INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR SHARPE® SERIES 80/89 & FS80/89 THREE-PIECE BALL VALVES SIZES ¼″ through 4″

Installation, Operation, and Maintenance Manual
Series 80-89 / FS80-89 3-Piece Ball Valves
Sizes ¼"–4", Classes 800 & 300

GENERAL

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

1) Always wear eye shields.
2) Always wear gloves and overalls.
3) Wear protective footwear.
4) Wear protective headgear.
5) Ensure that running water is easily available.
6) Have suitable fire extinguisher ready if media is flammable.

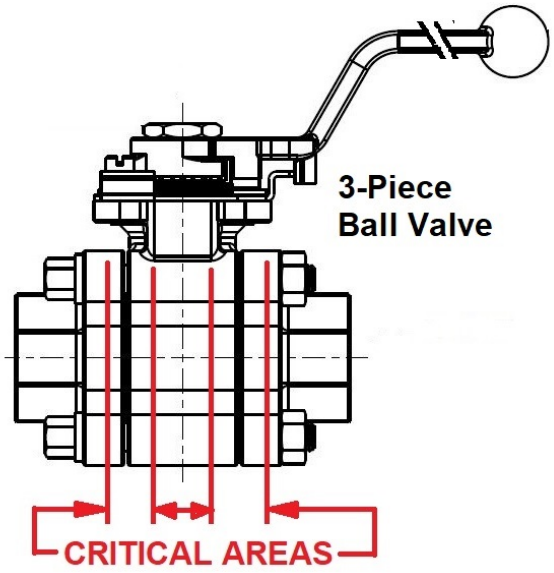
By checking line gauges, ensure that no pressure exists on either the upstream or the downstream sides of the valve.
Ensure that any media is released by operating the valve slowly to half-open position.
Ideally, the valve should be decontaminated when the ball is in the half-open position. Leave valve in fully open position.
These valves, when installed, have body connectors which form an integral part of the pipeline, and the valve cannot be removed from the pipeline without being dismantled.

INSTALLATION

Sharpe® valves are made for long life and easy maintenance when installed in accordance with proper plumbing convention. Pipes must align and accommodate hammer / thermal effects without imposing high load / torque through the valve. Support large actuators independently. Unidirectional valves with an arrow on the body indicates the direction of flow with the tail origin indicating the High Pressure (HP) side when closed.

Tongue-and-groove body seals enable valves with high-temperature seals to be welded in line without disassembly when the following precautions are taken:

- Delrin® or UHMWPE (Ultra-High Molecular Weight Polyethylene) seats must be disassembled and re-assembled using new body seals.
- If valve configuration is actuated to the fail-close position, remove the 4 bolts that attach the actuator to the mounting bracket. Rotate actuator 90° so valve is in the open position. Place the actuator in a safe, clean place until the valve is completely installed.
- Weld to clean pipes with valve in the fully OPEN position throughout the entire welding process.
- Temperatures in critical areas around the seals must not exceed 350°F [175°C] (300°F [150°C] for Kel-F® [PCTFE] & VITON® [FKM]). See illustration below.



- The installer is responsible for all welding procedures and qualifications.
- Manage temperature with controlled welding time, wet towels, gel heat barrier, heat sinks, clean compressed air, etc.
- Monitor heat in critical areas with Tempilstik® or pyrometer.

- Installer must flush any slag, splatter, or debris before operating valve.
- When valve has cooled, confirm torque on body bolts match values in **Table 2**.
- When possible, perform a final seat test before placing the valve in service.

For more details see the ***ASC Welding Instructions for Socket weld and Butt Weld Ends for Sharpe® Valves***.

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-Filler and/or 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 the relevant actuator.
Valves with actuators should be checked for alignment of the actuator to the valve. Angular or linear 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. Debris will damage the seats and ball surface.
These valves may be installed in any position using good pipe fitting practices.

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 12. Further maintenance necessitates dismantling of 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, and 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 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.

Leakage at Pipeline Joint

Screwed valves: test for tightness of screwed thread. If loose, tighten with standard wrench – excessive force will only split the connector. Normal joint material should be used in the correct quantity.
Welded valves: examine welds for leakage point.

