Fujikin of America, Inc.

Fine Ceramic Ball Valves

Cosmix® Ball Valve Operation, Installation and Maintenance Manual

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We always appreciate comment or suggestions from our customers.

Section I - Operational Considerations

STORAGE

- Fujikin valves should be stored indoors away from any sources of vibration and/or mechanical shock. When in storage, keep the valves in their original packaging.
- Do not stack more than two valves on top of each other. Always store the boxes upright.
- During transit, always handle the valves with care. Do not subject the valves to vibrations and/or shock and never drop the boxes from a height of more than two inches.
- Remove the valves from their original packaging only before installation.

HANDLING

a) Never remove the packing gland flange when the valve is in service. Before servicing the valve in any way, relieve any pressure from within the valve and connecting piping. If the valve is under pressure and the packing gland flange is removed, serious injury can occur from the pressurized fluid.

b) Always handle the valve with care. Avoid vibrations, mechanical shock or dropping of the valve.

c) Never strike any ceramic component with a metallic object.

d) Never subject the valve and/or any ceramic parts to a differential temperature of more than 122˚ F (50˚ C) per 5 minutes.

e) Always supply clean, dry air to the positioner or actuator. Installing an air filter or other air cleaning device will prolong the life of the actuation equipment. Do not use lubricated air on the positioner.

f) If you are not sure about handling the valve or need further information, consult this operation manual. If you require more specific information, contact your local Fujikin representative.

g) Do not handle the valve with the supply air still attached. Since the actuator produces a high amount of torque, there is possible danger of injury if the valve suddenly opens or closes. Special attention should be paid to spring-return actuators since they may operate unexpectedly if the valve is stuck in an open or close position.

h) In the case that fluid is leaking from the gland packing, replace the old packing with new packing. Tightening the gland nut is in no way a proper repairing procedure.

INSTALLATION & COMMISSIONING

a) During transit do not handle the valve roughly. Sudden impact shock or dropping of the valve will result in breakage. Do not drop the valves from a height of more than two inches.

b) Important points during installation:
- Maximum operating pressure = 150 psig.
- Maximum operating temperature = 392˚ F

Please refer to page 3 of this manual for more information on maximum conditions.

c) During installation, tighten the flange bolts the same amount, alternating between all bolts on each side (use the star-method, much like tightening a wheel on an automobile). Tighten the flange bolts on either end of the valve simultaneously. Do not use a hammer or other metallic object that might damage the ceramic components.

NOTE

Since this manual covers only general information, we cannot discuss every possibility of safety conditions here. Please use products under your responsibility with an understanding of your handling and operational conditions.

If you have any questions, please feel free to consult our sales representatives.

Section I - Operational Considerations

d) Special attention should be paid to the first run of liquid through the valve. Avoid thermal shock by heat-tracing the valve. Gradually increase the temperature within the valve as described on page 4 of this manual.

e) For fluids that coagulate at low temperature, a special arrangement should be equipped on the outside of the valve to prevent the fluid from solidifying within the valve. If there is a possibility of water or other fluids remaining within the valve and freezing due to extremely low temperature, drain any remaining fluid from the valve.

f) For media or slurries that can dewater or accumulate within the valve, provisions should be made to flush and throttle the valve a few times each week, or as necessary.

g) In the event that the valve does not operate, or has become stuck, DO NOT FORCE THE VALVE TO TURN. Attempt to flush the line. If that is not effective, take the valve out of line and disassemble the valve. Remove anything from the valve that has caused it to seize. Clean all the parts and re-install the valve.

h) Select the proper length of flange bolts so as not to reach the end of the threading when pipe flanges are installed. Standard flange bolts should be of sufficient length and strength so as to securely hold the valve in the piping assembly.

Section II - Valve Specifications

MAXIMUM OPERATING PRESSURE

The maximum valve operating (shell) pressure is 300 psi. This value is based upon standard packing materials and design.

MAXIMUM DIFFERENTIAL PRESSURE

The maximum differential pressure varies according to the size of the valve. Table 1 shows our standard guidelines, but the differential pressure is subject to change depending upon many factors including viscosity, ceramic material selection, and upstream pressure.

SEAT LEAKAGE

The allowable leakage for all Cosmix ball valves is shown in Table 2. This value is less than 1/50,000 of the maximum Cv value of the valve. The hard-seated seal between the ceramics is not vulnerable to wear as soft-seated designs are, and therefore this design allows for a vastly extended valve service life. The values shown in the table, however, could increase if the differential pressure across the valve is not sufficient enough to allow the floating ball to seat against the downstream seat.

Table 1

Valve Size	Maximum Differential Pressure	
	kgf/cm2	psi
1/2”	10	150
3/4”	10	150
1”	10	150
1 1/2”	10	150
2”	8	115
2 1/2”	8	115
3”	7	100
4”	7	100
6”	5	70

Table 2

Valve Size	Allowable Seat Leakage (cc/min)	
	Air	Water
1/2”	10 to 20	1 to 2
3/4”	10 to 20	1 to 2
1”	10 to 30	1 to 2
1 1/2”	20 to 50	2 to 3
2”	30 to 70	3 to 5
2 1/2”	50 to 150	4 to 6
3”	50 to 150	4 to 6
4”	90 to 250	5 to 10
6”	150 to 500	6 to 35

NOTE

Upstrem Pressure = 72psi Downstream Pressure = 0 psig

Section II - Valve Specifications

MAXIMUM OPERATING TEMPERATURE

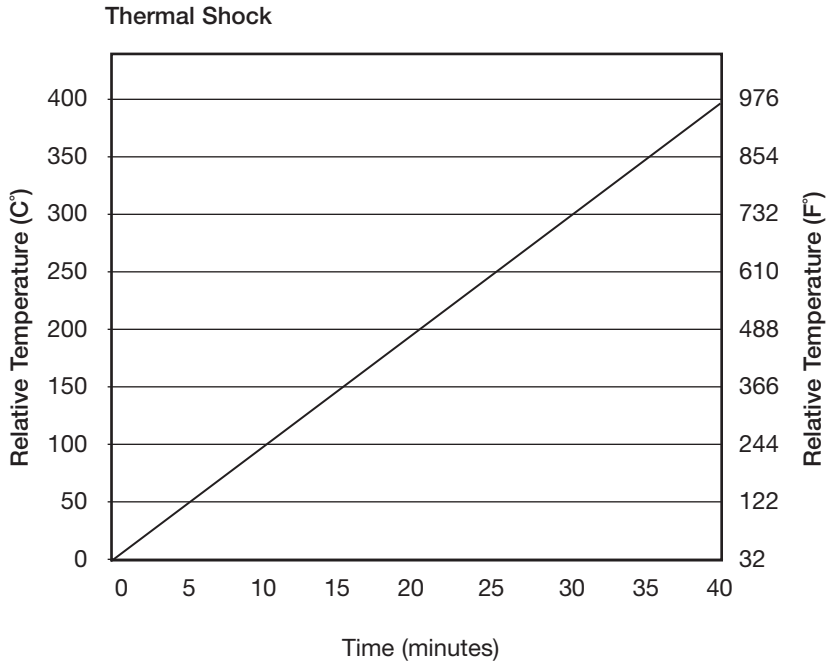
The maximum operating temperature for alumina ceramic valves is 392˚ F (200˚ C). The ceramics can withstand temperatures of 1832˚ F (1000˚ C) or higher but the actual operating temperature is limited to the thermal resistance of the packing materials. High temperature configurations are available - please consult with Fujikin if temperatures of over 392˚F (200˚ C) are required.

MAXIMUM DIFFERENTIAL TEMPERATURE (Thermal Shock)

Although Cosmix ceramic valves can be installed in very high temperature applications, particular care must be taken to ensure the ceramics are not damaged by thermal shock. The maximum instantaneous differential temperature between the valve and the media must not exceed 122˚ F (50˚ C) for standard alumina ceramic valve components. Therefore, it is very important that the valve temperature be gradually increased or decreased at a gradient of no more than 122˚ F per five minutes.

By use of heat-tracing devices, thermal swings twice that of the ceramic rating is possible. The temperature of the valve must be maintained at a temperature that is half the thermal excursion – provided that the thermal excursions do not exceed twice the thermal shock rating of the ceramic material.

Higher thermal shock resistant ceramic materials are available, such as silicon carbide, zirconia, and silicon nitride, which offer two and three times the thermal shock ability of alumina respectively. For more details regarding valve performance with fluids of different properties (liquid vs. gas, specific heat values, etc.), or for additional information on ceramics with a greater thermal shock ability, contact Fujikin.



