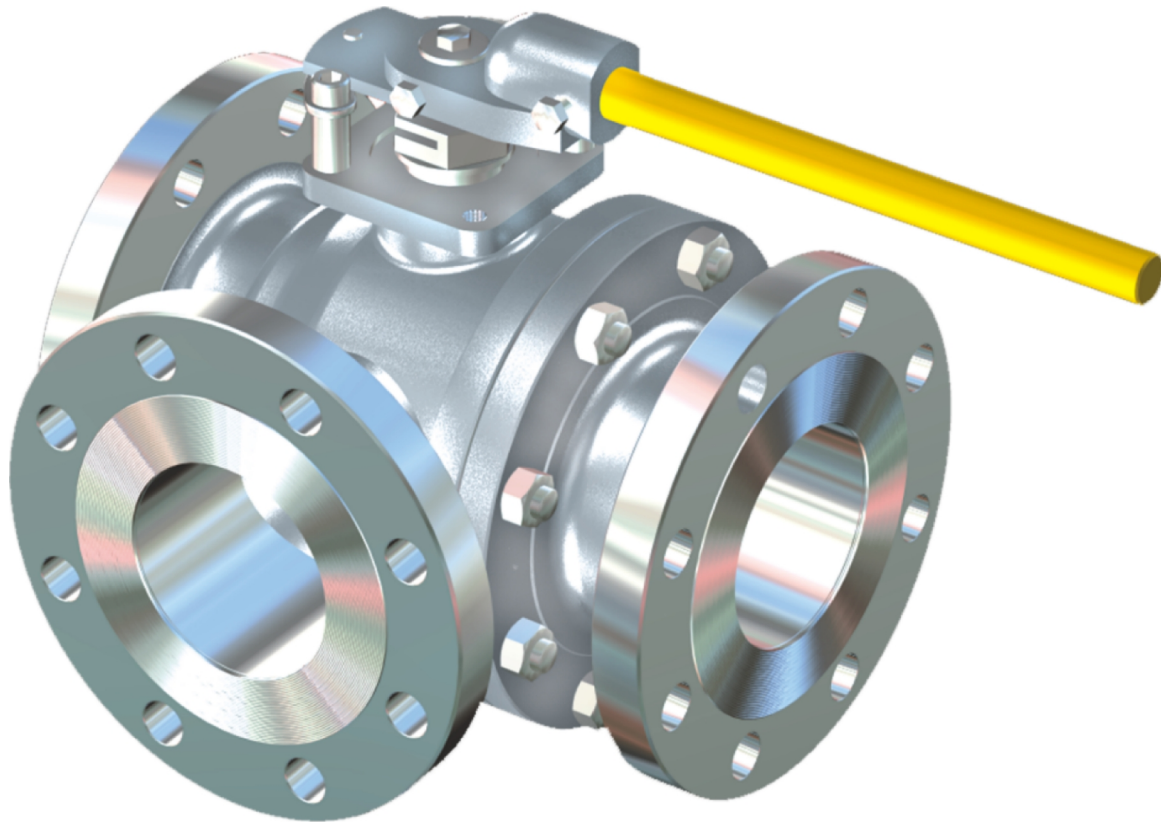


MICROFINISH 3 WAY BALL VALVES

INSTALLATION OPERATION AND MAINTENANCE MANUAL



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INTRODUCTION

Microfinish 3 way Ball Valves have been designed and manufactured to give you long, excellent and trouble free service.

This manual provides you with all the relevant information to install, operate and maintain the valve for long trouble free life. **Please note that all the drawings provided in this manual are typical views.**

1.0 PRIOR TO INSTALLATION

- 1.1. On receipt of material check for any damage during transportation.
- 1.2. Wrapping and protection applied should be left in place until the valve is installed.
- 1.3. If the valves are left exposed, they should be protected against entry of foreign material in the valve parts.
- 1.4. Flush the pipe clean before mounting the valve in the pipeline. Impurities such as sand and parts of welding electrodes could damage the ball surface and the seats.
- 1.5. If the valves are stored for a long time, they should be cleaned, lubricated and tested prior to installation. It is advisable to store the valve such that maximum ports are in open position.
- 1.6. In Lever operated valve, arrow plate is affixed on the top the stem which indicates the flow direction of the valve.