REFURBISHING (Valve sizes 1/2" to 2" – See parts list on page 11.)

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. Numbers in parentheses [ ] refer to the valve item on the assembly drawing and parts list on that page. These valves, after installation, have body ends [2] which form an integral part of the pipeline. The valve cannot be removed from the pipeline without disassembly.

Before disassembly of valves from the pipeline follow these instructions:

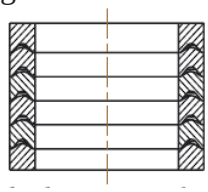
1. Cycle the valve with the line pressure fully relieved before attempting to remove the valve from the pipeline. Cycling the valve ensures pressure has also been discharged from the valve cavity.
2. Bring the valve handle [18] to the open position. **Warning**: trying to remove the valve body [1] from the line in the closed position will damage the ball [3].
3. With the valve in the open position, loosen all body bolts [22] and nuts [23] – taking care that any leftover pressure or media has been evacuated. Remove the body bolts [22], so the valve body [1] can be removed from between the end caps [2]. Bring the body [1] out from between the end caps [2] and bring it to a clean space where it can be dismantled.
4. Remove and discard the seats [4] and body seals [5]. Be careful not to damage the sealing surfaces of the end caps [2].
5. To remove the ball [3], support the ball to prevent it from falling out of the body [1] and rotate stem [6] so ball is in fully closed position. Carefully lift the ball [3] off stem [6] tang and from body with a "rolling" motion. Set the ball [3] aside in a clean, secure area for reuse. ***Note***: Extreme caution should be taken to avoid damaging or scratching the ball [3] surfaces during removal. ***Also,*** ball and seat instructions apply to all sizes, but stem assemblies vary with size.
6. To dismantle the stem assembly, first remove the handle nut [19] and handle [18] from stem [6]. 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 [9,10 & 11] 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 or 13, sometimes 12] may now be removed from the stem bore.
8. Clean all components thoroughly and examine all seating/sealing surfaces in the body [1] and end caps [2].
9. 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).
10. No eroded or corroded leak paths are permissible. If any are found, the part must be replaced. The ball [3] must have no scratches across its seating surfaces. Any damage to the port lip will destroy the new seats [4] – a damaged ball [3] must not be reused, install a new ball.

Rebuilding (Valve sizes 1/2" to 2" – See parts list on page 11.)

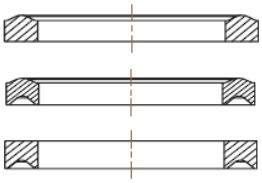
Before rebuilding, check that all the correct components are available and that they are fit for re-assembling. When rebuilding, cleanliness is essential to allow long valve life and provide cost-effective maintenance.

1. Install one seat [4] in the body [1] cavity with the spherical curvature facing the ball.
2. Lubricate the new stem [6] 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 rings [9, 10 & 11] upside down.
6. Fit the packing, 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. Apply anti-seize lubricant to the stem [6] threads if appropriate.
7. Using a wrench to prevent the stem from turning, fit the packing nut [16] and tighten to the torque figures in **Table 1**.
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 [6] 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 [3] with the handle [18] to the open position.

Note: The ball [3] must be in the open position since the closed ball protrudes beyond the body [1] cavity and the ball will be damaged against the body ends [2] when the body is removed or rotated. Also, with the valve in the open position, the ball [3] is retained by the stem tang and cannot fall out of the body cavity.

14. Fit the seat rings [4] to the body making sure that the contoured surface is on the ball side and the flat sides are on the body end [2] side. **Note**: a trace of silicone lubricant or clean grease (such as petroleum jelly), if compatible with the future pipeline media, will ease the rebuilding by helping to hold the seat rings [4] and body seals [5] in place. Use no grease with abrasive additives.
15. The valve must be installed back into the pipeline by sliding the body [1] in between the body ends [2]. The pipeline should, however, be sprung apart sufficiently to clear the valve body [1] and avoid damage to the seat rings [4], body seals [5] and body end [2] sealing faces.
16. Locate the body section on the centerline of pipework. Fasten with body connector bolts [22] and nuts [23]. By tightening, pull together the body section and body ends [2]. Tighten the bolts and nuts in a "Star" pattern to the torque specified in **Table 2**. The connector ends [2] will be metal-to-metal with the body [1] section when fully tightened. **Caution**: Use only standard wrenches – excessive force will only stretch or strip the bolts.
17. 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 12)

