INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR SHARPE® 70 SERIES FLANGE BALL VALVES

Installation, Operation, and Maintenance Manual
Series 70 / FS70 Flanged Ball Valves
Sizes ½"–4", Classes 150, 300

GENERAL

The following instructions only refer to Sharpe® standard valves as described in the current catalog. Keep protective cover in place until the moment of installation. Valve performance depends upon prevention of damage to ball surface. Upon removal of cover, make sure that the valve is completely open and free of obstruction.

When shipped, valves contain a silicon-based lubricant which aids the assembly of the valve; this may be removed with a solvent if found objectionable; alternatively, valves can be ordered without lubricants.

Certain ferrous valves are phosphate and oil-dipped during the course of manufacture, but the processes used are non-toxic and the valves are quite safe to use for edible or potable products.

Safety Precautions

Before removing valve from pipeline: media flowing through a valve may be corrosive, toxic, flammable, or of a contaminant nature. Where there is evidence of harmful fluids having flowed through the valve, the utmost care must be taken. It is suggested that the following safety precautions should be taken when handling valves:

- Always wear eye shields
- Always wear gloves and overalls
- Wear protective footwear.
- Wear protective headgear.
- Ensure that running water is easily available.
- Have suitable fire extinguisher ready if media is flammable.

By checking line gauges, ensure that no pressure exists on either the upstream or the downstream sides of the valve.

Ensure that any media is released by operating the valve slowly to half-open position. Ideally, the valve should be decontaminated when the ball is in the half-open position. Leave valve in fully open position.

These valves, when installed, have body connectors which form an integral part of the pipeline, and the valve cannot be dismantled without being removed from the pipeline.

OPERATION

Sharpe® valves provide tight shut off when used under normal conditions and in accordance with Sharpe® valves published pressure/temperature chart.

If these valves are used in a partially open (throttled) position, seat life may be reduced. Any media which might solidify, crystallize, or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided. If minimal maintenance is performed, Sharpe® valves offer Cavity Filled and/or steam jacketed ball valves.

Manual Operation
The type of wrench which is fitted to valve sizes ¼" to 2" is a cast handle with integral stop.
Sharpe® valves have ¼ turn operation closing in a clockwise direction.
It is possible to see when the valve is open or closed by the position of the wrench handle:

- When the wrench is perpendicular to the pipeline the valve is closed.
- When the wrench is parallel to the pipeline the valve is open.

The type of wrench which is fitted to valve sizes 2½" to 4" is a cast wrench block with a handle pipe and a stop plate.

Remote operation
Where manual operation is not required, valves may be automated for remote operation, instrument control, etc. A range of Sharpe® valves pneumatic and electric actuators are available. Operation will be in accordance with Sharpe® valves installation, operation, and maintenance instructions for relevant actuator.
Valves with actuators should be checked for alignment of the actuator to the valve. Angular or parallel misalignment may result in high operational torque and potential damage to the stem seals or stem.

MAINTENANCE

Sharpe® ball valves have been designed and engineered to provide long lasting and trouble-free service when used in accordance with the instructions and specifications herein.
Before installing the valves, the pipes must be flushed clean of dirt, burrs, and welding residues, or you will damage the seats and ball surface.
The valves are split-body, two-piece construction, full-port ball valves.
Design allows maintenance without the need for special tools.
These valves may be installed in any position using good pipe fitting practices.
Flanges conform to ASME Standard B16.5, Class 150 & 300.

General
With self-wipe ball/seats and pressure equalizing slots, Sharpe® valves have a long, trouble-free life, and maintenance is seldom required. When necessary, valves may be refurbished, using a small number of components, none of which require machining. Sharpe® valves are designed for easy service and assembly in the field.
The following checks should, however, help to extend valve life or reduce plant problems.

Stem leakage in valves
Examine the disk springs for damage. If in good condition, tighten the packing nut until disk springs are firmly compressed, then back nut off $^{1}/_{16}$" of a turn. If damaged, dismantle the stem down to the gland, fit new disk springs with their outer edges touching. 4-inch valves have special disk spring arrangements, see page 9. Further maintenance necessitates dismantling the valve.

