a governing specification, the requirements of ASME B31.1 or B31.3 for PWHT shall be considered.

For NACE valves, a NACE qualified user's WPS shall be used.



Valves with PTFE packing and gasket which have temperature limitations lower than the valve base material, may require special heat treatment procedures to be followed based on end-user requirements.

10.0 Nameplate

Each SMITH valve is equipped with an identification nameplate placed over the handwheel for gate and globe valves.

SMITH nameplates are custom laser printed to prevent any possibility of counterfeit or imitation.

The following is an example. The figure shows several descriptive data. The meaning of each data is given below:

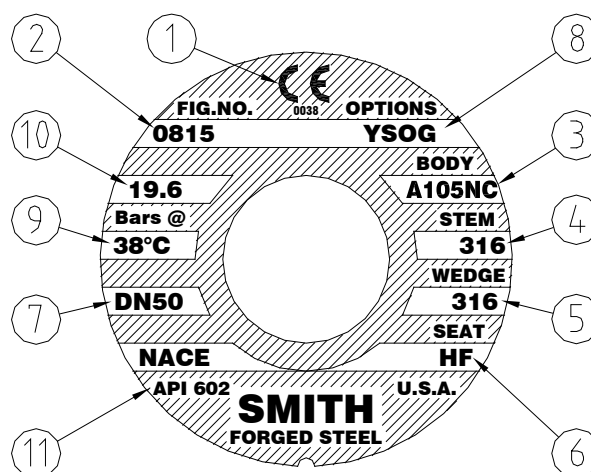


FIG. 5

1. CE marking, which means that the valves comply with the requirements of European Pressure Equipment Directive 2014/68/EU.
2. SMITH Valve's catalogue figure number.
3. Shell material (body, bonnet, cover).
4. Stem material.
5. Closure member material. In case of hard-faced overlay, "HF" will be marked.



6. Seat material. In case of hard-faced overlay, "HF" will be marked.
7. Nominal diameter.
8. Valve material code option.
9. Reference ambient temperature per ASME B16.34
10. Maximum working pressure at reference ambient temperature per ASME B16.34
11. Applicable Design codes.

11.0 Torque Tables

TABLE 11.a: BODY/EXTENSION TUBE BOLTING TORQUE

Bolt Size	Material	
	Alloy Steel (ft-lbs)	Stainless Steel (ft-lbs)
3/8 - 16	20-25	9-10
7/16 - 14	40-45	14-18
1/2- 13	60-65	22-29
5/8 - 11	120-125	46-55
3/4- 10	195-205	85-90

Notes:

1. Above values are based on lubricated bolt threads and bearing surfaces.
2. non-lubricated bolt torque is 1.4 to 1.5 times above values.

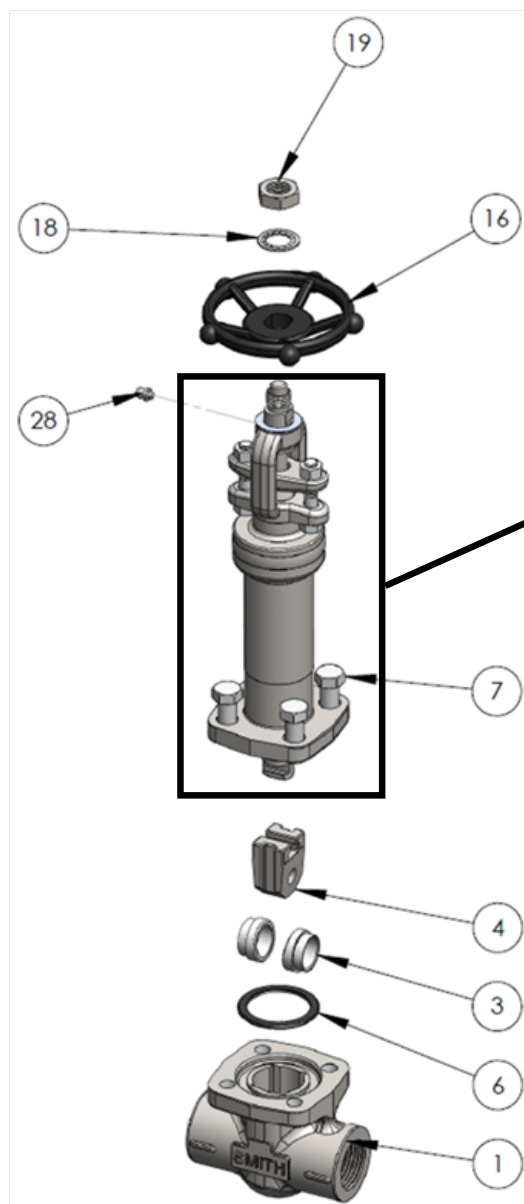
TABLE 11.b: PACKING GLAND STUD TORQUE (in-lbs)