Section II - Valve Specifications

FASTENER SPECIFICATIONS

Table 3

Valve Size	Mounting Pad			Stem Packing Retainer				Retaining Flange	
	Hex Bolt #17	Lock Washer #18	Qty.	Hex Bolt #19	Lock Washer #20	Flat Washer #21	Qty.	Hex Bolt #19	Qty.
1/2”	M6 X 12	6	4	M3 X 5 Set Screw			1	M5 X 8	4
3/4”	M6 X 12	6	4					M6 X 10	4
1”	M6 X 16	6	4	M6 X 20	6	6	2	M14 X 13 X H9.5	4
1 1/2”	M8 X 20	8	4	M6 X 20	6	6	2	M14 X 15 X H12	4
2”	M10 X 20	10	4	M8 X 20	8	8	2	M14 X 20 X H12	4
2 1/2”	M12 X 25	12	4	M10 X 30	10	10	2	M14 X 20	4
3”	M12 X 25	12	4	M10 X 25	10	10	2	M16 X 25	8
4”	M12 X 30	12	4	M10 X 25	10	10	2	M16 X 20	8
6”	M20 X 40	20	4	M12 X 35	12	12	2	M20 X 30	8

BOLT TORQUE VALUES

Table 4

Valve Size	Retaining Flange #5	Stem Packing Retainer #9	Mounting Pad #11	Actuator
1/2”	86	102	40	43
3/4”	103	102	40	43
1”	172	21	40	43
1 1/2”	172	21	94	90
2”	172	30	128	90
2 1/2”	172	40	283	90
3”	214	40	283	90
4”	214	40	283	90
6”	386	55	343	90

All values are in.lbs

Section II - Valve Specifications

FLANGE BOLT TORQUE VALUES

Fujikin does not publish flange bolt torque values. The required flange bolt torque will depend upon gasket material and thickness, flange material, valve rating, and so forth. Please follow the torque values as recommended by the gasket manufacturer.

FLANGE BOLT THREAD DEPTH

All Cosmix valve flanges are provided with threaded bolt holes. Selection of bolt length will depend upon the thickness of gasket being used, as well as the flange thickness. Thread depth for each size is listed in Table 5.

Table 5

Valve Size	Flange Bolt Thread Depth
1/2”	0.40”
3/4”	0.47”
1”	0.50”
1 1/2”	0.5”
2”	0.63”
2 1/2”	0.63”
3”	0.63”
4”	0.63”
6”	0.79”

Section III - Actuation Torque

The amount of actuation torque applied to the valve is critical to the longevity of the ceramic components. Excessive torque than that recommended will wear the stem prematurely and/or fracture the ceramic ball. Please read this section carefully, and only apply the recommended range of torque as shown in Table 6.

The “Necessary Torque” shown in Table 6 reflects twice the amount of torque required to operate the valve under 71 psi differential pressure of slurry. The Minimum Actuation Torque value is roughly 50% more than the Necessary Torque, and is that low-end of the actuator output range. The Maximum Actuation Torque is approximately half the ball fracture torque, and is the maximum amount of torque that should be applied to the valve.

It is important to understand that the Minimum Actuation Torque will sufficiently operate the valve under its highest rated differential pressure, and therefore exceeding the Maximum Actuation Torque will not improve operation of the valve in any way. Contrary, exceeding the Maximum Actuation Torque will wear the stem prematurely at the contact point with the ball, or even fracture the ball should the valve actuate with a solid object lodged within the ball port.

Table 6

Valve Size	Necessary Torque (in.lbs)	Minimum Actuation Torque (in.lbs)	Maximum Actuation Torque (in.lbs)
½”	45	68	109
¾”	68	102	157
1”	90	135	278
1½”	136	204	435
2”	170	255	696
2½”	226	340	914
3”	340	509	1175
4”	565	848	2175
6”	1357	2036	3263

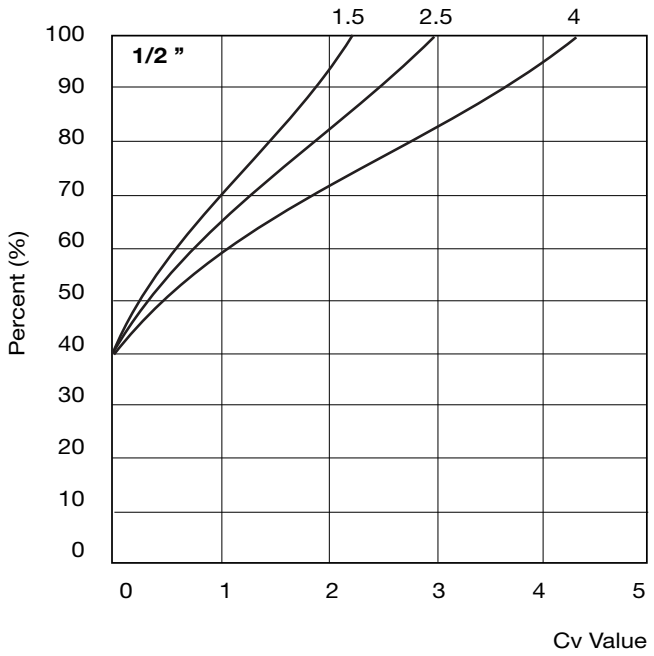
Section IV - Cv Values and Flow Rate Characteristics

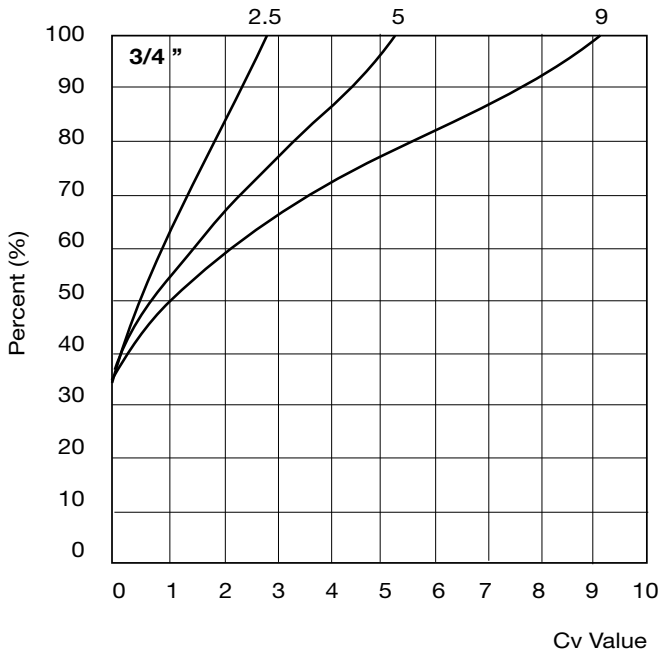
Table 7 shows the Cv values for round and triangular-ported balls. All triangular-ported balls are considered equal-percent characteristic and offer enhanced control characteristics in throttling applications. Although round-ported balls can also be used in control applications, it is best to select a round-ported trim exclusively for on/off services.

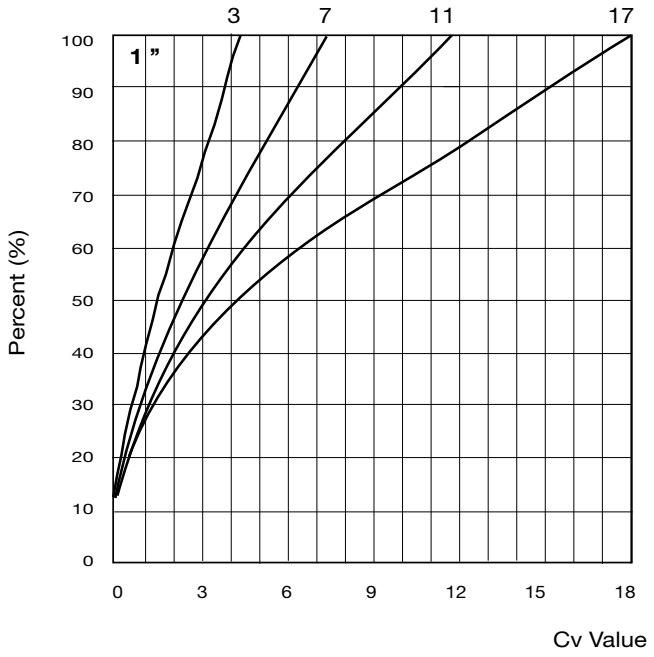
The Cv values for round-ported balls cannot be increased beyond their maximum rated Cv values. However, smaller, specialty or custom flow characteristic trims may be specially ordered.

