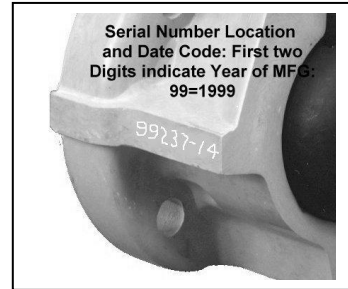
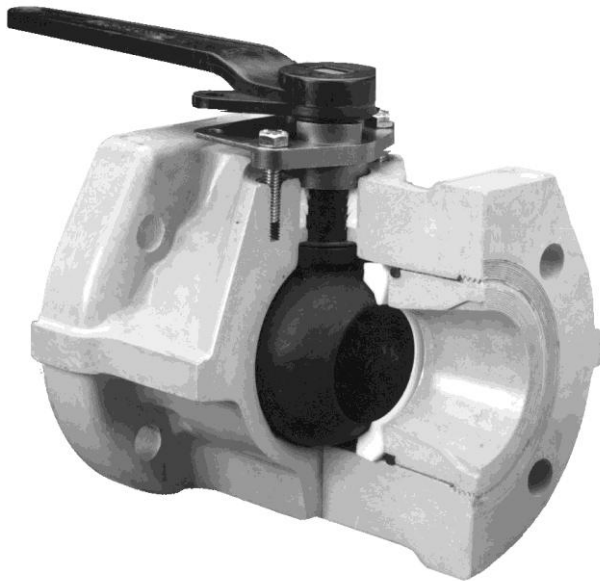


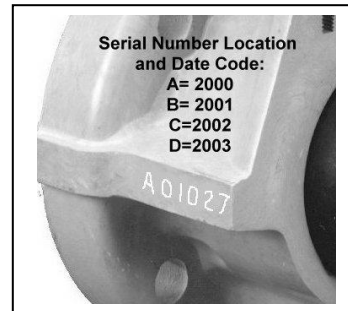


# Nil-Cor Flanged Ball Valves

Installation, Maintenance and Operating Instructions  
Series 300, 310, 410, 500XP and 610XP



Serial Number Date Code  
Prior to Jan. 2, 2000



**CAUTION:** Refer to the Nil-Cor Corrosion Guide, Catalog 1000, to verify suitability for chemical applications. Contact factory for assistance for chemicals not listed.

Nil-Cor<sup>®</sup> ball valves have been designed for easy installation, assembly and maintenance. 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. 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.

With the handle off, the gland is easily removed for access to packing. The ball and seats are retained by a threaded body insert that can be removed and can be serviced by maintenance personnel who routinely service metallic valves. In addition, since Nil-Cor ball valves are one-third the weight of metal valves, they are more easily and safely installed and maintained. All Nil-Cor valves are equipped with lockout devices as standard.

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## Site Storage Precautions

1. For outside site storage ensure valves or containers are wrapped in plastic or otherwise protected from ingress of dust or blowing sand. Do not remove flange covers.
2. Actuated or gear operated valves should be kept dry.
3. Inside warehouse storage requires no special protections.

## Installation

1. Fluid flow may be in either direction and the valve may be mounted in any position. When the valve terminates a line, the insert end should be positioned toward the flow direction (upstream side).
2. Pipe must be properly aligned and provisions made to minimize stress from thermal expansion. Always review pipe manufacturer's recommendations.
3. Expanded PTFE or 50 Durometer Rubber Full-Face gaskets are recommended.
4. Flange Bolts should be evenly tightened, using a torque wrench, in cross rotation to prevent flange damage. Refer to the table below for proper flange bolt torque. We recommend installation in piping systems with flat-faced flanges.
5. When installing against raised face flanges, spacer rings should be used to provide a flat surface to the face of the valve flange.
6. When washers are used under the nuts on flange studs, **AN960 Aeronautics Specification** washers should be used. Optional stainless steel washer kits meeting this specification are available from Nil-Cor.
7. After valve installation, the packing bolt torque should be checked to ensure the stem seal. Refer to the table below for the Packing Bolt Torque.