The following are the instructions for refurbishing and rebuilding the stem assemblies - sizes 2½" to 4". Follow REFURBISHING instructions on page 6, steps 1 through 5 to disassemble the valve. **Caution**: With large valves it is recommended to use a strap and lifting device to remove the ball [3]. Note: Valve size 4" may be equipped with two stem configurations: with a stem nut or with a packing flange as shown on page 12.

1. To dismantle the stem assembly, first remove the wrench bolt [23], the wrench block [21], and handle pipe [22] from stem [7].
2. Remove the lock [20].
3. To remove the lock tab [18], use a flat screwdriver and bend the flats open to allow the packing nut [19] to rotate.
4. Using wrench to prevent the stem from turning, remove the packing nut [19], lock tab [18], disk springs [17], stop plate [16] and gland [15]. It is normally not possible to remove stem packing [10, 11 & 12 or 13] at this stage.

Withdraw the stem [7] through the body cavity and remove the thrust bearings [8, 9] from the stem. Stem packing [10, 11 & 12], or [13] (possibly [14] if equipped), may now be removed from the top of the stem bore.

REFURBISHING (Valve size 4" with Packing Gland – see parts list on page 12)

1. Remove retainer ring [19a], wave spring [18a], stop plate [16], and thrust bearing [9].
2. Using a wrench, remove the gland bolts [17a], washers [16b], the gland [13a] and position ring [12a].
3. Withdraw the stem [7] through the body cavity and remove the thrust bearings [8, 9] from the stem. Stem packing may now be removed from the top of the stem bore. Clean all components thoroughly and examine all seating / sealing surfaces. Any leak paths or flat spots will require replacement parts. Lubricate moving parts as appropriate.

Rebuilding (Valve sizes 2½" to 4" – see parts list on page 12)

1. Fit the stem thrust bearings to the stem, with the PEEK [8] first and then the Nova [9].
2. Insert the stem [7] and thrust bearings [8, 9] through the body cavity into stem hole and push it up into body recess. Fit together the bottom [10], middle [11] and top [12] stem packing to make it easier to assemble.

Note: The stem packings have different shapes and must be fitted together as shown on page 7. There will always be a bottom [10] and top [12] stem packing and (depending on the stem build) there can be several middle packing rings [11]. Other configurations use a lantern ring [14] and/or graphite packing rings [13].

For Vacuum service it is recommended to insert the stem packing upside down.

Use anti-seize lubricant on stem [7] threads as appropriate.

3. Fit gland [15], stop plate [16] disk springs [17] and lock tab [18].
4. Using a wrench to prevent the stem from turning, fit the packing nut [19] and tighten to the torque figures in **Table 1**.
5. Bend the lock tab [18] flats on the packing nut [19] sides using a hammer or mallet.
6. Fit the wrench block [21] to stem and insert the handle pipe [22] to the wrench block.
7. Fit the wrench bolt [23] to the top of the wrench block and tighten to the stem [7].
8. Operate the stem several times and readjust to ensure there is no sticking or binding.

Rebuilding Valve Size 4" with Packing Gland (see parts list on page 12, alternate view).

1. Install packing sets (either lubricated [10, 11 & 12] or [13 & 8], possibly [14]) over the stem [7] and into the body [1] recess. Fit the gland position ring [12a] and gland [13a] on the stem [7].
2. Use anti-seize on threads as appropriate. Assemble the two gland bolts [17a] with the washer [16b], 8 disk springs [16a] and another washer [16b]. **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 of the assembly diagram on page 12.
3. Insert gland bolts [17a] and washers through the gland [13a] and thread into the body [1]. 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.