Leakage at body joint
Check for tightness in the body connector bolts. If loose, tighten body bolts. Standard wrenches should be used. Excessive force will only stretch or strip the bolts.
If there is still leakage, this will be due to damage to the body seal. It will be necessary to dismantle the valve.

In-Line Leakage

Check that the valve is fully closed. If it is, leakage will be due to a damaged seat or ball sealing surfaces, and it will be necessary to dismantle the valve.

Note: stem leakage and leakage at body joint, if not cured by simple means described above, necessitates dismantling the valve. If there is no stem leakage, the stem assembly should not be touched.

REFURBISHING (Valve sizes 1/2" to 2" – See parts list on page 8.)

Note: there are many valve builds. Each has its own parts and order of assembly. Here we only give the standard valve assembly instructions. For more details, contact Sharpe.

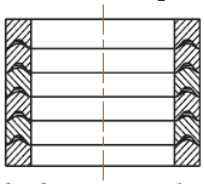
Before disassembly of valves from the pipeline follow these instructions:

1. Cycle the valve with the line pressure fully relieved before attempting to remove the valve from the pipeline. Ensure pressure has also been discharged from the valve cavity.
2. Remove flange bolts and nuts and lift valve from line. Care should be taken to avoid scratching or damaging flange facings.
3. Remove body end nuts [23], using proper wrench size. Lift off end cap [2]. One seat [4] should come out with body end.
4. Remove and discard the seat and body seal [5]. Be careful not to damage the sealing surfaces of the end cap.
5. To take out the ball [3], rotate stem [6] so ball is in fully closed position. Carefully lift ball off stem tang and from body with a "rolling" motion. With large valves it is recommended using a strap and lifting device to remove the ball.
   Note: Extreme caution should be taken to avoid damage to the ball.
6. To dismantle the stem assembly, first remove the handle nut [19] and handle [18] from stem. Using wrench to prevent the stem from turning, remove the lock tab [17], packing nut [16], disk springs [15] and gland(s) [14]. It is normally not possible to remove stem packing at this stage.
7. Withdraw the stem [6] through the body cavity and remove the thrust bearings [7, 8] from the stem. Stem packing [9, 10, 11] may now be removed from the top of the stem bore.
8. Take out the other seat [4].
9. Clean all components thoroughly and examine all seating/sealing surfaces in the body and end cap.
10. If there is build-up of solids which cleaning fluids will not remove, use a board, flat or blunt tool (do not scratch the machined surfaces).
11. No eroded or corroded leak paths are permissible. If any are found, the part must be replaced. The ball must have no scratches across its seating surfaces. Any damage to the port lip will destroy the new seats – a damaged ball must not be reused, install a new ball.

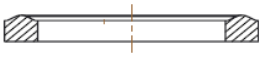
Rebuilding

Before rebuilding, check that all the correct components are available and that they are fit for re-assembling. When rebuilding, cleanliness is essential to allow long valve life and provide cost-effective maintenance.

1. Install one seat [4] in the body [1] cavity with the spherical curvature facing the ball.
2. Lubricate the new stem thrust bearings [7,8] and stem packing [9, 10, 11], with appropriate lubricant.
3. Fit the stem thrust bearing to the stem, with the PEEK [7] first and then the Nova [8].
4. Insert the stem and thrust bearings through the body cavity into stem hole and push it up into body recess. Fit together the bottom [9], middle [10] and top [11] stem packing to make it easier to assemble.
   Note: the stem packings have different shapes and must be fitted together as shown. There will always be a bottom and top stem packing and depending on the stem build there can be a number of middle stem packings.



- The bottom is flat on the bottom and triangular on the top.



- The middle is triangular on bottom and top.

- The top is triangular on the bottom and flat on the top.