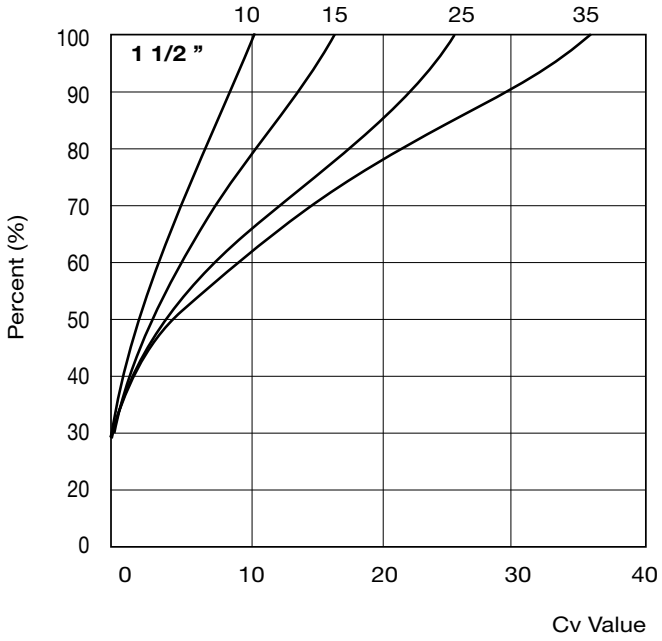
Table 7

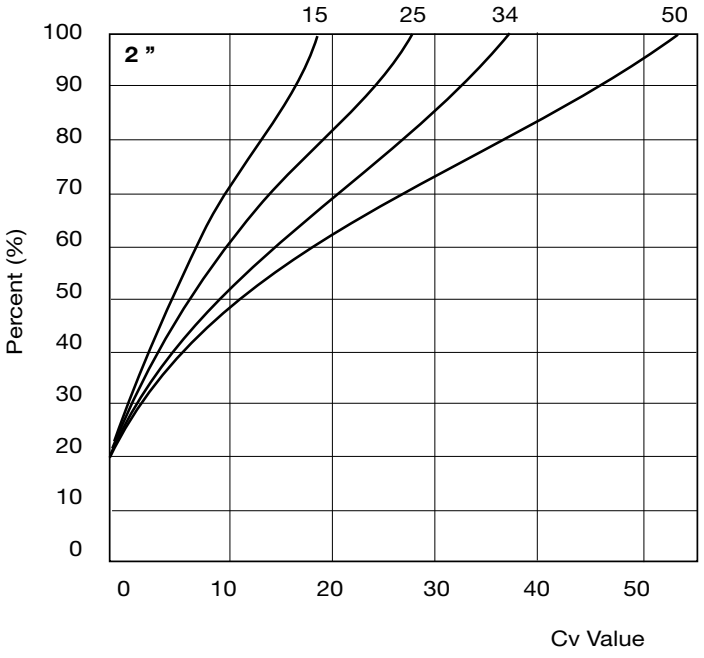
Valve Size	Round Port	Triangular Port			
1/2”	8	4	2.5	1.5	-
3/4”	14	9	5	2.5	-
1”	24	17	11	7	3
1 1/2”	55	35	25	15	10
2”	90	50	34	25	15
2 1/2”	130	80	54	35	25
3”	195	120	80	58	40
4”	340	200	130	85	57
6”	750	500	350	250	-

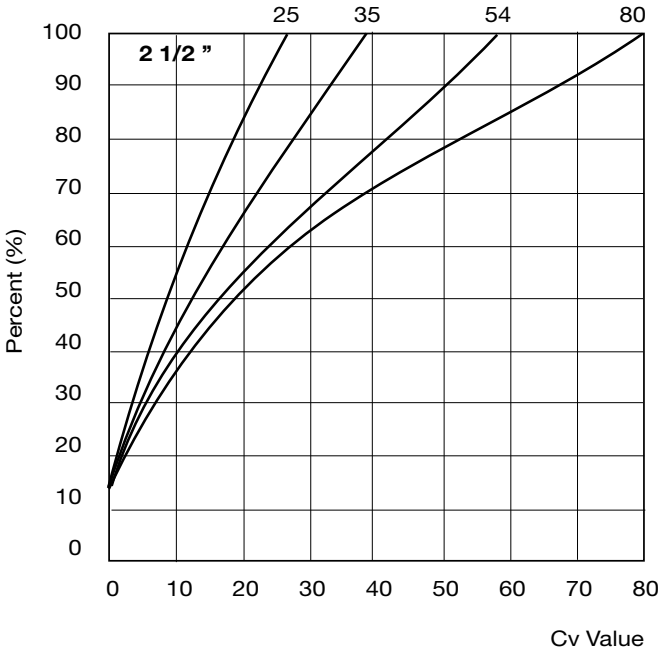


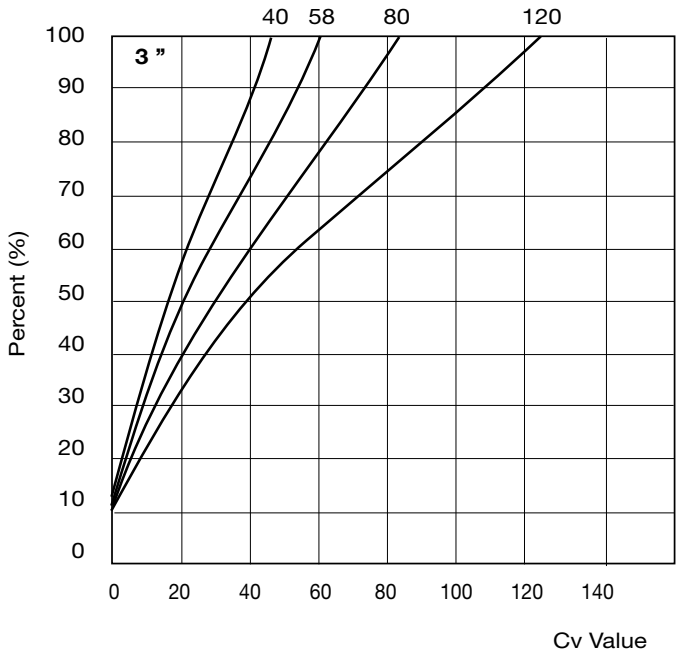


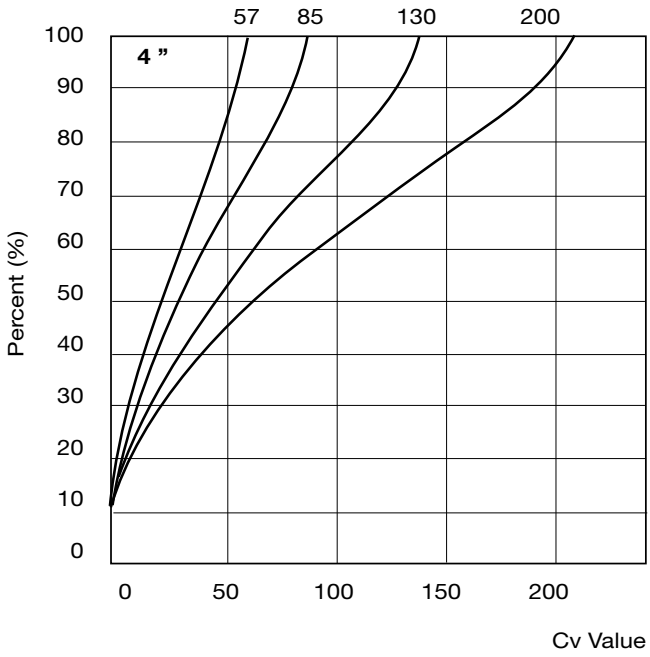

3
7
11
17
1 ”
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
3
6
9
12
15
18
Cv Value

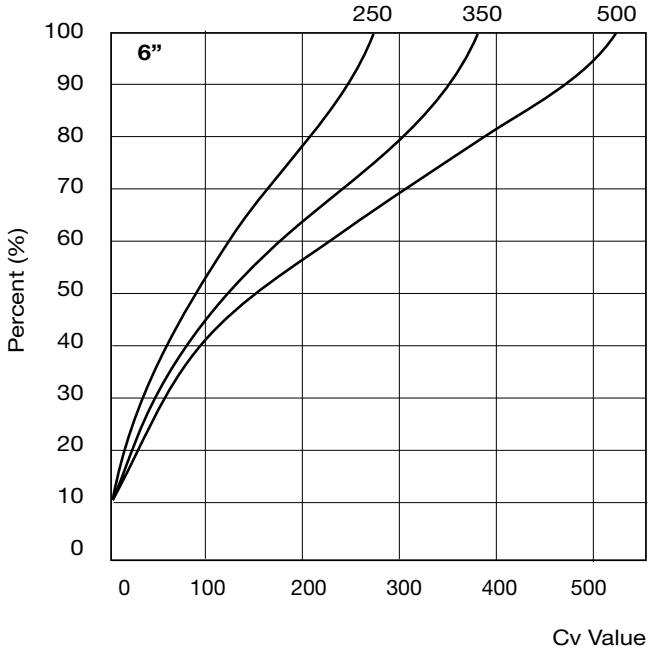

10
15
25
35
1 1/2 ”
100
90
80
70
60
50
40
30
20
0
Percent (%)
0
10
20
30
40
Cv Value


15
25
34
50
2 ”
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
10
20
30
40
50
Cv Value


25
35
54
80
2 1/2 ”
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
10
20
30
40
50
60
70
80
Cv Value


3 ”
40
58
80
120
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
20
40
60
80
100
120
140
Cv Value


4 ”
57
85
130
200
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
50
100
150
200
Cv Value


6”
250
350
500
100
90
80
70
60
50
40
30
20
10
0
Percent (%)
0
100
200
300
400
500
Cv Value

Section V - Identifying Valve Trim (Cv)

To identify the Cv of a ball, refer to the dimensions in Table 8.