Caution: Extra care must be taken to torque the gland bolts [17a] evenly to ensure the gland [13a] is parallel to the mounting plate, to prevent damage. The gland position ring should remain centered in the body bore.

4. Insert thrust bearing [8], stop plate [16], and wave spring [18a] on the stem and secure with the retainer ring [19a].

Maintenance kits

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

1) 2 seat rings, 2 body seals.
2) 2 stem thrust seals (1 PEEK, 1 Nova), 4 (or 16) Belleville washers.

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

Standard PTFE stem packing:

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

Standard Graphite stem packing:

6) For sizes ¼"-2": 2 graphite packing, and 1 more PEEK thrust seal.
7) 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, and 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 – Valve Stem Nut Torque Requirements

STEM NUT TIGHTENING TORQUE (PTFE Packing)				
VALVE SIZE		THREAD	TORQUE (NM)	TORQUE (LBS.IN)
80	89			
½" - ¾"	¼" - ½"	M10	10.2	90
1" – 1 ¼"	¾" – 1"	M12	13	115
1 ½" – 2"	1 ¼" – 1 ½"	M18	30	265
2 ½"	2"	1" - 14	60	530
3" – 4"	2 ½" – 3"	1⅛" - 12	80	700
4"*	-	M8	9	80

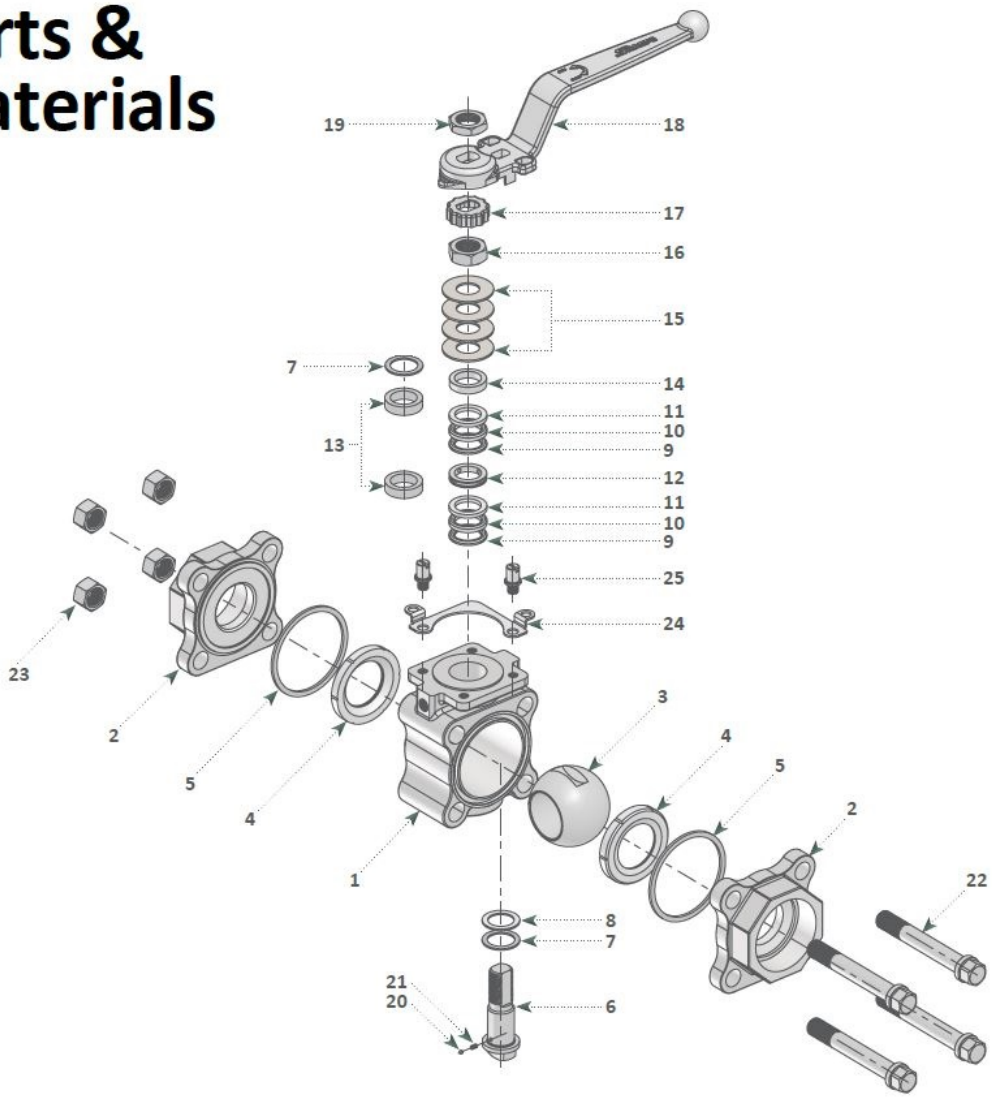
STEM NUT TIGHTENING TORQUE (GRAPHITE Packing)				
VALVE SIZE		THREAD	TORQUE (NM)	TORQUE (LBS.IN)
80	89			
½" - ¾"	¼" – ½"	M10	10.2	90
1" - 1¼"	¾" – 1"	M12	13	115
1½" – 2"	1 ¼" – 1 ½"	M18	30	265
2½"	2"	1" - 14	60	530
3" - 4"	2 ½" – 3"	1⅛" - 12	80	700
4"*	-	M8	14	120