5. For Vacuum service it is recommended to insert the stem packing upside down.
6. Fit gland(s) [14] and disk springs [15]. Put the first spring concave side up and the second spring concave side down. Repeat that with the other two springs so the outer edges touch each other in series.
7. Using a wrench to prevent the stem from turning, fit the packing nut [16] and tighten to the torque figures in **Table 1**. Use anti-seize on threads as appropriate.
8. Place the lock tab [17] on the packing nut [16] and adjust the orientation of the nut (loosen the nut if needed).
9. Operate the stem several times and readjust. Overtightening will only reduce the life of the stem assembly.
10. Fit the handle [18] to stem and the handle nut [19] to the handle.
11. Rotate the stem to the closed position - handle is perpendicular to the pipeline.
12. With the stem still in the closed position, the ball [3] may be inserted into the body [1] cavity by sliding the ball slot over the stem tang. Once the ball is seated inside the body, roll it so the center of its slot is aligned with the stem.
13. Rotate the ball with the handle to the open position.
    Note: for ease of assembly the ball should be in the open position when fitting the end cap. Also, with the valve in the open position, the ball is retained by the stem tang and cannot fall out of the body cavity.
14. Fit the new body seal [5] in its groove.
15. Fit the remaining seat [4] to the end cap [2].
    Note: a trace of silicone based lubricant or clean grease (such as petroleum jelly), if compatible with the future pipeline media, will ease the rebuilding by holding the seat rings and body connector seals in place. Use no grease with abrasive additives.
16. Put the end cap into the body, holding the seat in its place, and align the flange bolt holes to straddle the valve centerlines.
    Note: Be careful not to damage the body seal when putting the end cap into the body.
17. Install body nuts and tighten in a "Star" pattern to the torque specified in **Table 2**.

Take care that complete engagement of studs with body flange is maintained. There should be at least one stud thread exposed on each side.

18. Cycle the valve open and closed several times slowly to ensure that the operation is smooth and free of binding or sticking.

REFURBISHING (Valve sizes 2½" to 4" – See parts list on page 9)

The following are the instructions for refurbishing and rebuilding the stem assemblies of sizes 2½" to 4". Note: Valve size 4" may be equipped with two stem configurations: with a stem nut or with a packing flange as shown on page 9.

1. To dismantle the stem assembly, first remove the wrench bolt [22], the wrench block [20], and handle pipe [21] from stem.
2. Remove the lock [19].
3. To remove the lock tab use a flat screw driver and bend the flats open to enable opening the packing nut [18].
4. Using wrench to prevent the stem from turning, remove the packing nut [18], lock tab [17], disk springs [16], stop plate [15] and gland [14]. It is normally not possible to remove stem packing at this stage.
5. Withdraw the stem [6] through the body cavity and remove the thrust bearings [7, 8] from the stem. Stem packing [9, 10, 11] or [12] possibly [13] if equipped, may now be removed from the top of the stem bore.

REFURBISHING (Valve size 4" with Packing Gland)

1. Remove retainer ring [19a], wave spring [18a], stop plate [15], and thrust bearing [7].
2. Using a wrench, remove the gland bolts [17a], remove the gland [13a] and position ring [12a].
3. Withdraw the stem [6] through the body cavity and remove the thrust bearings [7,8] from the stem. Stem packing [9, 10, 11] or [12] possibly [13] if equipped, may now be removed from the top of the stem bore.

Rebuilding (Valve sizes 2½" to 4")

1. Fit the stem thrust bearing to the stem, with the PEEK [7] first and then the Nova [8].
2. Insert the stem and thrust bearings through the body cavity into stem hole and push it up into body recess. Fit together the bottom [9], middle [10] and top [11] stem packing to make it easier to assemble.
   Note: the stem packings have different shapes and must be fitted together as shown on page 4. There will always be a bottom and top stem packing and depending on the stem build there can be a number of middle stem packings.
   For Vacuum service it is recommended to insert the stem packing upside down.
3. Fit gland [14], stop plate [15] disk springs [16] and lock tab [17].
4. Using a wrench to prevent the stem from turning, fit the packing nut [18] and tighten to the torque figures in **Table 1**. Use anti-seize on threads as appropriate.
5. Bend the lock tab [17] flats on the packing nut [18] sides using a hammer or mallet. Adjust the orientation of the nut if needed.
6. Fit the wrench block [20] to stem and insert the handle pipe [21] to the wrench block.
7. Fit the wrench bolt [22] to the wrench block and tighten to the stem.
8. Operate the stem several times and readjust.