Valve Size	Flange Torque, Min-Max (ft-lbs)	Packing Torque, Min-Max (in-lbs)	Packing Rings (in addition to top and bottom adapter rings)
1"	20-25	20-40	2
1.5"	20-25	30-60	2
2"	20-35	35-70	2
2.5"	20-35	35-70	3
3"	25-35	50-100	3
4"	25-45	65-130	3
5"	25-40	65-130	3
6"	30-45	65-130	3
8"	40-50	65-130	3
10"	50-60	65-130	3

## Safety Precautions

**For your safety, it is important that these precautions be taken before removal of the valve from the line or before disassembly:**

- **Wear protective clothing or equipment appropriate for the particular fluid.**
- **Observe the precautions and follow the procedures in Disassembly Item 1.**

## Disassembly

1. Depressurize the line and valve as follows:
2. Open valve and drain the line.
3. Before removal from the line, cycle (open and close) the valve to relieve residual pressure in the body cavity.
4. After removal and before disassembly, cycle (open and close) the valve several times to clear it of fluid; then flush with water.
5. Open valve completely and remove handle.
6. Secure body in a clamping device, being careful not to damage or crush it.
7. Remove gland bolts from the valve body.
8. Use the Insert Removal Tool, sold separately, to unscrew body insert and remove ball, body insert gasket, (O-ring) and the upper ball seat.
9. Carefully push valve stem down into the valve body and withdraw it through the open end. Remove the thrust washer from stem.
10. Remove the lower seat.

## Assembly

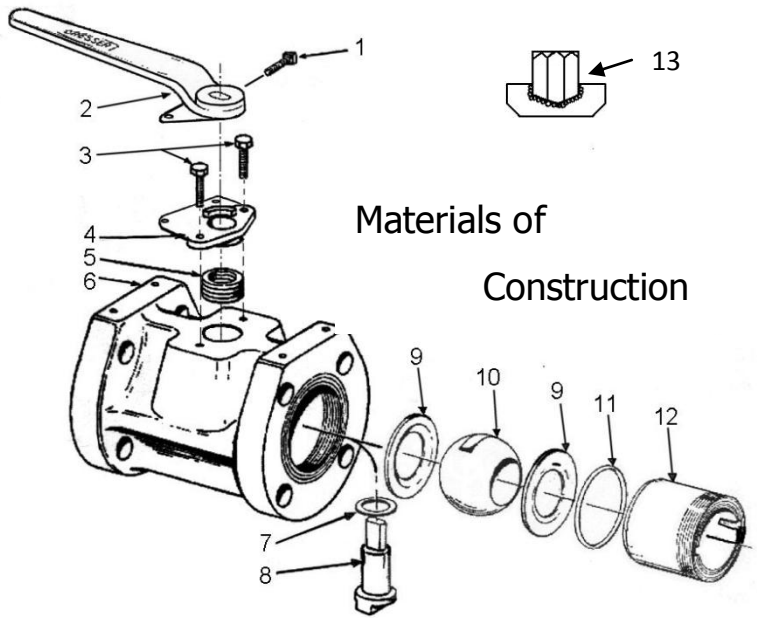
1. Inspect and clean all parts to make sure they are free of dust, grit or other material. New O-ring and ball seats should be used after the valve has been used in service and is reassembled.
2. A good lubricant compatible with the fluid service, such as silicone grease, should be applied lightly to seats, seal, ball, stem, and body insert threads.
3. Insert the lower ST or SR seat with the beveled side down.
4. With R-Seats, install with the O-ring side of the seat facing downward.
5. With CF seats, take care to align the notch in the CF-seat with the stem bore hole in the body bore so that the stem may turn freely in the notch, then, with the O-ring side of the seat facing downward, press one CF seat firmly into the valve body seat cavity. Care should be taken that the O-ring does not fall out or become misaligned inside the valve.
6. Assemble thrust washer on stem. Carefully insert upper end of stem into body of valve and maneuver into opening in top of valve. Push stem upward until thrust washer is seated.
7. While holding stem in position with one hand, slip gland packing into cavity around upper end of stem. See table at left for correct number of compression rings and adapter rings. Use the gland to press packing into place and slightly draw up the packing by tightening the gland bolts. Assemble valve handle to stem, insert cap screw and tighten hex nut.
8. Rotate stem so that stem bottom is aligned axially with the valve and ball can be fully inserted.
9. Place ball in body against seat, with ball in the closed position. Rotate stem and ball to the open position so that ball can not fall out.
10. Insert the upper ST or SR seat with the beveled side up, away from the ball.
11. With R-Seats, install with the O-ring side of the seat facing upward, toward the seat retainer.
12. In the case of CF seats, place second CF-seat into the body against the ball, with O-ring side up, again carefully aligning the notch in the seat to the stem bore, and the place the Body Insert O-ring in the body against the back of the seat.
13. Screw body insert into the valve body until flange serrations between body and insert are flush with each other.

