



## **Installation, Maintenance and Operating Instructions for Series 300 Ceramic-Lined Ball Valves**

Nil-Cor® Ball Valves have been designed for easy assembly, installation, and maintenance. A deep stuffing box around the stem holds PTFE chevron packing, which achieves a leak-tight seal with minimum pressure from the gland for ease of maintenance. In addition, the design of the gland and stem results in the gland taking the axial load of the chevron packing, which minimizes the torque

required to actuate, even when the gland is under very high pressure. With the handle off, the gland is easily removed for access to packing. The ball and seats are retained by threaded retaining rings that can be removed and can be serviced by maintenance personnel who routinely service metallic valves. However, we strongly recommend returning the valve to Nil-Cor, LLC for rebuilding or repair.



**Installation:**

1. Fluid flow may be in either direction and the valve may be mounted in any position.
2. Special provisions should be made for support of large actuation packages when the valve is installed in a vertical line.
3. Pipe must be properly aligned and provisions made to minimize stress from thermal expansion. Always review pipe manufacturer's recommendations.
4. 50 to 65 Durometer Full-Face elastomer gaskets are recommended. Care should be taken to make certain the gaskets are centered on the valve face.
5. **IMPORTANT: The I.D. of the gasket and the I.D. of the mating flange must equal the I.D. of the ceramic insert. This is to ensure that that the turbulent slurry cannot reach the composite retaining ring and possibly erode the face of the valve.**
6. We recommend installation in piping systems with flat-faced flanges. When installing against raised-face flanges, spacer rings should be used to provide a flat surface to the face of the valve flange.

7. Flange bolts should be evenly torqued, using a torque wrench, in cross rotation to prevent flange damage.
8. The valve should always be installed between flat-faced flanges. Failure to do so could result in cracking of the flanges if the flange bolts are overtightened.
9. Hangers should be used on both sides of the flange area to prevent pipeline bending loads being transferred to the ceramic liner.
10. Do not exceed these pressure/temperature ratings: 225 psi at 250°F; 275 psi from -40°F to 100°F.
11. These pressure/temperature ratings are based on capabilities of the material under non-corrosive conditions. In situations where corrosion may occur, the temperature limits must be reduced.
12. Thermal shock of up to 350°C (630°F) can be tolerated by the Zirconia ceramic components, but avoid exceeding the maximum temperature limitation of the body material.

Flange Bolt Torque (ft-lb)	
Valve Size	Recommended Range
1"	20-25
1.5"	20-25
2"	20-35
3"	25-35
4"	25-45
6"	30-45
8"	30-45