Rebuilding Valve Size 4" with Packing Gland

1. Fit the gland position ring [12a] and gland [13a] on the stem.
2. Assemble on the two gland bolts [17a] with the washer [16b], 8 disk springs [16a] and another washer [16b], then insert all through the gland hole and thread into the body.
   Note: Disk springs [16a] must be arranged in SERIES for PTFE packing, and in PARALLEL-SERIES for GRAPHITE packing as shown in Details A & B on the assembly diagram.
3. Using a wrench tighten to the torques in **Table 1**. Tightening should be done by alternating bolts on each side in 10 in-lb increments. Use anti-seize on threads as appropriate.
   Caution: Extra care must be taken to ensure that the gland bolts [17a] get torqued evenly to ensure the gland [13a] is parallel to the mounting plate to prevent damage.
4. Insert thrust bearing [7], stop plate [15], and wave spring [18a] on the stem and secure with the retainer ring [19a] into its groove.

Maintenance kits

Maintenance kits are available from Sharpe® valves. These kits consist of the following parts:

1. 2 seat rings, 1 body seal.
2. 2 stem thrust seals (1 PEEK, 1 Nova), 4 Belleville washers.

Depending on the valve stem build these kits also consist of the following items.

Standard PTFE stem packing:

1. For sizes ¼"-1¼": 1 bottom, 4 middle, 1 top.
2. For sizes 1½"-2": 1 bottom, 5 middle, 1 top.
3. For sizes 2½"-4": 1 bottom, 6 middle, 1 top.

Standard Graphite stem packing:

- For sizes ¼"-2": 2 graphite packing, and 1 more PEEK thrust seal.
- For sizes 2½"-4": 5 graphite packing, and 1 more PEEK thrust seal.

Note: Other stem packing options are available including fire safe, high temperature, fugitive emission, vacuum, high cycle and more.

When ordering maintenance kits, please be sure to specify the type and size of valve and sealing materials required.

Where a valve needs repairing, rather than maintaining, it must be noted that only Sharpe® valves authorized spare parts should be used. These include basic components such as bolts, screws, nuts, etc. In addition to maintenance kits, spare parts available from Sharpe® valves are balls, stems, glands. If additional parts are required, it is normally recommended that the complete valve be replaced.

Parts from different valve series should not be interchanged.

Tightening Torque Tables

Table 1
STEM NUT TIGHTENING TORQUE

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
¼″ - ¾″	M10	10.2	90
1″ - 1¼″	M12	13	115
1½″ – 2″	M18	30	265
2½″	1″ - 14	60	530
3″ - 4″	1⅛″ - 12	80	700
4″ *	M8	9	80 [PTFE Packing]
		14	120 [Graphite Packing]

***** Valves with flanged gland stem assembly.

Table 2
BODY BOLTS TIGHTENING TORQUE (Grade 1)