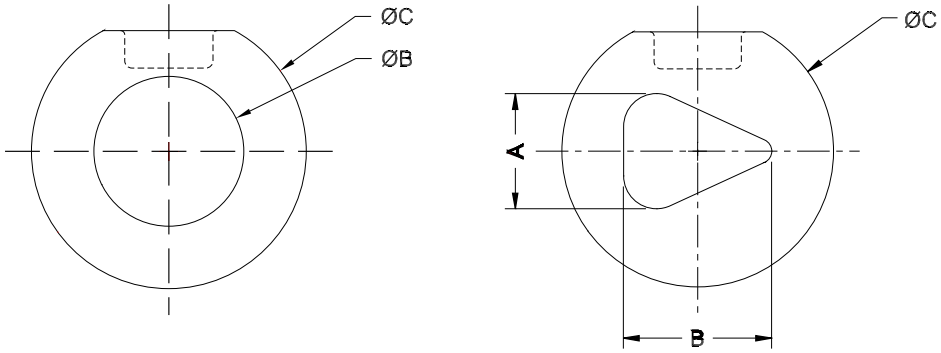


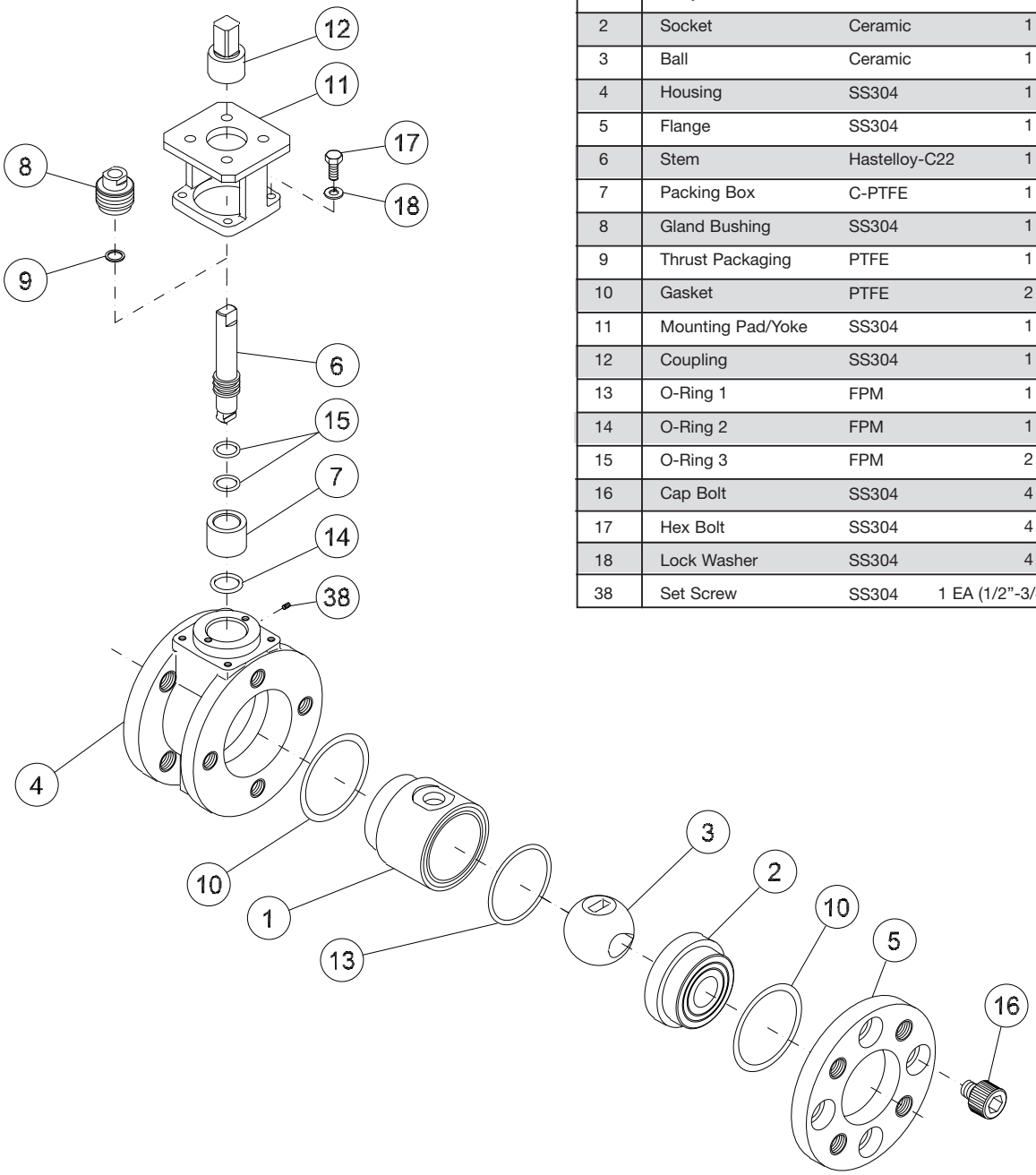
Table 8

Valve Size	Cv	Dimension (mm)		
		A	B	ØC
1/2”	E1.5	4	14	30
	E2.5	6		
	E4	8		
	O8	—	12	
3/4”	E2.5	4	18	38
	E5	8		
	E9	14		
	O14	—	17	
1”	E3	5	24	48
	E7	8		
	E11	13		
	E17	18		
	O24	—	23	
1 1/2”	E10	8	36	66
	E15	13		
	E25	20		
	E35	28		
	O55	—		
2”	E15	10	44	80
	E25	16		
	E34	20		
	E50	34		
	O90	—		
2 1/2”	E25	14	54	92
	E35	20		
	E54	30		
	E80	44		
	O130	—	56	
3”	E40	17	68	110
	E58	24		
	E80	32		
	E120	50		
	O195	—		
4”	E57	20	88	134
	E85	28		
	E130	42		
	E200	68		
	O340	—	86	
6”	E250	60	132	200
	E350	80		
	E500	110		
	O750	—		

Section VI - Bill of Materials

EXPLODED-VIEW DRAWINGS

1/2" and 3/4" Valve Sizes - Bare Stem

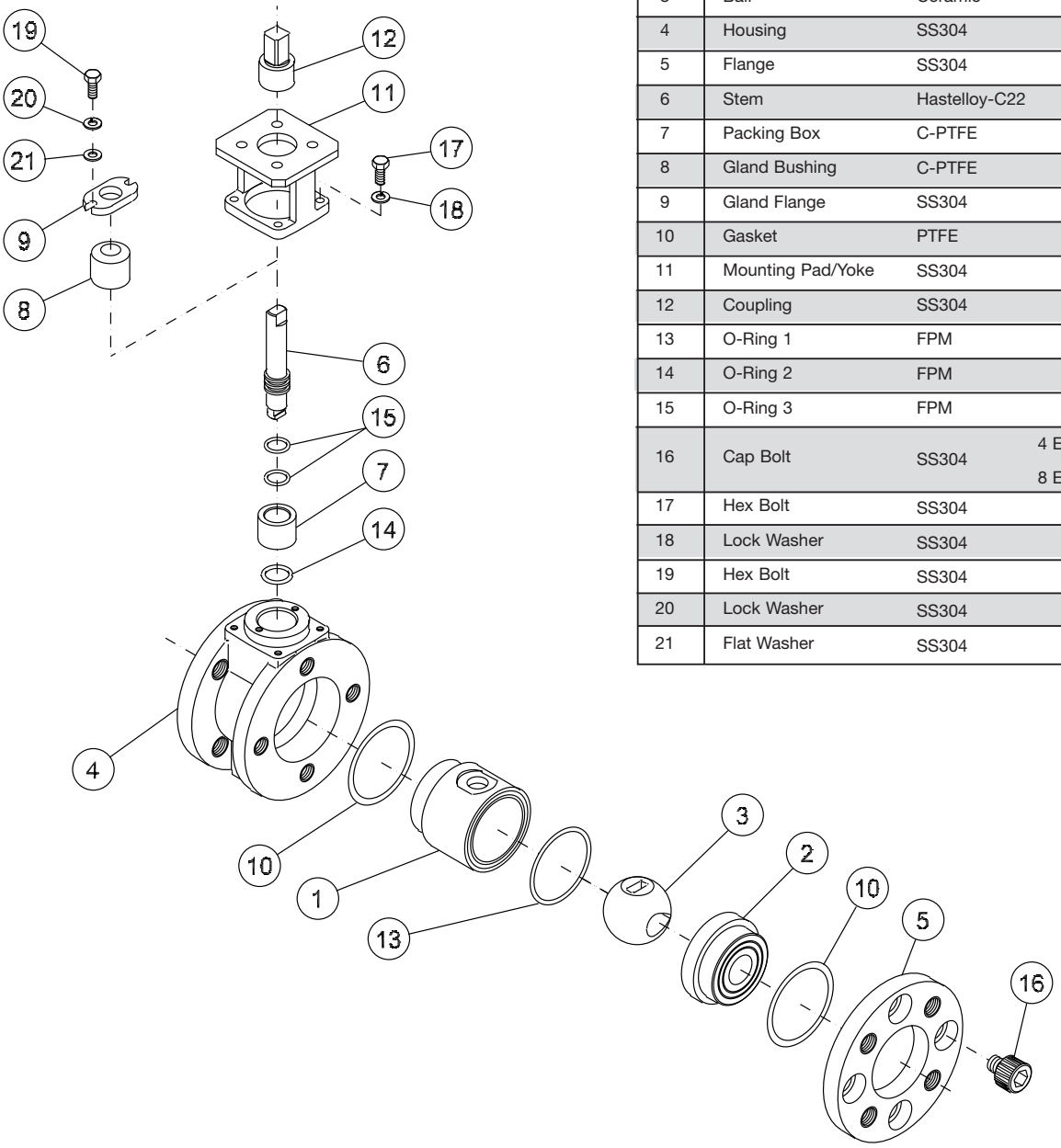


PART NO.	PART NAME	MATERIAL	QTY/REMARKS
1	Body	Ceramic	1 EA
2	Socket	Ceramic	1 EA
3	Ball	Ceramic	1 EA
4	Housing	SS304	1 EA
5	Flange	SS304	1 EA
6	Stem	Hastelloy-C22	1 EA
7	Packing Box	C-PTFE	1 EA
8	Gland Bushing	SS304	1 EA
9	Thrust Packaging	PTFE	1 EA
10	Gasket	PTFE	2 EA
11	Mounting Pad/Yoke	SS304	1 EA
12	Coupling	SS304	1 EA
13	O-Ring 1	FPM	1 EA
14	O-Ring 2	FPM	1 EA
15	O-Ring 3	FPM	2 EA
16	Cap Bolt	SS304	4 EA
17	Hex Bolt	SS304	4 EA
18	Lock Washer	SS304	4 EA
38	Set Screw	SS304	1 EA (1/2"-3/4" Valve Sizes)