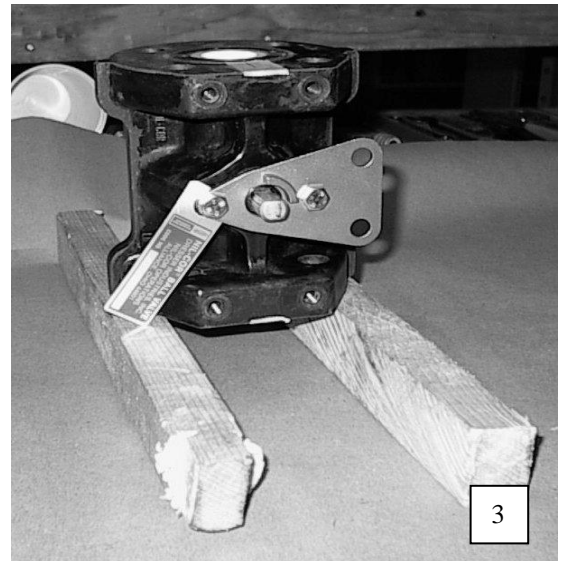
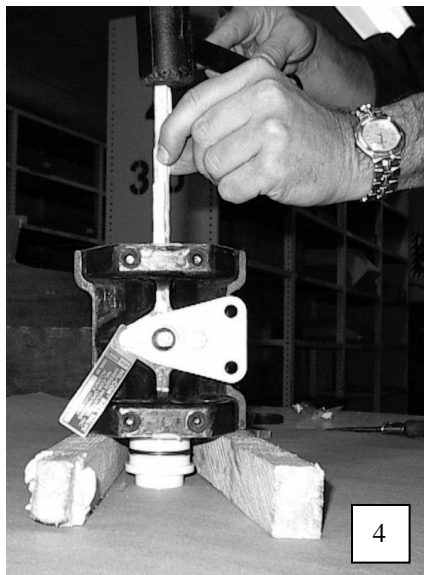
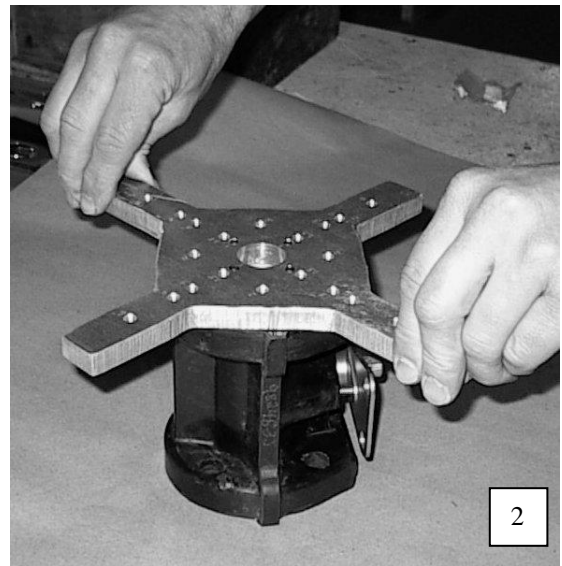
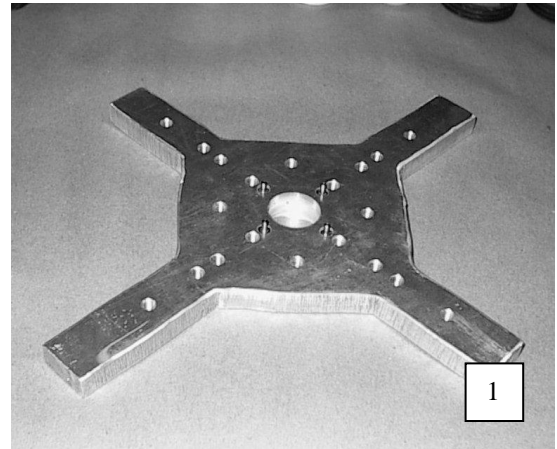
**Removal:**

**WARNING: FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN SERIOUS INJURY OR DEATH:**

1. Wear protective clothing or equipment appropriate for the particular fluid.
2. Depressurize the line and valve.
3. Before removal from the line, cycle (open and close) the valve to relieve residual pressure in the body cavity.
4. After removal, cycle (open and close) the valve several times to clear it of fluid.
5. Flush with water.