2.0 INSTALLATION

CAUTION

The valves should be used in a well-designed, adequately supported piping system such that it will not be subjected to undue forces, stresses or shock loads during service.

The valves are not designed to operate during or after earthquakes or under fatigue conditions. It is the responsibility of the owner to determine if fatigue conditions exist.

- 2.1 The valve may be installed in any position, however avoid stem position downwards. It is recommended to mount the valve having stem in vertical position.
- 2.2 Valve should not carry the weight of the piping. Proper support of the pipeline will minimize strain on the valve caused by shock in the pipe system. The valve can be supported by its body with pipe clamps and supports. Do not fasten supporting structure to the valve flanges.
- 2.3 Do not attempt to correct pipe misalignment by means of flange bolts.
- 2.4 Do not allow the valves to carry the weight of pipeline to avoid distortion and jamming.
- 2.5 If necessary, tighten the gland packing uniformly during the trial operation of the valve.
- 2.6 A qualified welder must perform all welding operations and the welding procedure shall be in accordance with ASME Boiler & Pressure Vessel Code Section IX.
- 2.7 When mounting the screwed end, butt weld end, socket weld end and flanged end type valves the following respective procedures must be followed, for better performance

2.8 SCREWED END VALVE INSTALLATION

- 2.8a Clean both the mating parts before assembly.
- 2.8b Sealant if necessary should be applied only to the pipe or male threads.
- 2.8c Use correct size wrenches with flat jaws on hexagon or octagon ends.
- 2.8 d Do not use undersized threads on section of pipe where the valves are to be installed.

2.9 BUTT WELD END VALVE INSTALLATION

- 2.9a Keep the valve such that maximum ports are in open position.
- 2.9b Space the joint apart, co-axially with a 2 to 3 mm gap.
- 2.9c Use an internal welding backing ring where practical.
- 2.9d After finishing the welding operation clean the pipeline and valve parts by flushing or pigging to remove the impurities formed during welding.
- 2.9e Do not allow rapid application of excess welding material.
- 2.9f Do not allow the temperature of valve body seat area to exceed 120° C (248° F) to prevent seat and seal damage.
- 2.9g When butt weld end valves are purchased with no extended nipple, before welding, remove the central body assembly along with ball and seats, place a spacer of same dimensions and then weld the ends.

2.9 SOCKET WELD END VALVE INSTALLATION

- 2.10a Keep the valve such that maximum ports are in open position.
- 2.10b First insert the pipe to full depth of socket then pull out about 1.5mm and weld.
- 2.10c Provide adequate support to the pipe on each side or to the valve prior to welding.
- 2.10d Weld each end of the valve with a continuous bead. The welding rod should not exceed 3.2 mm diameter.
- 2.10e Remove the spacer and reassemble the valve body assembly when the system cools down to ambient temperature.
- 2.10f Do not allow the temperature of valve body seat area to exceed 120° C (248° F) to prevent seat and seal damage.
- 2.10 g When socket end valves are purchased with no extended nipple, before welding, remove the central body assembly along with ball and seats, place a spacer of same dimensions and then weld the ends.

2.11 FLANGED END VALVE INSTALLATION

- 2.11a Be sure that flange gaskets and fasteners are suitable for the operating conditions.

- 2.11b Insert the valve along with suitable gasket between the mating flanges, align the flange bolt holes & hold it in place.
- 2.11c Hold the nuts first on backside of the valve flange and then insert the bolts.
- 2.11d Tighten all the bolts to finger tight.
- 2.11 e Use two spanners to tighten the joint, in the sequence as shown in Figure