Section VI - Bill of Materials

EXPLODED-VIEW DRAWINGS

1" to 6" Valve Sizes - Bare Stem

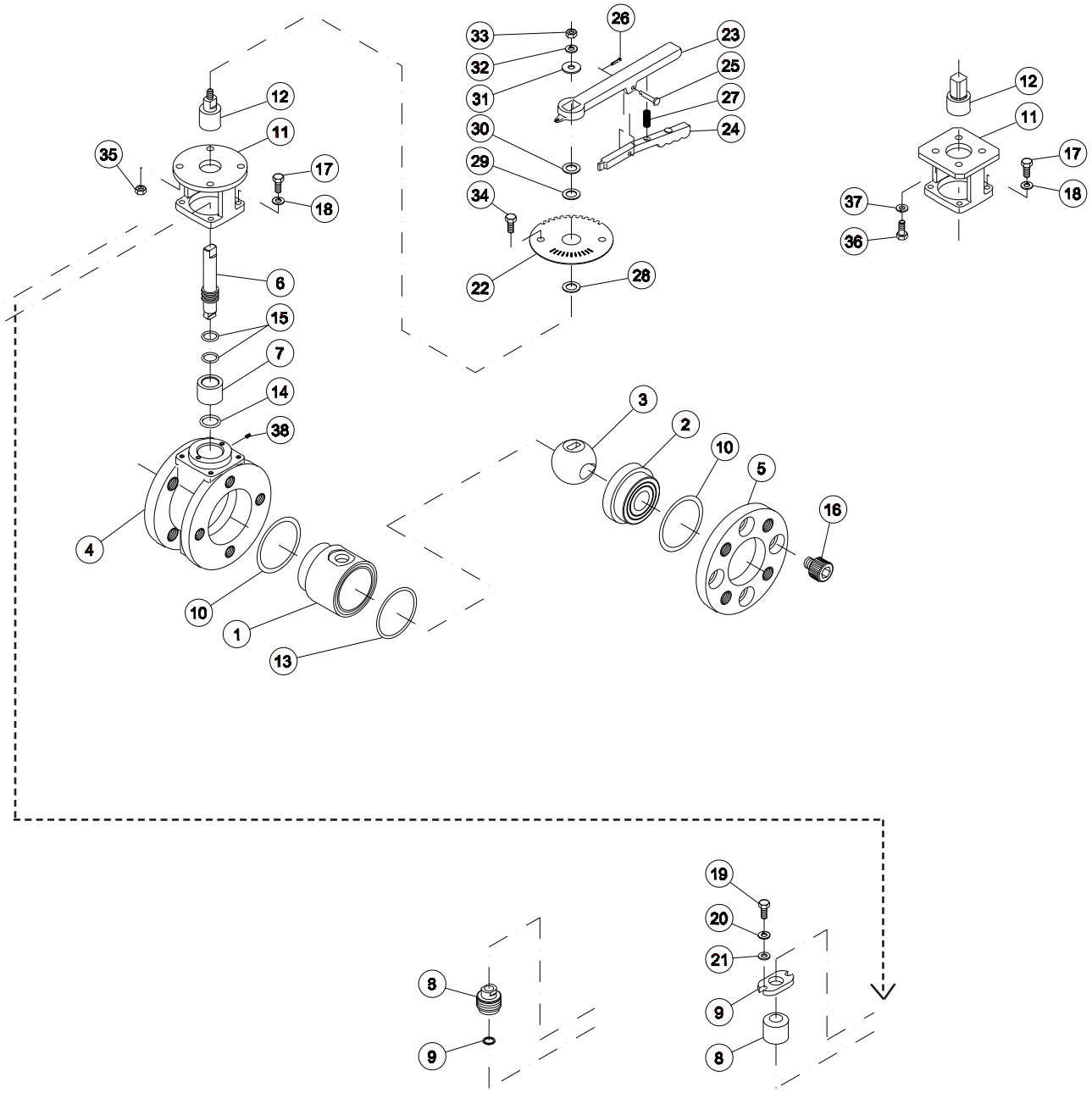


PART NO.	PART NAME	MATERIAL	QTY/REMARKS
1	Body	Ceramic	1 EA
2	Socket	Ceramic	1 EA
3	Ball	Ceramic	1 EA
4	Housing	SS304	1 EA
5	Flange	SS304	1 EA
6	Stem	Hastelloy-C22	1 EA
7	Packing Box	C-PTFE	1 EA
8	Gland Bushing	C-PTFE	1 EA
9	Gland Flange	SS304	1 EA
10	Gasket	PTFE	2 EA
11	Mounting Pad/Yoke	SS304	1 EA
12	Coupling	SS304	1 EA
13	O-Ring 1	FPM	1 EA
14	O-Ring 2	FPM	1 EA
15	O-Ring 3	FPM	2 EA
16	Cap Bolt	SS304	4 EA (1"-3" ANSI 150#) 8 EA (4"-6" ANSI 150#)
17	Hex Bolt	SS304	4 EA
18	Lock Washer	SS304	4 EA
19	Hex Bolt	SS304	2 EA
20	Lock Washer	SS304	2 EA
21	Flat Washer	SS304	2 EA

Section VI - Bill of Materials

EXPLODED-VIEW DRAWINGS

1/2" to 3" Valve Sizes - Manually-Operated



Section VI - Bill of Materials

EXPLODED-VIEW DRAWINGS

1/2″ to 3″ Valve Sizes - Manually-Operated

PART NO.	PART NAME	MATERIAL	QTY/REMARKS
1	Body	Ceramic	1 EA
2	Socket	Ceramic	1 EA
3	Ball	Ceramic	1 EA
4	Housing	SS304	1 EA
5	Flange	SS304	1 EA
6	Stem	Hastelloy-C22	1 EA
7	Packing Box	C-PTFE	1 EA
8	Gland Bushing	SS304	1 EA (1/2” -3/4” SIZES)
8	Gland Bushing	C-PTFE	1 EA (1” - 6” SIZES)
9	Gland Flange	SS304	1 EA (1” - 6” SIZES)
9	Thrust Packing	PTFE	1 EA (1/2” -3/4” SIZES
10	Sheet Packing	PTFE	2 EA
11	Mounting Pad/Yoke	SS304	1 EA
12	Coupling	SS304	1 EA
13	O-Ring 1	FPM	2 EA
14	O-Ring 2	FPM	1 EA
15	O-Ring 3	FPM	2 EA
16	Cap Bolt	SS304	4 EA (1”-3” ANSI 150#) 8 EA (4”-6” ANSI 150#)
17	Hex Bolt	SS304	4 EA
18	Lock Washer	SS304	4 EA

