

INSTALLATION & MAINTENANCE MANUAL
SERIES 90D SPLIT BODY, FLANGED, FULL PORT VALVE
Standard Version / Fire Safe Version

Brief Introduction

Split body (2-piece) valve allows easy replacement of gasket, seal, and seats without special tools. Series 90D ball valves use “floating ball” design. Induced by the line pressure the ball is free to move horizontally inside the valve body. The valve is capable of tight shutoff with flow in either direction or dead-end, regardless of the position of the valve in the line. The downstream seat, opposite the pressurized side of a closed valve, carries the load exerted by the line pressure on the ball, while the upstream seat is subject to little load or wear. For this reason, it is sometimes possible to increase seat life by turning the valve end-for-end in the pipeline.

1. USE:

- 1.1 Life of valve can be maximized if the valve is used within the rated range, in accordance with pressure, temperature, and corrosion data.

2. MANUAL OPERATION:

- 2.1 To open or close the valve, turn the handle ¼ turn (90 degrees).
- A. Valve in Open Position – the handle is in parallel (in-line) with the valve or pipeline.
 - B. Valve in Closed Position – the handle is perpendicular (crossed) with the valve or pipeline.

3. AUTOMATED OPERATION:

- 3.1 Valves with actuators should be checked for valve stem alignment. Angular or linear misalignment will result in high operational torque and unnecessary wear on the stem seal.

4. GENERAL INFORMATION FOR ON-SITE INSTALLATION:

- 4.1 The valve may be fitted in any position on the pipeline.
- 4.2 To prevent damage to the seats and ball surface, the pipeline must be flushed, free of dirt, burrs, and welding residues before installing the valve.

5. DISASSEMBLING & CLEANING THE VALVE:

- 5.1 If the valve has been used in hazardous media, it must be decontaminated before disassembly.
- 5.2 As shipped from the factory, valves contain silicone-free based lubricant. If Lubricant is unacceptable for your particular application, you may disassemble the valve and wash the parts in solvent.

6. REPLACING THE THRUST WASHER AND PACKING

- 6.1 Before replacing the thrust washer and the packing, the pipeline must be de-pressurized.
- Note: Stem seal leakage may be corrected without replacing the seal and/or packing. Tighten the packing nut to flatten the belleville washers. If leakage continues or valve's operating torque becomes excessive, the seals are worn and must be replaced.*
- A. Remove flange bolts and nuts and lift the valve from the line. Care should be taken to avoid scratching or damaging serrated gasket. The valves are heavy, and they should be adequately supported before removing it from the line.
 - B. Loosen the stem nut and remove handle and stop plate. Next, remove lock saddle, packing nuts, belleville washers and gland.
 - C. Remove body bolt nuts, using proper wrench. Lift off body end. One seat should come out with the body end.
 - D. Remove body seal.
 - E. To take out the ball, rotate stem so ball is in fully closed position. Lift ball from the body, using a strap and lift device, if necessary. Extreme caution should be taken to avoid damage to the ball.
 - F. Take out the other seat.
 - G. Stem must be removed from inside the body. A tap to the top of the stem should loosen it. The thrust washer should come out with the stem. Then, remove the stem packing.

7. VISUAL INSPECTION:

- 7.1 Clean and inspect metal parts. It is not necessary to replace neither ball nor stem unless the surface has signs of abrasion or corrosion. We strongly recommend replacement of all soft parts whenever the valve is disassembled for reconditioning. We provide replacement kits that contain all the replaceable parts.

Note: The valve may be assembled and operated dry with any lubricant. However, a light lubrication will aid in assembly and reduce initial operating torque. Lubricant used must be acceptable with the intended line fluid.

8. Assembly

Install one seat in the body cavity with the spherical curvature facing the ball.