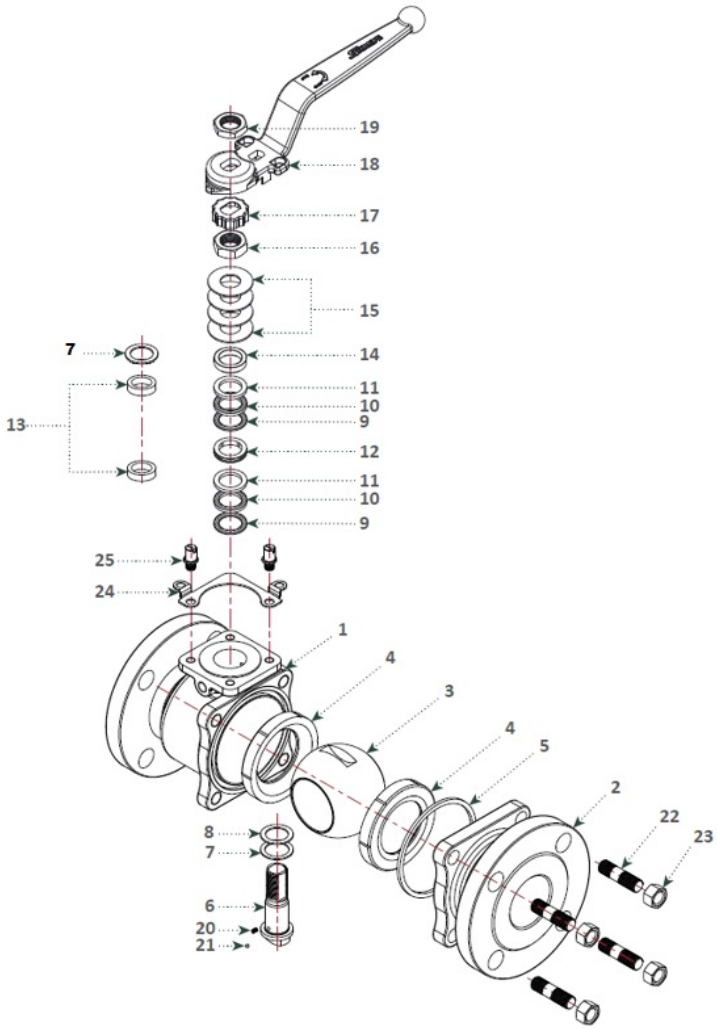
CLASS 150

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
½"	5/16″-18	7	65
¾"	5/16″-18	7	65
1"	3/8″-16	14	125
1½"	1/2″-13	28	250
2"	1/2″-13	28	250
2½"	1/2″-13	28	250
3"	1/2″-13	28	250
4"	1/2″-13	28	250

CLASS 300

VALVE SIZE	THREAD	TORQUE (NM)	TORQUE (LBS.IN)
½"	5/16″-18	7	65
¾"	5/16″-18	7	65
1"	3/8″-16	14	125
1½"	1/2″-13	28	250
2"	5/8″-11	55	355
2½"	5/8″-11	55	355
3"	5/8"-11	55	355
4"	5/8"-11	55	355