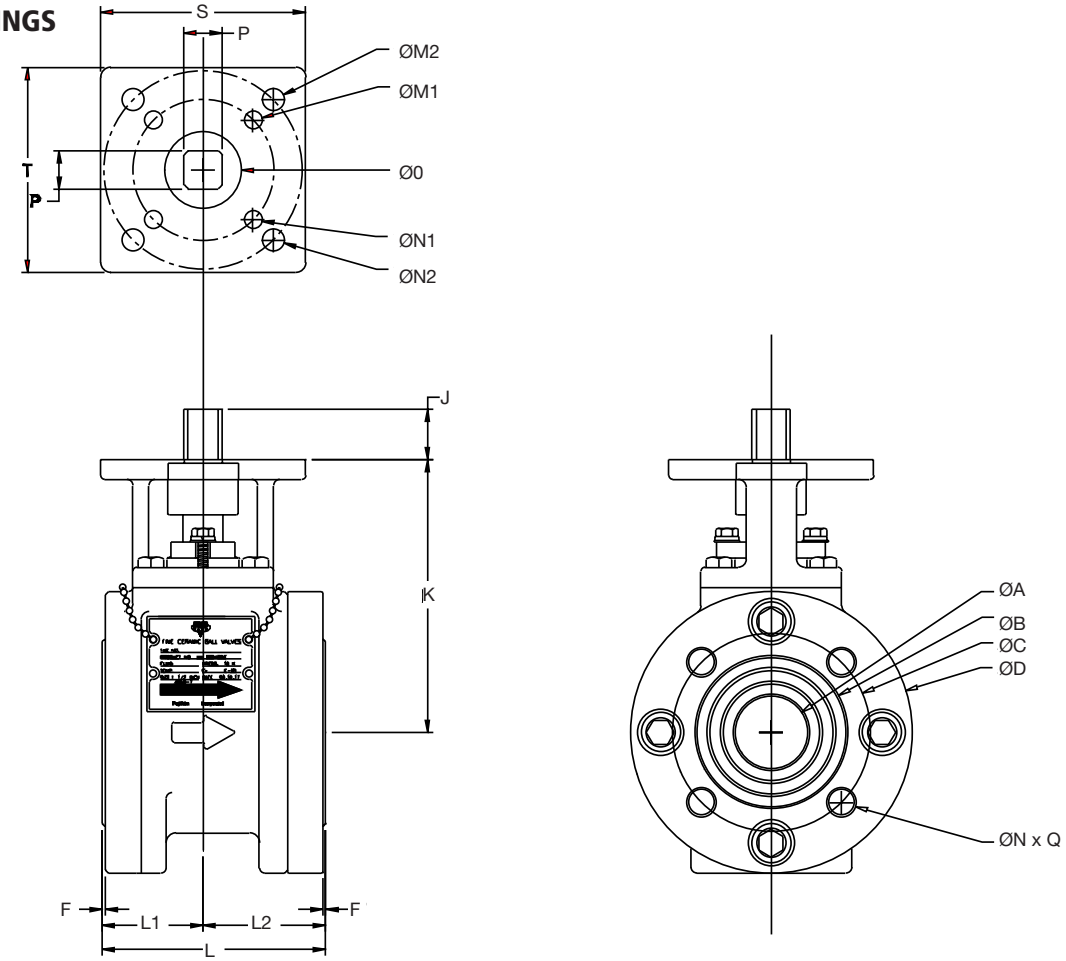
PART NO.	PART NAME	MATERIAL	QTY/REMARKS
22	Indicator/Scale Plate	SS304	1 EA
23	Handle	Cast Aluminum	1 EA
24	Clutch Lever	Cast Aluminum	1 EA
25	Pin	SS304	1 EA
26	Cotter Pin	SS304	1 EA
27	Spring	SS304	1 EA
28	Thrust Sheet	PTFE	1 EA
29	Thrust Sheet	PTFE	1 EA
30	Thrust Sheet	PTFE	1 EA
31	Washer	SS304	1 EA
32	Lock Washer	SS304	1 EA
33	Hex Nut	SS304	1 EA
34	Hex Bolt	SS304	1 EA
35	Hex Nut	SS304	1 EA
36	Hex Bolt	SS304	4 EA
37	Lock Washer	SS304	4 EA
38	Set Screw	SS304	1 EA (1/2”-3/4”SIZES)

NOTE

Valve sizes 4″ and 6″ are provided with third-party gear operators.

Section VI - Bill of Materials

DIMENSIONAL DRAWINGS



Valve Size	ØA	ØB	ØC	ØD	F	G	H	I	J	K	S	T	L	L1	L2	ØM1	ØM2	ØN1	ØN2	ØO	ØP	Q(Qty)	Ø
1/2"	0.47	1.57	2.38	3.74	0.04	0.28	4.10	5.91	0.79	3.35	2.60	2.60	2.80	1.30	1.50	0.35	0.35	1.97	2.76	0.94	0.431	4	UNC 1/2"
3/4"	0.67	1.80	2.75	3.94	0.04	0.28	4.22	5.91	0.83	3.46	2.60	2.60	3.13	1.38	1.75	0.35	0.35	1.97	2.76	0.94	0.549	4	UNC 1/2"
1"	0.91	2.20	3.12	4.92	0.06	0.28	5.48	5.91	0.87	4.72	2.60	2.60	3.35	1.54	1.81	0.35	0.35	1.97	2.76	1.18	0.549	4	UNC 1/2"
1 1/2"	1.42	2.99	3.88	5.51	0.06	0.36	6.19	7.09	1.00	5.31	3.94	3.94	4.37	1.97	2.40	0.35	0.43	2.76	4.02	1.50	0.745	4	UNC 1/2"
2"	1.73	3.70	4.75	6.10	0.06	0.36	6.46	7.09	1.00	5.59	3.94	3.94	4.72	2.24	2.48	0.35	0.43	2.76	4.02	1.50	0.745	4	UNC 5/8"
2 1/2"	2.20	4.09	5.51	6.89	0.06	0.36	6.78	7.09	0.91	6.42	4.57	4.57	5.51	2.64	2.87	0.35	0.43	2.76	4.02	2.17	0.864	4	UNC 5/8"
3"	2.83	4.88	6.00	7.83	0.06	0.36	7.01	7.09	1.00	7.09	3.94	4.57	6.48	3.15	3.33	0.35	0.43	2.76	4.02	2.36	0.864	4	UNC 5/8"
4"	3.50	5.83	7.50	9.02	0.06	CONSULT FUJIKIN			1.30	7.87	3.94	5.51	7.62	3.74	3.88	0.35	0.43	2.76	4.02	2.56	1.059	8	UNC 5/8"
6"	5.28	8.35	9.50	12.20	0.10				1.38	10.24	5.51	6.30	9.84	4.78	5.05	0.43	0.67	4.02	5.51	3.15	1.456	8	UNC 3/4"

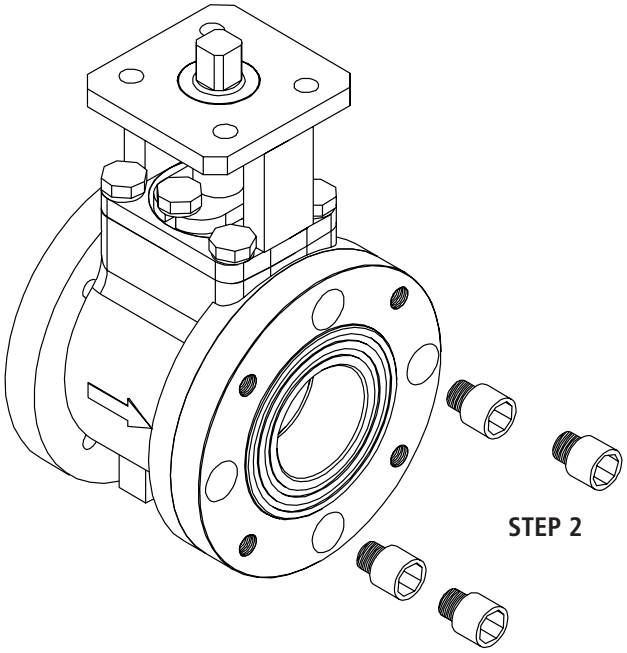
Section VII - Assembly and Disassembly Procedures

IMPORTANT NOTES AND CONSIDERATIONS

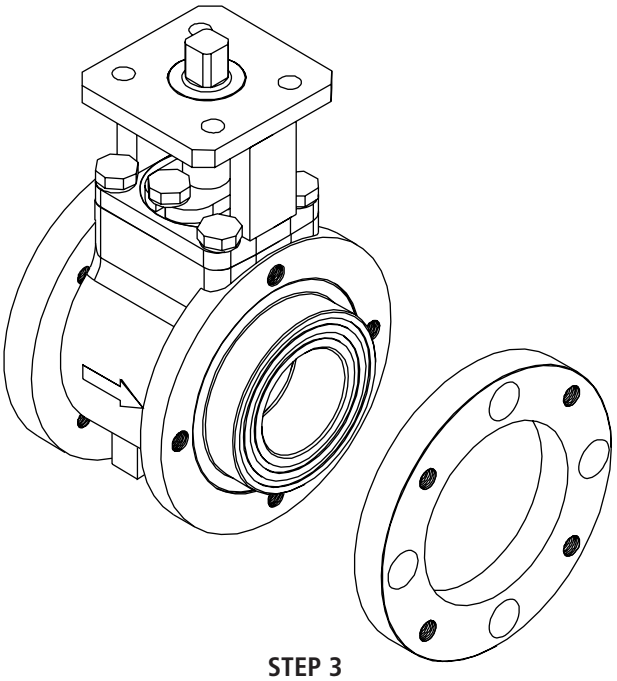
- Ceramics are extremely durable and erosion resistant, but may chip or fracture if they are handled in a rough manner, or allowed to drop. Therefore, when handling ceramic valve components, they should be handled carefully and placed on a clean, clutter-free workbench away from other components and tools until ready for use.
- Always start with a clean workbench.
- Hammers should never be used during any procedure.
- If performing maintenance on a valve that has been in service and the components have gotten stuck together or in the valve housing, we recommend soaking the valve in water (or any fluid that will dissolve - but not harm - the ceramic and/or stainless components) overnight prior to resuming. A wooden, rubber, or plastic mallet may be used cautiously if all else fails, but doing so may facture the ceramic components. **EXERCISE EXTREME CAUTION!**

DISASSEMBLY PROCEDURE

1. Disconnect and remove any automation that has been mounted onto the valve. Be sure the actuator is completely vented free of compressed air before attempting to remove it from the valve.
2. Remove all socket-head cap screws #16 with an appropriate metric hex wrench.
3. To break free any scale or media that may be binding flange #5 onto the housing #4, grasp the flange firmly by hand or with a non-metallic strap-wrench and rotate a complete turn. When it spins freely by hand, twist the flange off with an upward motion to remove it from the valve.
4. Remove and discard PTFE gasket #10.
5. Grasp the ceramic socket #2, and similarly rotate it within