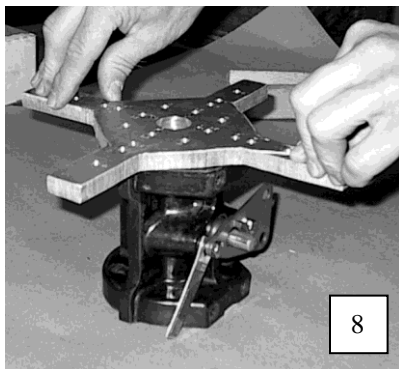
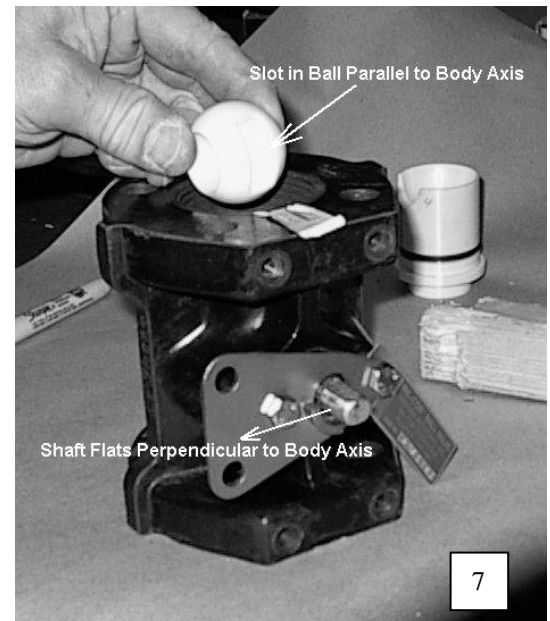
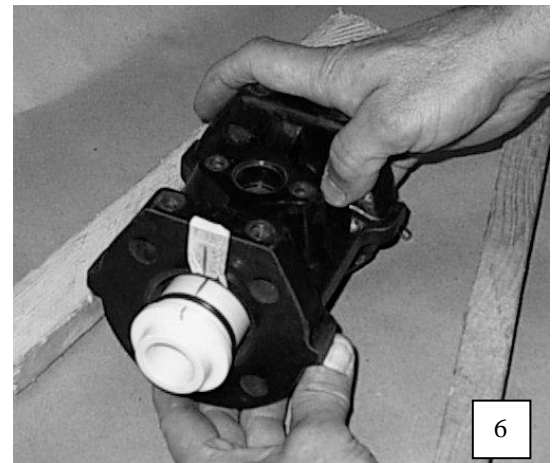
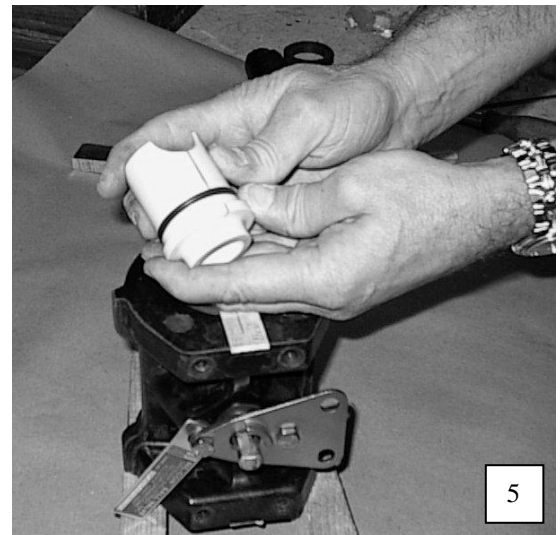
**Disassembly:**

1. **Field disassembly and repair or replacement is possible, however if circumstances permit, the valve should be returned to the factory, since special tools are required.**
2. Remove handle or actuation assembly.
3. Set the four pins in the spanner tool (Fig. 1) to the appropriate size.
4. Firmly clamp one end of the valve to the top of the workbench, taking care not to damage the flange.
5. Using the spanner tool, unthread and remove the retainer ring from the end of the body (Fig. 2).
6. Reverse the valve on the table and remove the other retainer in the same fashion.
7. Remove valve from clamps, and turn the ball to the closed position.
8. Place the valve on the table with one end supported with wooden blocks approximately 2" high. Be sure that the blocks clear the port opening (Fig. 3).
9. Using a wooden or rubber tipped driver, gently drive the ball downward, which will eject the lower seat insert. Be careful not to allow the seat insert to contact a hard surface as it falls from the body.
10. Reverse the body on the blocks, reinsert ball and drive out the remaining seat insert as in Step 9.
11. Remove gland bolts, gland and packing.
12. Remove the stem by pushing it to the inside of the body and lifting it out through one end of the body (Fig. 4).