* Valves with flanged gland stem assembly.

Table 2 – Valve Body Bolt Torque Requirements

BODY BOLTS TIGHTENING TORQUE						
VALVE SIZE		THREAD	TORQUE (NM)		TORQUE (LBS.IN)	
80	89		Class 1 (NACE)	Class 2 (Strain Hard)	Class 1 (NACE)	Class 2 (Strain Hard)
½"	¼"	¼" - 20	3	9	26	80
¾" – 1"	½" – ¾"	M8	6	19	53	165
1¼"	1"	M10	12	39	106	345
1½"	1 ¼"	M12	22	65	195	575
2"	1 ½"	M14	35	110	310	970
2½"	2"	M20	107	300	945	2655
3"	2 ½"	$^{7}/_{16}$" - 14	18	39	160	345
4"	3"	½" - 13	27	65	239	575

Parts & Materials



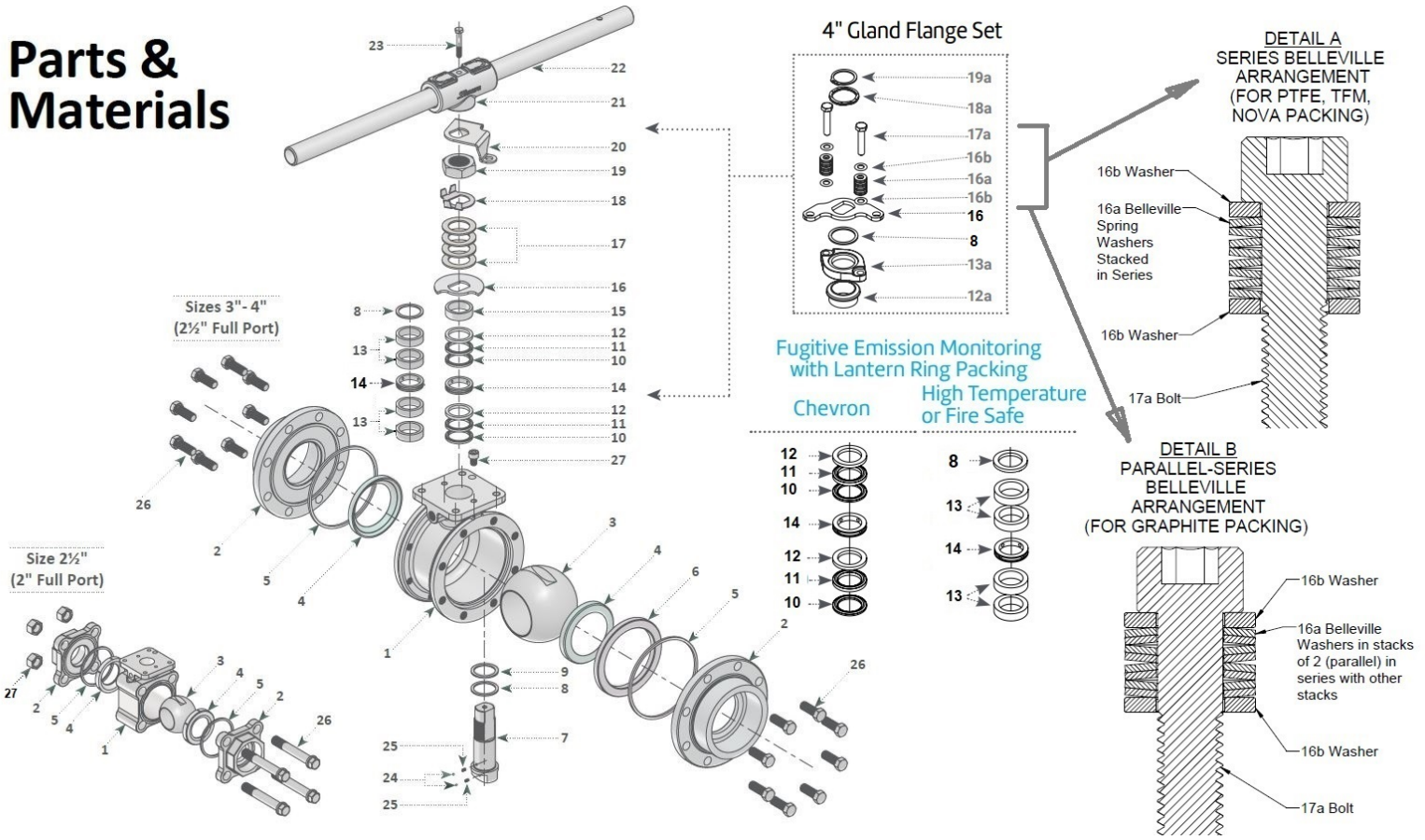
Sizes ½" - 2" (¼" – 1½" Full Port)