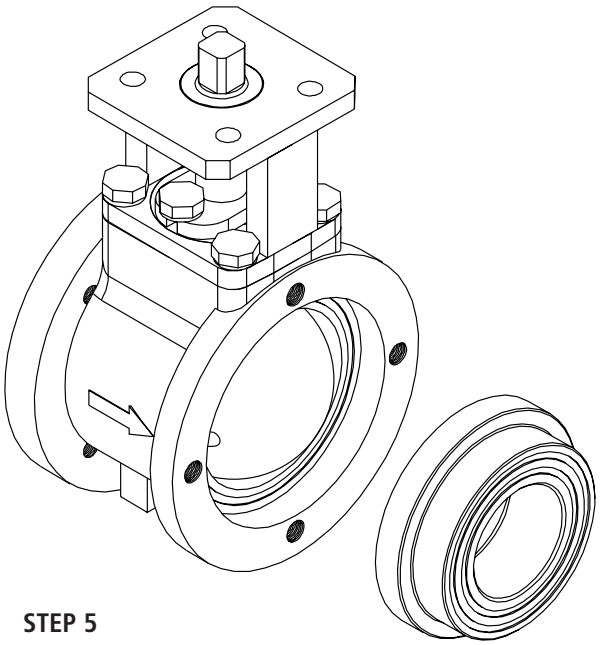
STEP 2



STEP 3

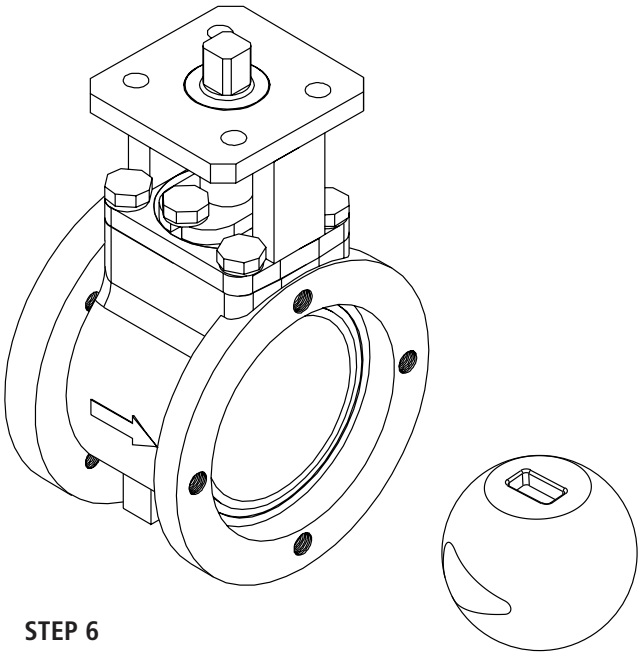
Section VII - Assembly and Disassembly Procedures

the housing #4. If the socket #2 does not rotate, and/or cannot be removed, immerse the valve assembly in water or other agent that will soften and/or dissolve the hardened media within the valve, (avoid the use of harsh chemicals that may corrode the stainless steel valve components). When the socket #2 spins freely, remove it from the housing #4.



STEP 5

6. Remove the ceramic ball #3 from the valve assembly.

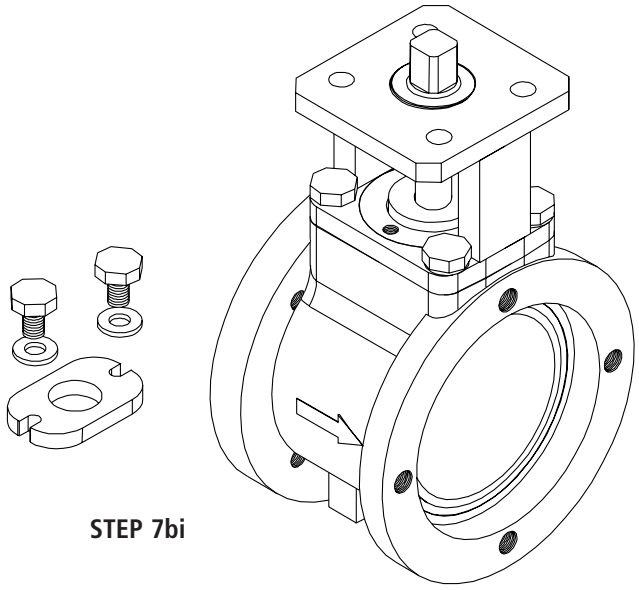


STEP 6

Section VII - Assembly and Disassembly Procedures

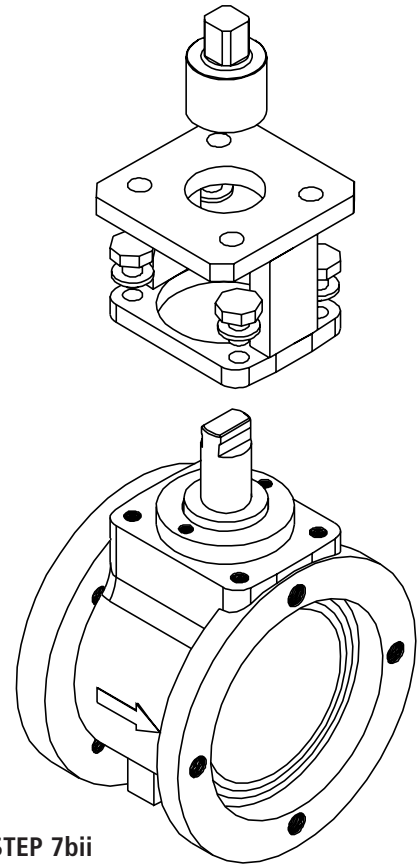
7. a. **Valve sizes 1/2" to 3/4":**
   i. Loosen set screw #38, and remove stem packing gland #8
   ii. Remove the actuator mounting pad #11 by loosening and removing hex screws #17 with lock washers #18.
   iii. Grasp stem #6 and remove from valve assembly by pulling upwards. Be sure all components of the stem packing set are removed from the valve assembly (parts #7, #9, #14, #15).

   b. **Valve sizes 1" and larger:**
   i. Remove stem packing gland #9 by loosening and removing two sets of hex screws #19, lock washers #20, and flat washers #21.



STEP 7bi

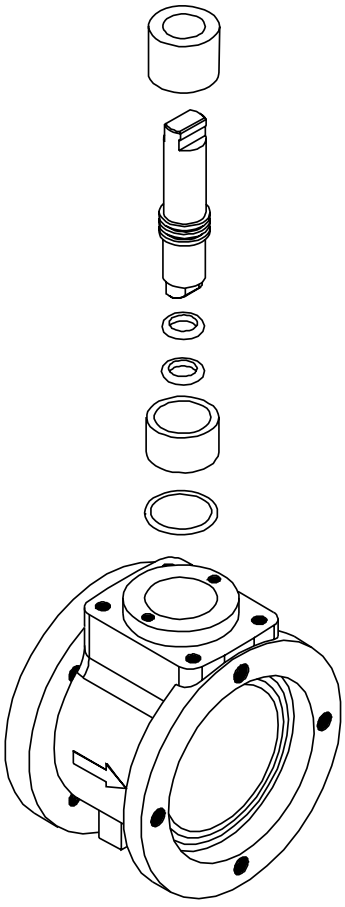
ii. Remove the actuator mounting pad #11 by loosening and removing hex screws #17 with lock washers #18.



STEP 7bii

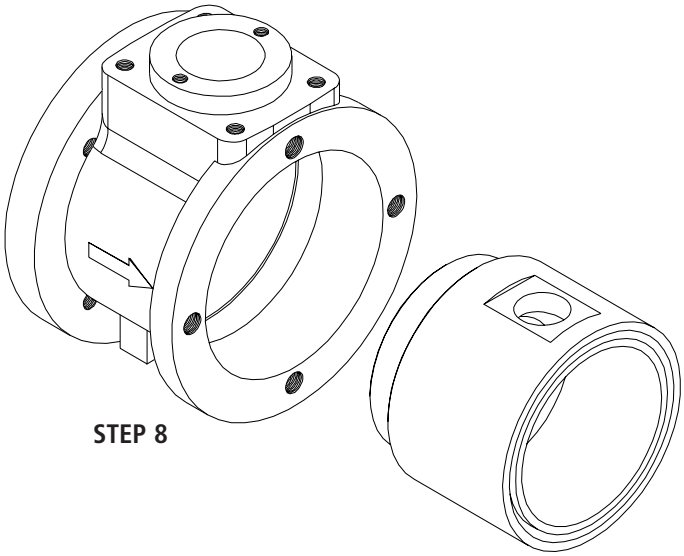
Section VII - Assembly and Disassembly Procedures

iii. Grasp stem #6 and remove from valve assembly by pulling upwards. Be sure all components of the stem packing set are removed from the valve assembly (parts #7, #8, #14, #15).



STEP 7biii

8. Push the ceramic body #1 out of the stainless steel housing #4, and discard PTFE gasket #10.



STEP 8

Inspection of valve components:

Clean the valve components of any remaining media, and carefully inspect each component for signs of wear or damage. None of the components are repairable – and therefore any damaged components must be replaced with new.

Pay particular attention to the following:

- If any areas of wear/erosion or cracks are observed on any of the ceramic components, they must be replaced.
- If the stem is worn in the area of contact with the ball, it must be replaced to ensure tight control.
- The stem packing set (parts #7, #9, #14, #15 for 1/2" and 3/4" valves, and #7, #8, #14, #15 for valves 1" and larger) as well as the soft packing set (parts #10, and #13) should be replaced whenever the valve is disassembled.