BOLTING SEQUENCE CHART

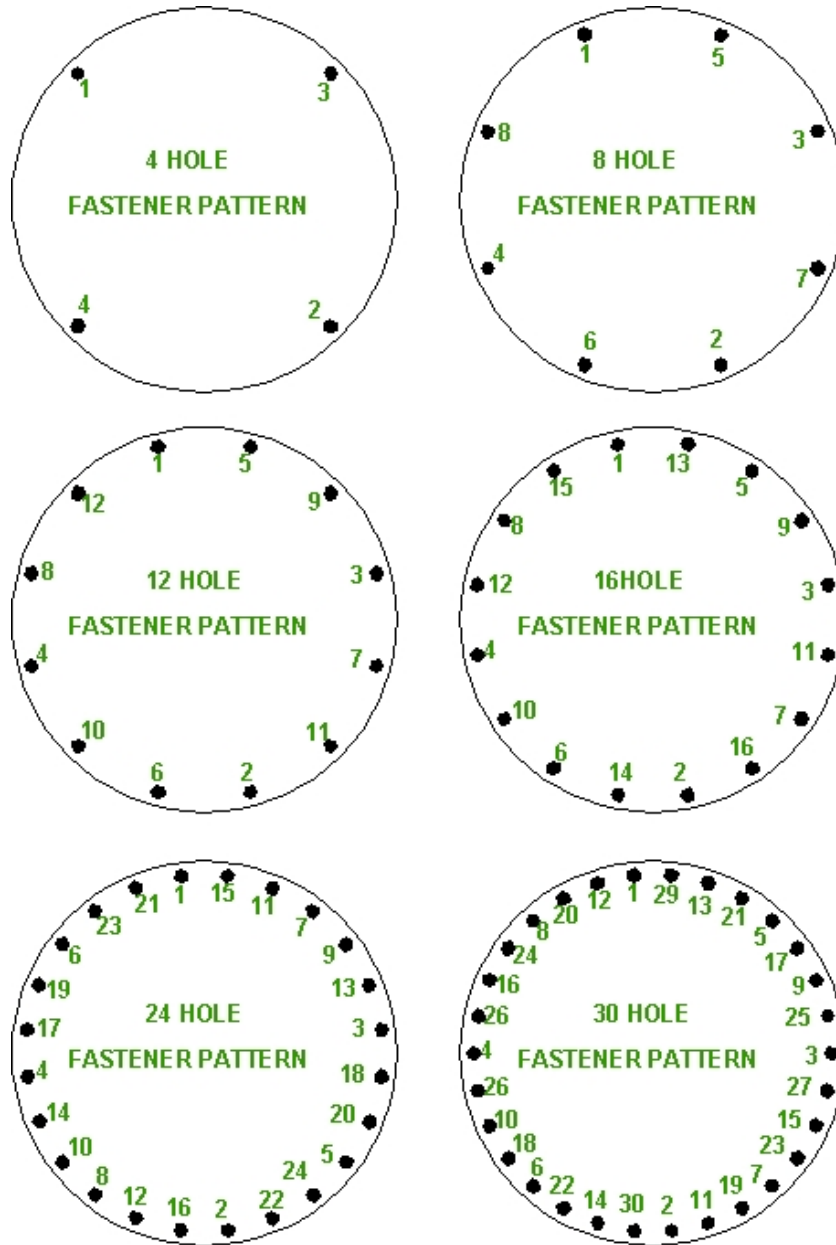


FIGURE-1

TIGHTENING TORQUES FOR FASTENERS

Thread size x Pitch	Tightening Torque for lubricated fasteners		Tightening Torque for Dry fasteners	
	N-m	lbf-in	N-m	lbf-in
M5X0.8	3 to 4	27 to 35	4 to 5	35 to 44
M6X1	5 to 6	44 to 53	7 to 9	62 to 80
M8X1.25	11 to 14	97 to 124	16 to 20	142 to 177
M10X1.5	22 to 24	195 to 212	30 to 33	266 to 292
M12X1.75	37 to 39	327 to 345	51 to 54	451 to 478
M14X2	55 to 57	487 to 504	81 to 85	717 to 752
M16X2	83 to 87	735 to 770	123 to 130	1089 to 1151
M20X2.5	165 to 170	1460 to 1505	240 to 250	2124 to 2213
M24X3	275 to 290	2434 to 2567	410 to 430	3629 to 3806
M27x3	415 to 438	3673 to 3872	618 to 650	5465 to 5753
M30X3	555 to 585	4912 to 5178	825 to 870	7302 to 7700
M30X3.5	540 to 570	4779 to 5045	800 to 840	7081 to 7435
M33x3	745 to 785	6594 to 6948	1115 to 1170	9869 to 10355
M33X3.5	740 to 775	6550 to 6859	1100 to 1155	9736 to 10223
M36X3	975 to 1025	8629 to 9072	1460 to 1535	12922 to 13586
M36X4	935 to 985	8275 to 8718	1390 to 1455	12303 to 12878
M39X3	1260 to 1325	11152 to 11727	1890 to 1985	16728 to 17569
M42X3	1570 to 1650	13896 to 14604	2360 to 2475	20888 to 21906
M42X4.5	1490 to 1560	13188 to 13807	2210 to 2320	19560 to 20534
M48X3	2380 to 2500	21065 to 22127	3585 to 3765	31730 to 33323
M48X5	2220 to 2335	19649 to 20666	3305 to 3470	29252 to 30712
M52X3	2170 to 2279	19207 to 20168	4555 to 4785	40315 to 42351
M52X4	2195 to 2305	19427 to 20399	4395 to 4615	38899 to 40846
M56X3	2697 to 2832	23868 to 25061	5610 to 5890	49653 to 52131
M56X4	2766 to 2904	24480 to 25704	5725 to 6010	50671 to 53193
M60X3	3988 to 4187	35296 to 37061	6965 to 7310	61645 to 64699