Parts & Materials



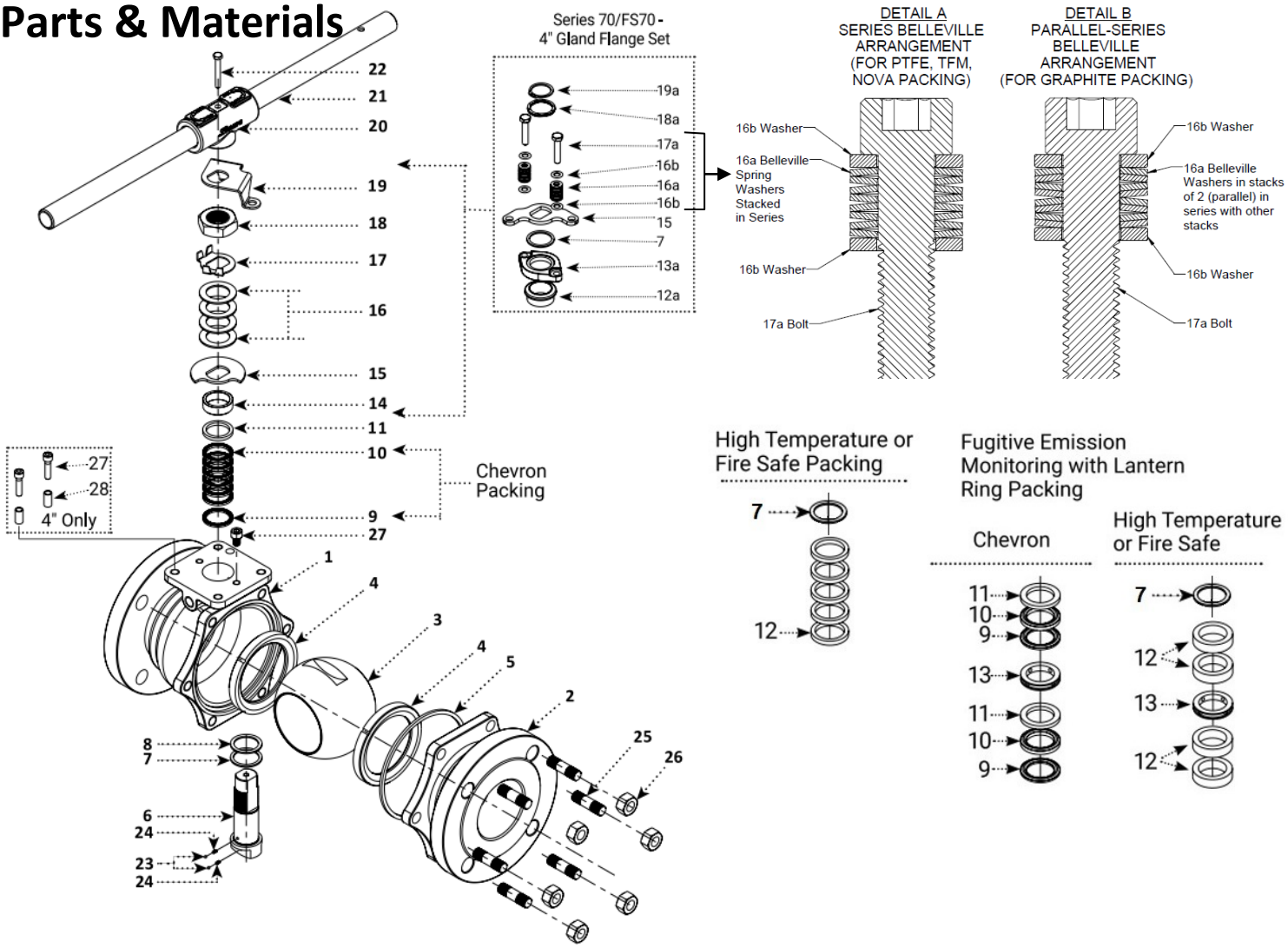
Sizes ½" - 2"

ITEM	DESCRIPTION	MATERIAL	QTY
1	Body	Stainless Steel ASTM A351 CF8M Carbon Steel ASTM A216 WCB SMO ASTM A351CK3MCuN Alloy 20 ASTM A351 CN7M Hastelloy C ASTM A494 TYPE CW-12MW Monel ASTM A494 GR M35-1	1
2	End Cap	Stainless Steel ASTM A351 CF8M/CF3M Carbon Steel ASTM A216 WCB SMO ASTM A351CK3MCuN Alloy 20 ASTM A351CN7M Hastelloy C ASTM A494 TYPE CW-12MW Monel ASTM A494 GR M35-1	2
3	Ball	316 Stainless Steel SMO 254 Alloy 20 17-4 PH Hastelloy C Monel	1
4*	Seat	PTFE, RTFE, TFM®, Nova, PEEK, DELRIN®, UHMWPE	2
5*	Body Seal	PTFE, RTFE, Graphite, Viton®	1
6	Stem	316 Stainless Steel SMO 254 Alloy 20 17-4 PH Hastelloy C Monel Inconel	1

ITEM	DESCRIPTION	MATERIAL	QTY
7*	Thrust Bearing - Bottom	PEEK, UHMWPE, NYLATRON	1/2
8*	Thrust Bearing - Top	Nova, PEEK, UHMWPE, NYLATRON	1
9*	Stem Packing - Bottom	PTFE, TFM®, Nova	0/2
10* **	Stem Packing - Middle	PTFE, TFM®, Nova	varies
11*	Stem Packing - Top	PTFE, TFM®, Nova	0/2
12	Lantern Ring	Stainless Steel	1
13*	Stem Packing	Graphite (Fire safe or high temperature)	0/2
14	Gland	Stainless Steel	1/2
15	Belleville Spring	S.ST 17-7	4
16	Packing Nut	Stainless Steel	1
17	Lock Tab	Stainless Steel	1
18	Handle	ASTM A351 CF8 / CS	1
19	Handle Nut	Stainless Steel	1
20	Anti-Static Ball	Stainless Steel	1/2
21	Anti-Static Spring	Hard Drawn Stainless Steel	1/2
22	Body Bolt	A193 Gr. B8A	4
23	Body Nut	A194 Gr. B8	4
24	Lock Plate	Stainless Steel	1
25	Stop Pin	Stainless Steel	2