Valve Size	Gate and Globe	Gate	Globe
	Class 150 thru 800	Class 1500	Class 1500
1/2"	50-55	50-55	60-70
3/4"	50-55	50-55	60-70
1"	50-55	75-85	75-85
1-1/2"	60-70	160-175	160-175
2"	110-120	160-175	160-175

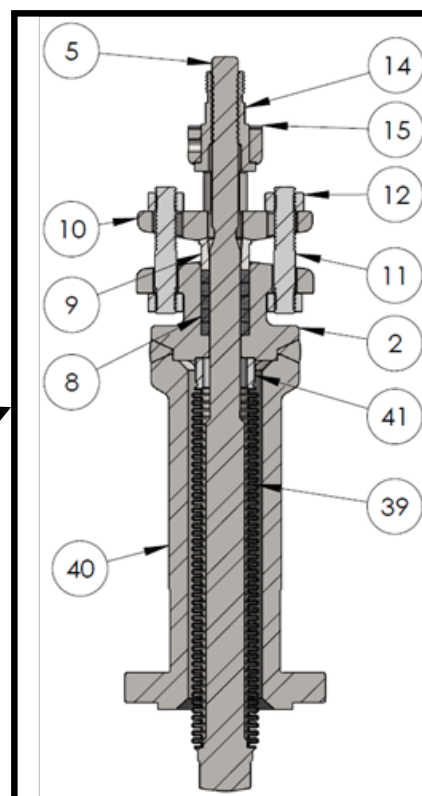
Notes:

1. Above torque values are based on a friction factor of 0.45 in dry conditions. Torque values may differ based on valve service conditions such as: corrosion due to environmental exposure and service temperature.
2. non-lubricated bolt torque is 1.4 to 1.5 times above values.