M60X4	4711 to 4946	41695 to 43780	7070 to 7425	62575 to 65717
M64X3	4852 to 5095	42948 to 45095	8300 to 8715	73461 to 77134
M64X4	4711 to 4946	41695 to 43780	8615 to 9050	76249 to 80099
M72X3	6939 to 7285	61411 to 64482	12350 to 12970	109307 to 114794
M80x3	9113 to 9569	80656 to 84689	16240 to 17050	143736 to 150905

3.0 OPERATION AND MAINTENANCE

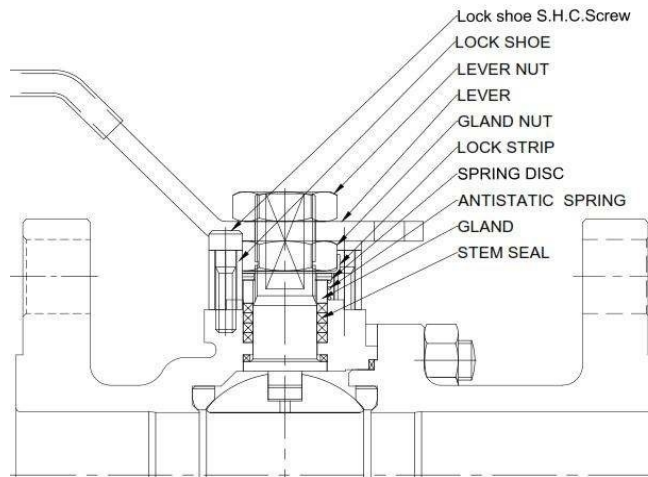
- 3.1 Flush the pipeline carefully after the valves are mounted to remove all the possible impurities. Ensure all ports of diverter valve are flushed.
- 3.2 Valves should be operated slowly to avoid hammering effect on the valve and pipeline.
- 3.3 Valve should be in either opened or closed position to prevent damage to the seat and ball caused by wire drawing.
- 3.4 Valve is intended for on-off service only, it should not be used for throttling services.
- 3.5 If stem leak develops, tighten the gland nut until leakage has been stopped. If the stem leak cannot be stopped then replacement of stem packing is necessary.
- 3.6 If a through leak occurs, ensure that the valve is fully closed. Don't use extra leverage or extra force on the stem to prevent leakage. If leakage persists, replacement of seats is necessary.
- 3.7 After a long service life, when through valve leakage is observed, the seats can be replaced.
- 3.8 3 way ball valve needs no regular maintenance or lubrication.
- 3.9 Replacement of stem packing:

When replacing the packing, be sure that the valve is not under pressure. Remove all accessories including actuator to give access to the packing. After loosening and removing the gland nut, the packing can be removed by means of a hooked wire.