## **Reassembly:**

1. Clamp one end of the body to the workbench.
2. Grease I.D of body with silicone grease (Versalube or equivalent).
3. Using a soft, sharp pencil, mark both inserts with centerlines through the shaft cutouts (Fig. 5).
4. Install the o-ring on one insert, grease and insert the part into the end of the body with the end having the cutout going in first. Use the penciled centerline to assist in aligning the cutout with the shaft hole in the body. The alignment must be accurate within 1/16" in order to allow adequate clearance for the shaft (Fig 6).
5. Check stem and ball slot for fit. The fit should be free but not with excessive play.
6. Install the thrust washer on the stem and insert the stem into the body.
7. Install packing, gland, gland bolts and tag. Tighten bolts to proper torque.
8. Clamp the stem with vise grips and pull out to fully seat it in the body.
9. Turn the stem so that the external flats are perpendicular to the flow axis and install the ball by gently rolling the stem tang into the ball slot (Fig.7).
10. Loosen and remove the clamps and reverse the valve on the table, being careful not to damage the flanges with the clamps.
11. Install the remaining insert as in Step 4.
12. Using the spanner tool, insert both retainer rings into the body until they are flush with the body. Tighten until snug. Do not overtighten (Fig. 8).
13. Cycle ball open and closed to be sure it moves freely.
14. Set ball at 45 degrees for shell test. Do not exceed pressure given in applicable Technical Specification.
15. Close ball for seat leakage test. Leakage is tested to ANSI/FCI B16.104 Class IV.



## **Stem Gland Packing Set**

Valve Size	No. Compression Ring	Adaptors
1"	2	2
1 1/2"	2	2
2"	2	2
3"	3	2
4"	3	2
6"	3	2
8"	3	2

The normal acceptable range for actuation torque on a newly assembled Nil-Cor ® Ball Valve is

Size	Minimum Torque (in.-lbs.)	Maximum Torque (in.-lbs.)
1"	45	135
1 1/2"	60	190
2"	75	225
3"	185	555
4"	340	1020
6"	700	2100
8"	1000	4200

## **Maintenance**

Periodic observation is recommended to ensure that the valve is functioning well. The frequency of observation depends on the application. Adjustment to stem gland packing should be made periodically to compensate for wear caused by the stem turning against the TFE packing.

Table 2 shows the recommended packing bolt torque for Nil-Cor ceramic ball valves.

**Table 2**

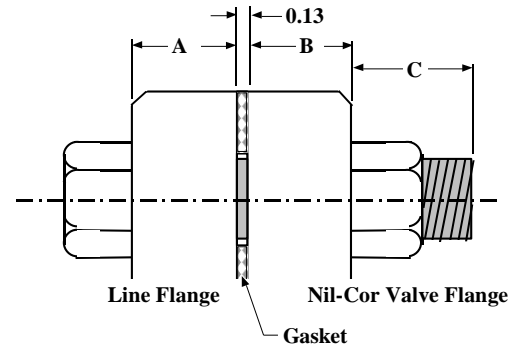
Valve Size	Recommended (in-lbs)	Maximum (in-lbs)
1"	20	40
1 1/2"	30	60
2"	35	70
3"	50	100
4"	65	130
6"	65	130
8"	65	130

In case the service media should dry and solidify in the ball cavity area, hot water should be used to loosen and flush. Do not hammer stem or force valve to open or close.