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	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" (2"-3" Full Port)

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 Cap	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	2
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®	2
6*	Seat Ring	ASTM A216 WCB ASTM A351 CF8M / CF3M	1
7	Stem	316 Stainless Steel SMO 254 Alloy 20 17-4PH Hastelloy C Monel	1
8*	Thrust Bearing - Bottom	Nova, PEEK, UHMWPE, Nylatron	2/3
9*	Thrust Bearing – Top	Nova, PEEK, UHMWPE, Nylatron	1
10*	Stem Packing - Bottom	PTFE,TFM®,Nova	0/2
11*	Stem Packing - Middle	PTFE,TFM®,Nova	varies
12*	Stem Packing - Top	PTFE,TFM®,Nova	0/2
12a	Gland Position Ring	300 Series Stainless Steel	1

ITEM	DESCRIPTION	MATERI	QTY
13	Stem Packing	Graphite (Firesafe or High Temp)	4
13a	Gland (size 4" only)	316 Stainless Steel A351 CF8M	1
14	Lantern Ring	Stainless Steel	1
15	Gland	Stainless Steel	1
16	Stop Plate	Stainless Steel	1
16a	Belleville Washer	17-7PH Stainless Steel	16
16b	Washer	300 Series Stainless Steel	4
17	Belleville Washer	17-7PH Stainless Steel	4
17a	Gland Bolt	300 Series Stainless Steel	2
18	Lock Tab	Stainless Steel	1
18a	Wave Spring	17-7PH Stainless Steel	1
19	Packing Nut	Stainless Steel	1
19a	Retainer Ring	300 Series Stainless Steel	1
20	Lock	Stainless Steel	1
21	Wrench Block	Stainless Steel ASTM A351 CF8	1
22	Handle Pipe	Stainless Steel	1
23	Wrench Bolt	Stainless Steel	1
24	Anti-Static Ball	Stainless Steel	2
25	Anti-Static Spring	Hard Drawn Stainless Steel	2
26	Body Bolt	A193 Gr. B8	4/16
27	Body Nut	300 Series Stainless Steel	4/16
28	Stop Pin Sleeve	Stainless Stee1	1

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.**