- 3.10 Do not try to correct the through valve leakage by giving packing pieces behind the seat to make it tight. Instead replace the seat.
- 3.11 If a body seal leak develops, do not over tighten the body end cover studs and nuts. This may damage the valve. Instead body seal should be removed and replaced by new one.
- 3.12 **Stem packing adjustment;**
 - a. Microfinish valves include the feature of an externally adjustable stem seal in the event there is leakage experienced from the stem area.
 - b. If possible, relieve any pressure within the valve during the adjustment process. If this is not possible, it is still safe to perform this adjustment on a valve in the field.
 - c. Operate the valve once in the No load condition.
 - d. Loose the Gland Nut / Chuck Nut for 2 rounds.
 - e. Operate the valve for 5 times.
 - f. Tight the Gland Nut / Chuck Nut as per Table (01) column "X".
 - g. Again loose the Gland Nut / Chuck Nut.
 - h. Operate the valve for 5 times.
 - i. Retighten the Gland Nut / Chuck Nut as per Table (01) column "Y".
 - j. Operate the valve for 5 times.
 - k. Record the No load torque.
 - l. If this first action has not stopped the leak, repeat steps " d " to " j ". Only perform this adjustment action a maximum of 5 times. If the leakage has not stopped after three attempts, stop the test as further attempts could be detrimental to elements of the stem packing system.

CHECK NUT TIGHTENING TORQUE (Nm)				
TRIM NUMBER	GRAFOIL		PTFE	
	X	Y	X	Y
10	10	5	9	5
12.7	15	7	13	5
16	17	9	15	8
19	19	11	17	11
22	22	19	20	15
30	29	19	27	18
40	34	22	32	20
48	60	38	40	30
60	70	47	90	70
68	80	70	120	90
76	90	82	140	100
82	99	90	154	110
105	109	99	169	121
120	120	109	186	133
140	152	175	295	177
150	167	193	325	195

Table No. 01 Check Nut Tightening Torque



For smaller valves with a double nut design, the Gland nut is held in place by a locking strip. The adjustment of the stem seal to tighten the packing cannot be carried out while this locking clip is firmly in place. It first needs to be loosened by pulling back the tabs from the nut with a flathead screwdriver, so the nut can be rotated and reset the stem seal. When the action is complete, you need to re-secure the locking strip to the nut by pushing back up the tabs

4.0 DISASSEMBLY

For your safety and protection, it is important that the following precautions be taken prior to removing the valve from service or before any disassembly of the valve.

4.1 DISASSEMBLY FROM PIPE LINE

- 4.1a Keep hands out, since remotely actuated valves could close at any time. Disconnect all auxiliary piping of jackets and pneumatic or electric connections.
- 4.1b Wear any protective clothing or equipment normally required when working with media involved.
- 4.1c De-pressurize all the lines and drain the system fluid. Cycle the valve several times to relieve any pressure still inside the valve.
- 4.1 d Keep the valve such that maximum ports are in open position. Remove the valve and place it on a level surface in vertical position.

WARNING!

VALVES SHALL NOT BE DISMANTLED IN CLOSED POSITION

4.2 DISASSEMBLY OF THE 3 WAY FLOATING VALVE

- 4.2a Flush the valve to remove the residuals in the valve.
- 4.2b Support the valve on a platform.
- 4.2c Remove all accessories if fitted and also adapter, lever or gear operator.
- 4.2d Remove check nut / gland nut, spring, locking plate and gland.
- 4.2e Unscrew the body end connection studs and separate the body and end pieces/tail piece.
- 4.2f Place the disassembled parts on clean wooden or cardboard surface. Do not keep ball and seats on cement or metal surfaces to avoid damage.
- 4.2g Take out the seat rings and body seal. Body seal to be replaced during re-assembly.
- 4.2h Ensure the "Double D" stem across flat is in transverse position when viewed from top and remove the ball.
- 4.2i Push the stem into the body cavity and then takeout through the end port. Remove the stem washer and stem seal.
- 4.2j Clean all parts carefully. If necessary use suitable solvent.
- 4.2k Check all the sealing surfaces and parts for damage or uneven wear. Minor scratches or flashes on the ball surface can be removed using a fine abrasive cloth.
- 4.2l Check the condition of the stem.

4.3 DISASSEMBLY OF 3 WAY TRUNNION MOUNTED VALVE

4.3a Follow the points in clause 4.2a to 4.2c

4.3b Remove lever / adapter or gear operator and bracket.

4.3c Remove check nut, spring disc, gland and anti-static spring.