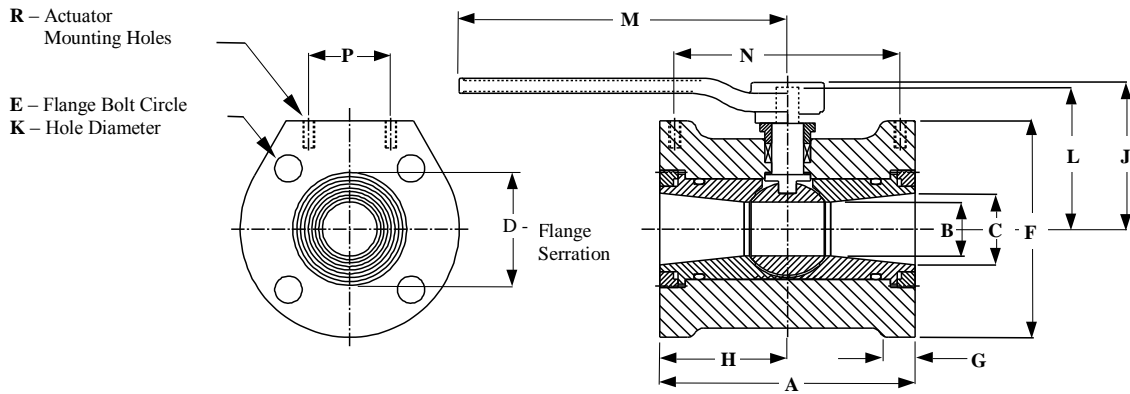
## FLANGE BOLT LENGTHS

For metal and FRP flanges

SIZE	METAL A	FRP A	B	C	NO.	BOLT SIZE	LENGTH METAL	LENGTH FRP
1"	.56	.88	.94	.50	4	1/2 - 13 NC	2.50	2.75
1 1/2"	.69	1.19	1.00	.50	4	1/2 - 13 NC	2.50	2.75
2"	.75	1.19	1.00	.63	4	5/8 - 11 NC	3.00	3.50
3"	.94	1.19	1.36	.63	4	5/8 - 11 NC	3.25	3.75
4"	.94	1.5	1.50	.63	8	5/8 - 11 NC	3.50	4.00
6"	1.00	1.63	1.63	.76	8	3/4 - 10 NC	3.75	4.50
8"	1.12	1.75	1.75	1.0	8	3/4 - 10 NC	4.00	4.63



## DIMENSIONS

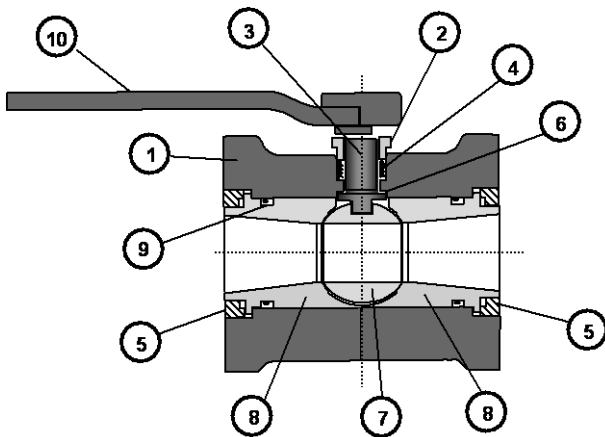


SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N*	P*	R
1"	5.00	.88	1.00	2.25	3.13	4.25	.88	2.50	3.29	.62	2.77	6.25	4.18	1.75	5/16 - 18
1-1/2"	6.50	1.25	1.50	3.00	3.88	5.00	1.00	3.25	3.93	.62	3.55	6.25	5.62	1.75	5/16 - 18
2"	7.00	1.50	2.00	3.66	4.75	6.00	1.00	3.50	4.14	.75	3.96	9.00	6.18	2.25	5/16 - 18
3"	8.00	2.31	3.00	5.00	6.00	7.50	1.36	4.00	5.54	.75	5.42	9.00	7.12	3.50	3/8 - 16
4"	9.00	3.00	4.00	6.19	7.50	9.00	1.50	4.50	6.90	.75	6.50	11.44	8.00	4.00	7/16 - 14
6"	10.50	4.50	6.00	8.50	9.50	11.00	1.63	5.25	8.27	.88	7.91	+	9.00	5.25	7/16 - 14
8"	11.50	6.00	8.00	11.25	11.75	13.50	1.75	5.75	Note **	.88	9.21	Note **	9.75	6.00	1/2 - 13

\*Flange mounting holes symmetrical about CL of valve. +Stainless steel handle adapter standard.

\*\* Gear Operator required for 8" size

## MATERIALS OF CONSTRUCTION:



ITEM	DESCRIPTION	MATERIAL
1	Valve Body	Graphite Reinforced Vinyl Ester
2	Packing Gland	Hastelloy-C
3	Stem	GRVE/Hastelloy-C Insert Hastelloy -C (optional)
4	Packing	PTFE V-Rings
5	Seat Retainers	Graphite Reinforced Vinyl Ester
6	Thrust Washer	Graphite Reinforced PTFE
7	Ball	Ziconia Ceramic
8	Seat Inserts	Ziconia Ceramic
9	O-Rings	PTFE Coated Viton
10	Handle	PPA-FRP