Section VII - Assembly and Disassembly Procedures

ASSEMBLY PROCEDURE

Prior to assembling the valve, it is important that all used components are washed, clean, and free of any debris. If necessary, media-blast all of the metallic components with minimally-aggressive media (such as fine-grit glass bead) to remove difficult debris but to also minimize material removal. Particular attention must be paid to the interior surfaces where the ceramic components will be assembled into. The ceramic components must also be clean and free of debris to ensure that all assembly tolerances are kept, the valve will operate properly, and to ensure a smooth assembly. Use of soap, water, and a stiff nylon brush is the preferred means of cleaning. If a more aggressive means of cleaning is necessary, soak the ceramics in an acid or alkali solution for a few minutes followed by thorough washing with water. Media-blasting the ceramics is not recommended, as this will dull the polished sealing surfaces, and result in a higher leakage rate than normal.

Required Items

- Dow Corning Compound #111 Valve Lubricant and Sealant or equivalent O-ring lubricant
- Medium-Strength Threadlock

1. Place the housing #5 onto a clean workbench, upstream side laying flat onto the bench.

2. Place one gasket #10 into the housing.

3. Carefully slide the ceramic body #1 into the housing.

4. Lift the valve assembly up, and place onto the bench so the stem hole is facing vertically up.

5. Push the ceramic body all the way in until it cannot go any further.

6. Visually align the stem-hole in the body with the stem-hole in the housing.

7. Thoroughly lubricate O-rings #14, and #15 (2 ea), as well as packing box #7 and O-ring Gland #8.

8. Slide one of each O-ring #15 over stem #6 and into each O-ring groove. Place O-ring #14 into O-ring groove of packing box #7.

9. Slide the packing box #7 onto the ball side of the stem. Push the packing box until it snaps over both O-rings and cannot go any further.

10. Slide the O-ring gland #8 onto the opposite side of the stem, making sure that the flat end is seated up against the packing box, and the convex end is facing the end of the stem.

11. Carefully place the stem assembly into the housing.

12. With slight force onto the top of the stem, slightly rotate the ceramic body until you feel that the stem packing is seated flat against the body. Be careful not to inadvertently change the position of the body at this point.

13. **1/2" and 3/4" valves:**
    - Apply Threadlock on the packing gland #8 threads, and securely thread into the housing. Lock it in place with Set-Screw #38.

    1" and larger valves:
    - Place the mounting pad #11 onto the housing.
    - Slide the packing gland over the stem, and fasten it to the body with two sets of hex bolts #18, lock washers #19, and flat washers #20.
    - Apply threadlock to four hex bolts #17. Fasten the mounting pad onto the housing with bolts #17 and lock washers #18.

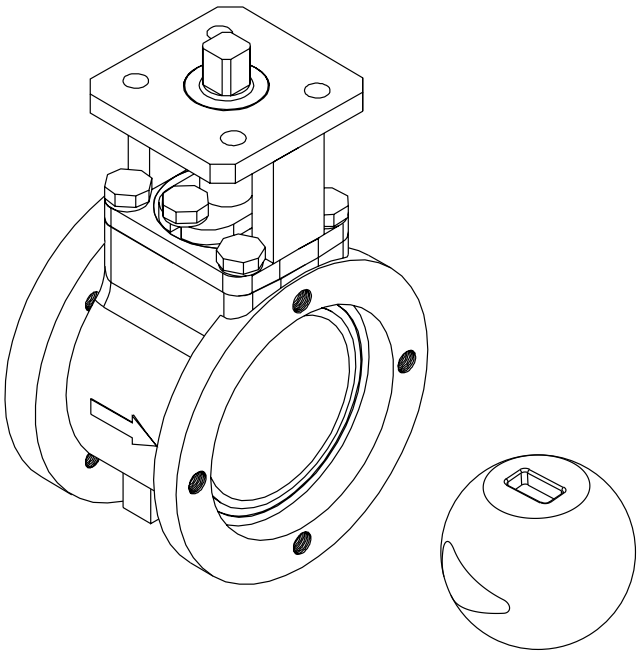
Be sure all bolts above are torqued as indicated in Table 4.

Section VII - Assembly and Disassembly Procedures

14. Lay the valve back down onto its upstream side as in step (1).

15. Looking at the portion of the stem that is visible within the valve cavity, rotate until the flats are parallel with the direction of flow.

16. Grasp the ceramic ball #3 by placing your thumb and forefinger into the smallest portion of the triangular port.



17. Tilt the ball into the body, making sure the stem is inserted into the ball stem slot.

18. Verify that the tip of the triangular port is facing toward the downstream side of the valve.

19. Lubricate and insert O-ring #13 into the body O-ring groove.

20. Insert the ceramic socket #2 into the valve body. If the socket can rotate freely within the valve cavity, it has been inserted properly.

21. Place second gasket #10 over the socket.

22. Place retaining flange #5 over the socket. Again, if the retaining flange can rotate freely, it has been inserted properly.

23. Align the countersunk holes with their respective locations on the housing. Secure the retaining flange onto the housing with socket head cap screws #16, brushing the threads of each bolt with Threadlock.

24. Place actuator Coupling #12 onto stem, and verify that operation is smooth.

Before placing automation onto the valve, verify that the smallest portion (tip) of the triangular port will be exposed first. Standard, fail closed automation will rotate counter-clockwise to open; therefore by rotating the coupling counter-clockwise, and by looking up into the downstream side of the valve, the tip of the triangular port should be exposed first.

Section VIII - Troubleshooting

Fujikin provides a no-cost evaluation of failed valves regardless of if the valve is within the warranty period. Before returning any valves to Fujikin, please perform any preliminary troubleshooting steps to minimize valve down-time. If the problem cannot be rectified on-site, contact your local Fujikin representative to obtain a returned goods authorization number. Be sure the Returned Goods Form at the end of this manual is completed and included with the valve.

NEVER INCREASE THE SUPPLY AIR BEYOND THE ORIGINAL SET-POINT!

NEVER TRY TO FREE THE VALVE BY MEANS OF MANUALLY TURNING IT WITH A WRENCH!

NEVER STRIKE THE VALVE WITH A HAMMER OR SIMILAR OBJECT!

Condition	Remedy
Valve does not operate at all	a) Determine if the differential pressure across the valve is within limits. b) Verify that supply air is present, and that the air regulator is set to 60 psig or 80 psig (depending upon actuator size). c) Confirm that the control signal is operational. Test the valve operation locally with a hand-held signal generator. d) Shut down - or bypass and isolate - the line, and verify that no pressure is present. • Remove the automation package from the valve; • Determine if the automation package is operational without being mounted onto the valve; • If the automation operates properly, remove the downstream piping and inspect the valve internals by looking into the downstream side of the valve; eliminate any solids that may have lodged within the ball port; • If the valve is in the closed position or no large solids are present within the ball port, remove the valve from the line and disassemble. Remove any process that may have accumulated and solidified within the valve. Proceed with assembly and installation within the piping.
Valve does not open fully	a) Verify that the supply air is set to 60 psig or 80 psig (depending upon actuator size). b) Determine if the actuator limit stops are preventing the valve from opening or closing fully.
Valve does not close fully	a) Determine if the differential pressure across the valve is within limits. b) Confirm that the control signal is operational, and that the positioner span and/or zero set-points have not inadvertently been adjusted. c) Make a note of the actuator make, model, size, and spring configuration. Contact Fujikin for verification that the installed actuator has ample torque to close the valve under your process conditions. d) Remove the valve from the line, and inspect the internals for foreign objects.

Section VIII - Troubleshooting

Condition	Remedy
Valve rotation is erratic, jumpy, and not smooth	a) Determine if the differential pressure across the valve is within limits. b) Confirm that the control signal is sound. c) Make a note of the actuator make, model, size, and spring configuration. Contact Fujikin for verification that the installed actuator has ample torque to operate the valve under your process conditions.
Valve position does not correspond to the control signal	Recalibrate the positioner according to the manufacturer's recommendations.
Process is leaking from the valve	Remove the valve from service and overhaul the valve, replacing any ceramic components that may have fractured, or packing that is not compatible with the process.

Section IX - Returned Goods Information Sheet

In order to accurately determine the possible cause(s) of failure, expedite the diagnosis and repair, and to recommend a solution to the problem, please fill in all the required information about the valve and its service as completely as possible.

Order Information:

RGA #		Today's Date	
End-User		Contact	
Representative		Contact	
Customer's PO#		FOA SO# / Inv #	
Delivery Date		Installation Date	
Valve Size		Cv	

Service Conditions:

Valve In Service For ____❑ Days ❑ Months ❑ Years	Media	
Concentration	% Solids	Specific Gravity
Is the line flushed periodically? ❑ Yes ❑No	Cleaning Media	
Upstream Pressure	Downstream Pressure	Differential Pressure
Normal Temperature	Low Temperature	High Temperature
Maximum Flow	Normal Flow	Minimum Flow

Valve Automation:

❑ Throttling Service	❑ On/Off Service	❑ Manually Operated
Actuator Mfr & Model	Positioner Mfr & Model	
Plant Air Supply Pressure	Air to Valve Being Regulated? ❑ No ❑Yes - @_____psi	

Describe the problem in detail:

_____

_____

_____

Damaged/failed parts are to be:

❑ returned to the end-user ❑ returned to the representative ❑ disposed of

Prior to the returning any products to Fujikin, thoroughly clean all parts.
A copy of this completed form must be included as part of your packing list.

Notes

Notes

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