4.3d Remove stuffing box, stuffing bearing and stuffing box seal.

4.3e Pull the stem from top and take out. Remove anti-static spring, stem washer and stem seals.

4.3f Remove trunnion and trunnion seal.

4.3g Unscrew the body end connection studs and separate the body and tailpiece.

4.3h Remove seat retainer from tailpiece and seat springs.

4.3g Remove the ball from body and also remove trunnion bearing and thrust washer.

4.3h Remove seat retainer from body and springs.

4.3i Place all parts on clean soft surface. Do not keep the parts on cement or metal surfaces to avoid damage.

4.3j Clean all the parts carefully. If necessary use suitable solvent.

4.3k Check all the sealing surfaces and parts for damage or uneven wear. Minor scratches or flashes on the ball surface can be removed using a fine abrasive cloth.

4.3l Check for the wear or any damage at all the sealing area of stem, ball, seat, bearings and stuffing box bore. Correct / replace the damaged parts if necessary.

5.0 ASSEMBLY

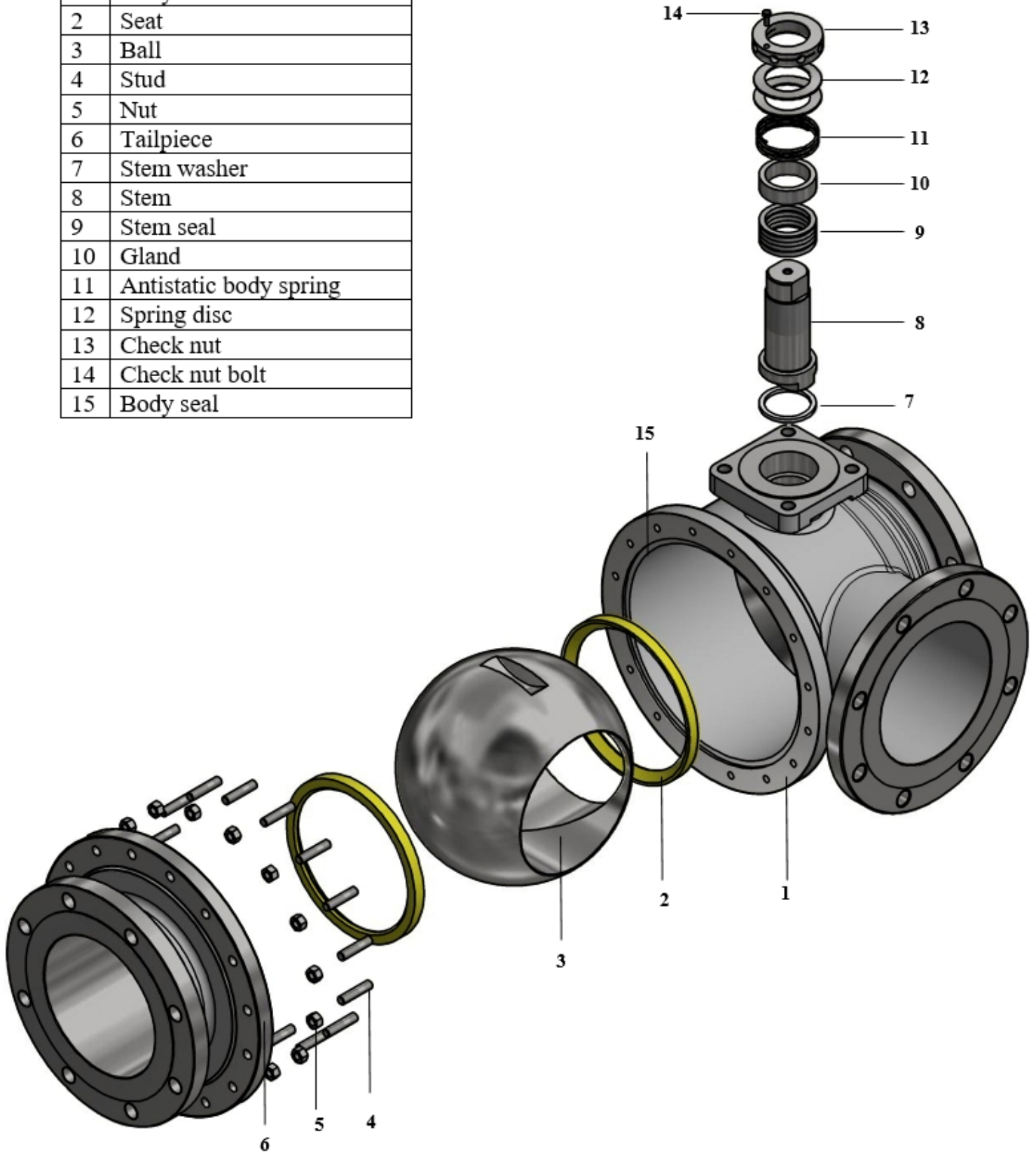
Using the parts contained in complete repair kit, reverse the disassembly procedure. Never reuse Packing, Body Seals, Stem Seal, Stem Washer and dispose the material as per the local government rules in such manner they could not affect the environment.






