

INSTALLATION & MAINTENANCE MANUAL

SERIES 91D UNI-BODY, FLANGED, REDUCED PORT VALVE

Brief Introduction

Series 91D is uni-body (1-piece) valve, with “floating ball” design. Induced by the line pressure the ball is free to move horizontally inside the valve body.

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 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 handle nut and remove handle and stop pin. Next, loosen the stem nut and remove belleville washers and gland.
 - C. Remove end cap using proper wrench.
 - D. Remove body seal, Seat and ball.
 - 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 without 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. Screw the stem nut into the stem.
- 8.2 Install handle and washer.
- 8.3 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 gasket into body and seat into the valve. Be careful not to damage body seal when putting cap end into body.
- 8.8 Install end cap. Extreme care must be exercised during adjustment of end cap.
- 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.

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.
- D. Make sure the handle is in the correct position.

91D SERIES

(R-PTFE SEATS)

Valve Size		Valve Size		Break Away Torque	
		Standard		Fire safe	
Inch	DN	Nm	In/Lb	Nm	In/Lb
1/2"	15	10	92	11	101
3/4"	20	10	92	11	101
1"	25	14	127	15	140
1 1/2"	40	33	288	36	317
2"	50	40	357	44	393
2 1/2"	65	44	392	48	431
3"	80	59	518	65	570
4"	100	96	852	106	937
6"	150	212	1877	233	2065

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:

Basic Torque * Media Factor * Service Factor = Sizing Torque

Torque figure to tighten stem nut

With O- ring

Size	Non-fire safe valve			Fire Safe valve		
	In-lbs	Nm	kgf-cm	In-lbs	Nm	kgf-cm
1/2"	95	10.8	110	104	11.8	120
3/4"	95	10.8	110	104	11.8	120
1"	95	10.8	110	104	11.8	120
1 1/2"	139	15.7	160	148	16.7	170
2"	165	18.6	190	191	21.6	220
2 1/2"	165	18.6	190	191	21.6	220
3"	165	18.6	190	191	21.6	220
4"	234	26.5	270	260	29.4	300
6"	321	36.0	370	347	39.0	400

SERIES 91D

Manual 91D.doc
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MATERIALS LIST

NO.	PART NAME	MATERIAL	QTY
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	O-RING	VITON	1
7	Stem	SUS 316	1
8	Stem Seal	RPTFE	1
9	ORING	VITON	1
10	Gland Packing	PTFE	§
11	Gland Packing	25% Glass Fiber Filled + PTFE	1
12	Gland Bush	SUS 304	1
13	Belleisle Washer	SUS 304	2
14	Stop Washer	SUS 304	1
15	Stem Nut	SUS 304	2
16	Stem Washer	SUS 304	1
17	Handle	SUS 304	1
18	Stop Pin	SUS 304	1
19	Locking Device	SUS 304	1
20	Handle Sleeve	VINYL	1
21	Pin Nut	SUS 304	1
22	Anti-static Device	SUS 304	2

§ 1/2"-11/2"- 2 pcs, 2-4"-3pcs.