- 8.1 Install the thrust washer on stem and slide the stem up through the body. Install packing, gland, belleville washers, locking saddle. Screw the packing nut into the stem. Lock the saddle in place.
- 8.3 Install stop plate, handle and washer. Screw the stem nut into the stem until the handle is secure.
- 8.4 Turn handle to the closed position. Line up the ball slot with the stem end and slide the ball into position. Turn the handle to the open position to hold the ball in place.
- 8.5 Install the remaining seat into body side.
- 8.6 Put body seal gasket into body and line up end flange. Because the body flange bolt pattern is different from the line flange bolt pattern, it is possible to assemble the valve such that the line flanges bolt pattern don't line up. Be certain to align end flanges bolt holes to straddle valve center lines. Be careful not to damage body seal when putting cap end into body.
- 8.8 Install cap end nuts and tighten in the "star" pattern to the proper torque. Extreme care must be exercised during adjustment of cap end nuts to make sure that complete engagement of the studs with body flange is maintained. There should be at least one stud thread exposed on each side.
- 8.9 Cycle the valve slowly, with a gentle back and forth motion, to build gradually to the full quarter turn. By cycling slowly, the seat lips will assume a permanent seal shape against the ball. A fast turning motion, at this point, may cut the seats before they have a chance to form the proper seal.
- 8.10 Test valve, if possible, prior to placing valve back into line position. If not properly secured, the valve can separate from the pressure source, resulting in possible injury. Always join the valve to companion flanges of same pressure rating as valve and secure with a full set of flange bolts.

TEST AS FOLLOWS:

- A. Secure valve to a test fixture by means of a mating flange with full bolting and a suitable gasket. Orient valve so seat to be tested is facing up.
- B. Introduce 50 to 100 psig air. Partially cycle the valve, under pressure, then slowly close to make sure the cavity is pressurized (use hearing protection). Pour water into the upper port to cover the ball and visually check for bubbles. If bubbles appear, pour the water out, cycle the valve several times and recheck. To check for leakage in the other port, reverse the valve and introduce air pressure to the port just checked.
- C. Check stem seal at this time by coating the stem top area with a water/soap solution. If leakage occurs, tighten stem seal just until leakage stops.

SERIES 90D

SERIES 90D Standard

(R-PTFE SEATS)

Valve Size		Break Away Torque		Cv
Inch	DN	In/Lb	Nm	G. P .M.
1/2"	15	92	10	28
3/4"	20	127	14	50
1"	25	150	17	95
1 1/4"	32	207	23	132
1 1/2"	40	357	40	260
2"	50	392	44	485
2 1/2"	65	518	58	800
3"	80	852	94	1250
4"	100	1302	101	2250
5"	125	2073	234	3620
6"	150	2188	247	5400

SERIES 90D (Fire safe)

(R-PTFE SEATS)

Valve Size		Break Away Torque		Cv
Inch	DN	In/Lb	Nm	G. P .M.
1/2"	15	101	11	28
3/4"	20	139	16	50
1"	25	165	19	95
1 1/4"	32	228	26	132
1 1/2"	40	393	44	260
2"	50	431	49	485
2 1/2"	65	570	64	800
3"	80	938	103	1250
4"	100	1432	111	2250
5"	125	2281	257	3620
6"	150	2407	272	5400

30% safety factor included.

Media and Service Factors:

Media Factors	Multiplier
Clean, particle free, non-lubricating (water, alcohol, etc)	1.00
Clean, particle free, non-lubricating (oils, hydraulic fluid, etc)	0.80
Slurries or heavily corroded and contaminated systems	2.00
Gas or saturated steam, clean and wet	1.00
Gas or superheated steam, clean and dry	1.30
Gas, dirty unfiltered e.g. natural gas, Chlorine	1.50

Service Factors	Multiplier
Simple On and Off Operations	1.00
Throttling	1.20
Positioner Control	1.50
Once per day Operations	1.20
Once every two days or a "Plant Critical" Operation	1.50

Torque Determination:

$$\text{Basic Torque} * \text{Media Factor} * \text{Service Factor} = \text{Sizing Torque}$$