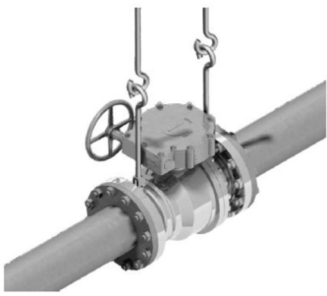


In case of damage / wear / corrosion to the parts of the valve, they need to be replaced during re-assembly and handover the damaged parts to authorized agency for reuse or dispose, so that damaged parts could not affect the environment.

When the valve is declared as scrap handover the valve to authorized agency for reuse or dispose, so that scrapped valve could not affect the environment.

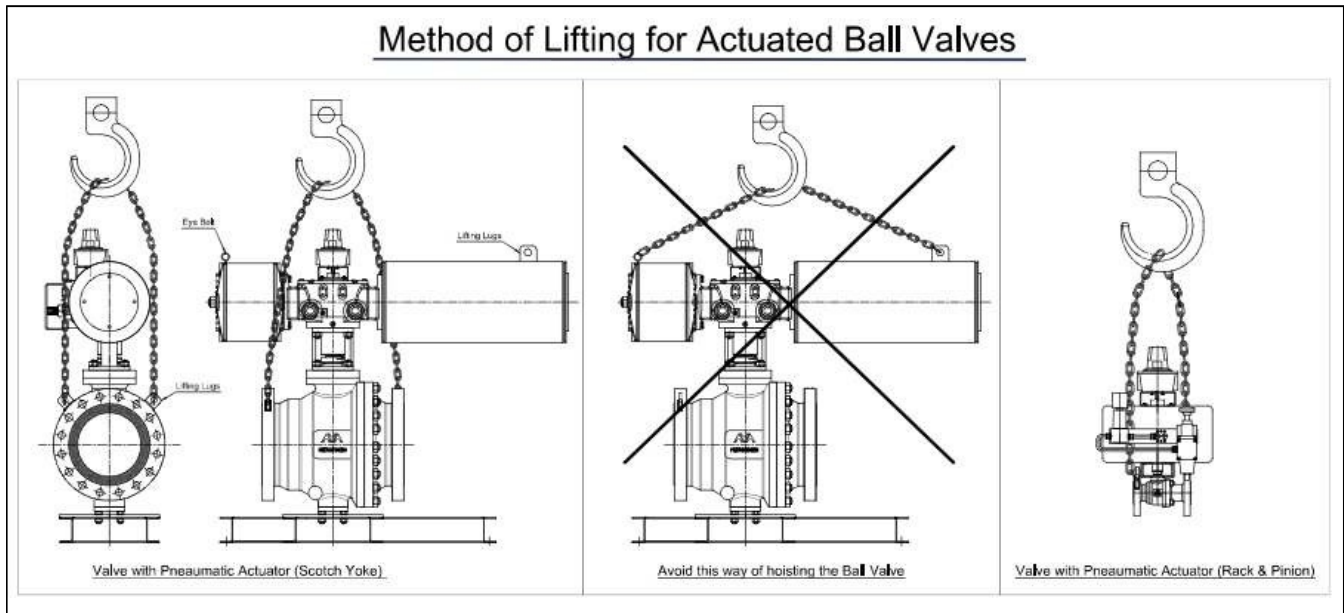
3 WAY FLOATING BALL VALVE

1	Body
2	Seat
3	Ball
4	Stud
5	Nut
6	Tailpiece
7	Stem washer
8	Stem
9	Stem seal
10	Gland
11	Antistatic body spring
12	Spring disc
13	Check nut
14	Check nut bolt
15	Body seal