The quantities pictured in the stem arrangement are for fugitive emission sniffer-port assemblies. Standard stem assemblies carry more seals and no lantern rings.
*** These parts are used in repair kits. ** Middle stem packing is only used from size 1-1/2" and above.**

Parts & Materials



Sizes 2-1/2" - 4"

ITEM	DESCRIPTION	MATERIAL	QTY
1	Body	Carbon Steel ASTM A216 WCB 316 Stainless Steel ASTM A351 CF8M Alloy 20 ASTM A351 CN7M Hastelloy C ASTM A494 CW-12MW Monel ASTM A494 GR M35-1	1
2	End Piece	Carbon Steel ASTM A216 WCB 316 Stainless Steel ASTM A351 CF8M Alloy 20 ASTM A351 CN7M Hastelloy C ASTM A494 CW-12MW Monel ASTM A494 GR M35-1	1
3	Ball	316 Stainless Steel SMO 254 Alloy 20 17-4PH Hastelloy C Monel	1
4*	Seat	PTFE, RTFE, TFM®, Nova, PEEK DELRIN®, UHMWPE	2
5*	Body Seal	PTFE, RTFE, Graphite, VITON®	1
6	Stem	316 Stainless Steel SMO 254 Alloy 20 17-4PH Hastelloy C Monel	1
7*	Thrust Bearing - Bottom	Nova, PEEK, UHMWPE, Nylatron	1/2
8*	Thrust Bearing - Top	Nova, PEEK, UHMWPE, Nylatron	1
9*	Stem Packing - Bottom	PTFE,TFM®,Nova	0/2
10*	Stem Packing - Middle	PTFE,TFM®,Nova	0/2
11*	Stem Packing - Top	PTFE,TFM®,Nova	0/2
12*	Stem Packing	Graphite (FS or high temperature)	4
12a	Gland Position Ring	300 Series Stainless Steel	1

ITEM	DESCRIPTION	MATERIAL	QTY
13	Lantern Ring	300 Series Stainless Steel	1
13a	Gland (size 4" only)	316 Stainless Steel A351 CF8M	1
14	Gland	300 Series Stainless Steel	2
15	Stop Plate	300 Series Stainless Steel	1
16	Belleville Washer	17-7PH Stainless Steel	4
16a	Belleville Washer	17-7PH Stainless Steel	16
16b	Washer	300 Series Stainless Steel	4
17	Lock Tab	300 Series Stainless Steel	1
17a	Gland Bolt	300 Series Stainless Steel	2
18	Packing Nut	300 Series Stainless Steel	1
18a	Wave Spring	17-7PH Stainless Steel	1
19	Lock Plate	300 Series Stainless Steel	1
19a	Retainer Ring	300 Series Stainless Steel	1
20	Wrench Block	304 Stainless Steel ASTM A351CF8	1
21	Handle Pipe	Stainless Steel Zinc Plated Carbon Steel	1
22	Wrench Bolt	300 Series Stainless Steel	1
23	Anti-Static Ball	300 Series Stainless Steel	2
24	Anti-Static Spring	Hard Drawn Stainless Steel	2
25	Body Stud	A193 Gr. B8A	6/8
26	Body Nut	A193 Gr. B8	6/8
27	Stop Pin	300 Series Stainless Steel	2
28	Stop Pin Sleeve	300 Series Stainless Stee1	2

The quantities pictured in the stem arrangement are for fugitive emission sniffer-port assemblies. Standard stem assemblies carry more seals and no lantern rings.
*** These parts are used in repair kits.**