SERIES 90D**Torque of Body Bolts**

SIZE	Threads	lbf-in	kgf-cm	N-m
1/2"	5/16"-18UNC	174 ~ 200	200 ~ 230	19.6 ~ 22.5
3/4"	5/16-18UNC	200 ~ 217	230 ~ 250	22.5 ~ 24.5
1"	7/16"-14UNC	260 ~ 286	300 ~ 330	29.4 ~ 32.3
1.1/4"	7/16"-14UNC	286 ~ 304	330 ~ 350	32.3 ~ 34.3
1.1/2"	7/16"-14UNC	286 ~ 304	330 ~ 350	32.3 ~ 34.3
2"	1/2"-13UNC	347 ~ 391	400 ~ 450	39.2 ~ 44.1
2.1/2"	1/2"-13UNC	347 ~ 391	400 ~ 450	39.2 ~ 44.1
3"				
4"				
5"				
6"				
8"				
10"				
12"				

Torque of Body Bolts

SIZE	Threads	lbf-in	kgf-cm	N-m
1/2"	M8	174 ~ 200	200 ~ 230	19.6 ~ 22.5
3/4"	M8	200 ~ 217	230 ~ 250	22.5 ~ 24.5
1"	M10	260 ~ 286	300 ~ 330	29.4 ~ 32.3
1.1/4"	M10	347 ~ 391	400 ~ 450	39.2 ~ 44.1
1.1/2"	M12	286 ~ 304	330 ~ 350	32.3 ~ 34.3
2"	M12	347 ~ 391	400 ~ 450	39.2 ~ 44.1
2.1/2"	M12	347 ~ 391	400 ~ 450	39.2 ~ 44.1
3"	M14	477 ~ 521	550 ~ 600	53.9 ~ 58.8
4"	M14	477 ~ 521	550 ~ 600	53.9 ~ 58.8
5"	M14	477 ~ 521	550 ~ 600	53.9 ~ 58.8
6"	M14	477 ~ 521	550 ~ 600	53.9 ~ 58.8
8"	M16	1042 ~ 1215	1200 ~ 1400	117.6 ~ 137.2
10"	M16	1042 ~ 1215	1200 ~ 1400	117.6 ~ 137.2
12"	M16	1042 ~ 1215	1200 ~ 1400	117.6 ~ 137.2

SERIES 90D

90D	Non-fire safe valve			fire safe valve		
SIZE	In-lbs	Nm	Kg/cm	In-lbs	Nm	Kg/cm
1/2"	122	14.3	140	130	15.3	150
3/4"	122	14.3	140	130	15.3	150
1"	122	14.3	140	130	15.3	150
1.1/4"	165	19.4	190	174	20.4	200
1.1/2"	191	22.4	220	208	24.5	240
2"	191	22.4	220	208	24.5	240
2.1/2"	191	22.4	220	208	24.5	240
3"	278	32.7	320	304	35.7	350
4"	278	32.7	320	304	35.7	350
5"	365	42.9	420	391	45.9	450
6"	365	42.9	420	391	45.9	450

Torque of Stem Nut

SERIES 90D

MATERIALS LIST

NO.	PART NAME	MATERIAL	Q'TY
1	Body	CF8M / WCB	1
2	Cap	CF8M / WCB	1
3	Ball	SUS 316	1
4	Seat	RPTFE	2
5	Joint Gasket	PTFE	1
6	Stem	SUS 316	1
7	Stem Seal	RPTFE	1
8	Gland Packing	PTFE	§
9	Gland Packing	25% Glass Fiber Filled + PTFE	1
10	Gland Bush	SUS 304	1
11	Belleville Washer	SUS 304	2
12	Stop Washer	SUS 304	1
13	Stem Nut	SUS 304	2
14	Stem Washer	SUS 304	1
15	Handle	SUS 304	1
16	Handle Sleeve	VINYL	1
17	Bolt Nut	SUS 304	※
18	Bolt	SUS 304	※
19	Stop Pin	SUS 304	1
20	Pin Nut	SUS 304	1
21	Locking Device	SUS 304	1
22	Anti-static Device	SUS 304	2
23	O-RING	VITON	1

§ 1/2"~11/4"- 2pcs, 11/2"~6"-3pcs.

※ For 1/2"~2"-4pcs of bolt ;and bolt nuts.

For 21/2"~5"- 8pcs of stud and nuts

For 6"- 10pcs of stud and nuts