	
<p>Way of Hosting the Ball Valve</p>	<p>Avoid this way of Hosting the Ball Valve</p>
	
<p>Way of Hosting the Ball Valve</p>	<p>Avoid this way of Hosting the Ball Valve</p>
	
<p>Valve ready for Disassembling supported on Platform</p>	<p>Way of supporting the Ball Valve</p>
	
<p>Way of supporting the Ball Valve</p>	<p>Way of supporting the Ball Valve</p>

6.0 Method of Lifting for Actuated Ball Valves



6.1 Instruction for lifting the valve assembly

- 6.1.1 Valve weighing 50kg and above will be provided with lifting lugs.
- 6.1.2 Valve shall be lifted using the lifting lugs provided on the valve. Eye bolts provided on the actuator shall not be used for lifting the entire valve – actuator assembly. Eye bolting actuator shall be used only for lifting the actuator during maintenance if any.
- 6.1.3 Along with the lifting lugs provided on the valve, eye bolts provided on the actuator may also be used for balancing if needed while lifting.
- 6.1.4 While lifting the valve assembly care should be taken to see that the tubing and accessories mounted on the valve and actuator are not damaged.

TROUBLESHOOTING

Sl.No.	Nature of Defect	Cause	Remedy
1	Seat Leakage	<ol style="list-style-type: none"> 1. Damage of Seat due to presence of foreign particles. 2. Damage of 'O' Ring at the seat/retainer. 3. Damage of seat in weld end valves due to improper precautions. 4. Damage of seat at high temperature. 5. Improper closing of actuator operated valves. 6. Damage of seat due to rust at body of seat retainer. 	<p>Dismantle, clean & replace by new seats</p> <p>Dismantle, clean & replace by new 'O' Rings</p> <p>Suggest following right steps as per IOM manual.</p> <p>Check for suitability of seat material and design.</p> <p>Ensure correct closing of actuator.</p> <p>Dismantle, clean & reassemble/replace.</p>
2	Gland Leakage	<ol style="list-style-type: none"> 1. Loosening of check nut or locking bolt. 2. Damage of stem seal/stem washer 3. Misalignment of actuator, bracket & stem. 	<p>Tighten the check nut & locking bolts</p> <p>Replace the stem seal/stem washer.</p> <p>Ensure correct alignment.</p>
3	Body Seal Leakage	<ol style="list-style-type: none"> 1. Improper tightening of Body bolting. 2. Improper precautions in case of weld end valves. 3. Misalignment of pipe line mating flanges. 	<p>Ensure proper tightening of Body bolting.</p> <p>Suggest following right steps as per our IOM manual.</p> <p>Ensure correct alignment of flanges.</p>
4	High Torque operation	<ol style="list-style-type: none"> 1. High temperature of fluid handled. 2. Highly viscous fluid handled. 3. Insufficient air supply pressure in case of pneumatic operated valves 4. Reducing of lever length by user due to less space. 5. Pipeline flange pressure in case of single piece valves. 	<p>Check for suitability of material and design.</p> <p>Check for suitability of material and design.</p> <p>Ensure sufficient air pressure.</p> <p>Suggest using levers of correct length.</p> <p>Face the seat or seat seal to relieve extra pressure.</p>
5	Jerky operation	<ol style="list-style-type: none"> 1. Presence of foreign particles at seat contact area. 2. Peeling of plating of Ball in case of metal seated valves. 3. Insufficient air supply pressure in case of pneumatic operated valves 	<p>Dismantle, Clean & Reassemble.</p> <p>Check for service condition/replace.</p> <p>Ensure sufficient air pressure.</p>
6	Gear Operator Damage	<ol style="list-style-type: none"> 1. Very high torque operation. 2. Poor material of construction & design. 3. Transit damage 	<p>Check for causes as covered in Sl.No.4</p> <p>Check for suitability.</p> <p>Replace the damaged spares & report accordingly.</p>