12.0 Valve Components



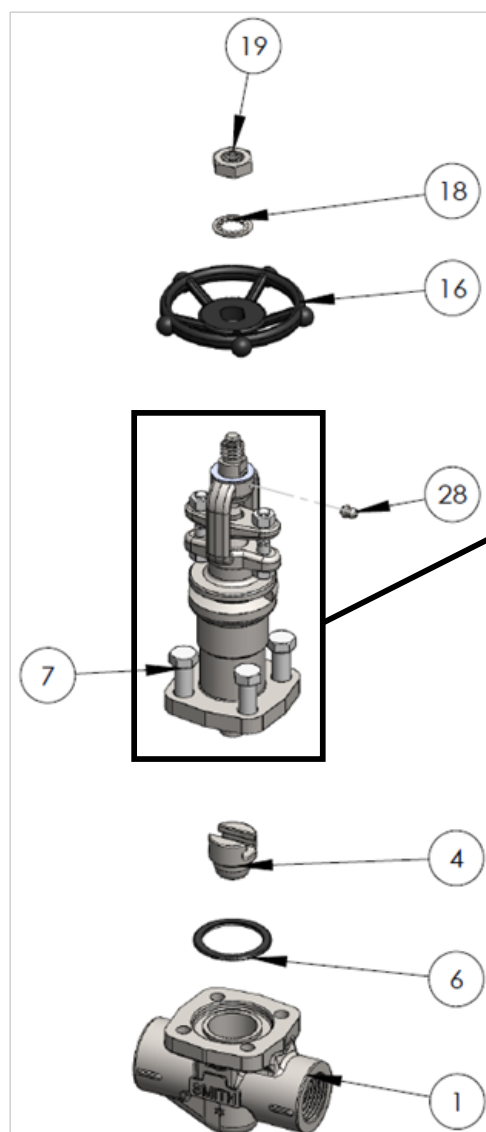
Bonnet Assembly



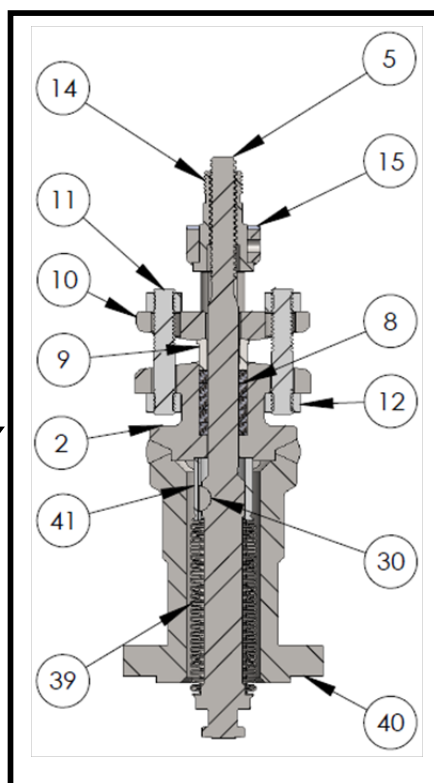
Gate Valve	
Item	Description
1	Body
2	Bonnet
3	Seat Ring
4	Wedge
5	Stem
6	Gasket
7	Capscrew
8	Packing
9	Gland Bushing
10	Gland Flange
11	Gland Stud
12	Gland Nut
14	Yoke Nut
15	Thrust Washer
16	Handwheel
18	Lock Washer
19	Handwheel Nut
28	Grease Fitting
39	Bellows
40	Extension Tube
41	Bellows End Fitting

Gate Valve

Note: Bonnet assembly includes the Bonnet (2), Stem (5), Bellows (39), and Bellows Fitting (41). Replacement of any of these parts would require replacement of the entire assembly.



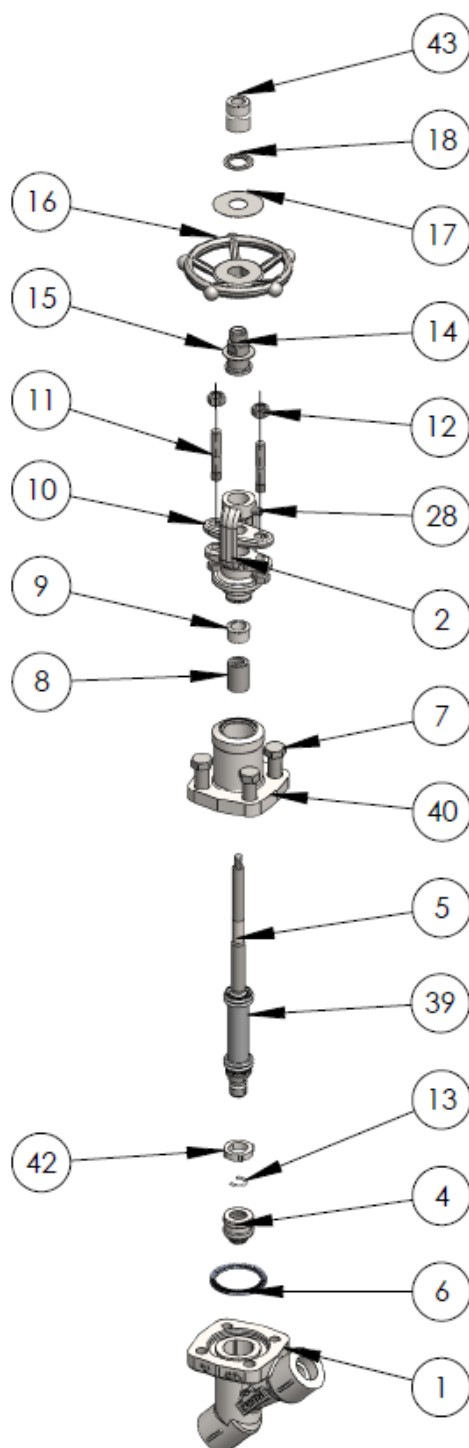
Bonnet Assembly



Globe Valve	
Item	Description
1	Body
2	Bonnet
4	Disc
5	Stem
6	Gasket
7	Capscrew
8	Packing
9	Gland Bushing
10	Gland Flange
11	Gland Stud
12	Gland Nut
14	Yoke Nut
15	Thrust Washer
16	Handwheel
18	Lock Washer
19	Handwheel Nut
28	Grease Fitting
30	Stem Key
39	Bellows
40	Extension Tube
41	Bellows End Fitting

Globe Valve

Note: Replacement of stem would require replacement of entire stem assembly which includes stem (5), bellows (39), bellows end fitting (41), and disc (4). In addition, the gasket (6) should be replaced as well.



Y-Pattern Globe Valve	
Item	Description
1	Body
2	Bonnet
4	Disc
5	Stem
6	Gasket
7	Capscrew
8	Packing
9	Gland Bushing
10	Gland Flange
11	Gland Stud
12	Gland Nut
13	Disc Wire
14	Yoke Nut
15	Thrust Washer
16	Handwheel
17	Nameplate
18	Lock Washer
28	Grease Fitting
39	Bellows
40	Extension Tube
42	Lock Plate
43	Indicator Nut

Y-Pattern Globe Valve

Note: Simplified view of the bellows (39) is shown. Actual bellows has corrugation throughout entire length.