14. Attach handle, being sure to line up stop on the gland with the raised stop on the handle. Carefully tighten handle setscrew to 48 in-lbs (4 ft-lbs.) max.
15. Cycle valve open and closed to turn ball slowly with a gentle back and forth motion, building gradually to a full quarter turn. By rotating slowly, the seat lips will assume a permanent seal shape against the ball and prevent damage to the seals.
16. If maximum torque levels are exceeded, the body insert should be installed in 2 or 3 steps as follows: Tighten the insert until about 1/4 inch still protrudes beyond the valve face, then operate the valve on and off several times as in step 10. Tighten the insert to about 1/32-inch from flush and operate valve several times. Tighten insert until flush with flange. Seat leak tests at 20 and 80 psi are recommended.
17. Gland bolts should be tightened as indicated in the table on page 2. If leakage should occur in service, adjustment is made by alternately turning each packing bolt 1/4 turn until the leak stops or the maximum packing torque is reached. (See Torque Table on preceding page.)
18. If the valve is gear-operated or automated, assemble the mounting bracket to the actuator, but do not fully tighten the cap screws.
19. Install the coupler into the gear or actuator drive. Be certain that the valve and actuator are in the corresponding position, i.e., for DA actuators, the drive should be in the full-clockwise position with the valve closed. For SR actuators, be certain the ball is the position corresponding to the desired actuator air-fail position. The axis of the actuator cylinder should align with the axis of the valve bore.
20. Bring the actuator, bracket and coupler down onto the valve, being certain that the coupler properly engages the stem. Visually align coupler and stem.
21. Install and tighten the flange mounting cap screws. Tighten the actuator mounting screws.
22. Apply air and test operation.

## Maintenance

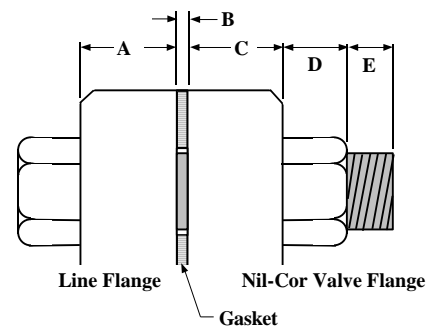
Periodic observation is recommended to ensure that the valve is functioning well. The frequency of observation depends on the application. Adjustment to stem gland packing should be made periodically to compensate for wear and packing consolidation.

Nil-Cor Ball Valve Flange Bolt Lengths							For Metal Flanges	For FRP Flanges
SIZE	A (FRP)	B	C	D	E	No.	Size and Length	Size and Length
1"	0.875	0.13	0.88	0.5	0.2	4	1/2-13 UNC x 2.25"	1/2-13 UNC x 3.25"
1.5"	1.188	0.13	1.00	0.5	0.2	4	1/2-13 UNC x 2.5"	1/2-13 UNC x 3.5"
2"	1.188	0.13	1.00	0.63	0.2	4	5/8-11 UNC x 2.75"	5/8-11 UNC x 3.5"
2.5"	1.188	0.13	1.19	0.63	0.2	4	5/8-11 UNC x 3.0"	5/8-11 UNC x 3.5"
3"	1.188	0.13	1.36	0.63	0.2	4	5/8-11 UNC x 3.5"	5/8-11 UNC x 4.0"
4"	1.5	0.13	1.50	0.63	0.2	8	5/8-11 UNC x 3.75"	5/8-11 UNC x 4.25"
5"	1.6	0.13	1.50	0.76	0.2	8	5/8-11 UNC x 3.75"	5/8-11 UNC x 4.5"
6"	1.6	0.13	1.63	0.76	0.2	8	3/4-10 UNC x 4.0"	3/4-10 UNC x 4.75"
8"	2.06	0.13	1.75	0.76	0.2	8	3/4-10 UNC x 4.5"	3/4-10 UNC x 5.0"
10"	3.06	0.13	2.00	0.89	0.2	12	7/8-10 UNC x 4.75"	7/8-10 UNC x 6.5"



## Materials of Construction

1. **Setscrew:** Stainless Steel.
2. **Handle:** VE FRP (1"-4"). All handles have locking provision.
3. **Gland Bolts:** Hastelloy-C.
4. **Gland:** Hastelloy-C with integral locking plate.
5. **Stem Packing:** Chevron style PTFE.
6. **Body:** Solid construction of fiberglass or graphite reinforcement and resin matrix.
7. **Thrust Washer:** Glass and carbon-filled PTFE.
8. **Stem:** Hastelloy-C metal insert with molded composite on all wetted surfaces.
9. **Seats:** Virgin PTFE. Glass-filled and cavity-filler seats available.
10. **Ball:** Solid construction of fiberglass or graphite reinforcement and same resin as body.
11. **Seals:** PTFE-coated Viton O-ring.
12. **Insert:** Solid composite, same as body material.
13. **Insert Removal Tool**

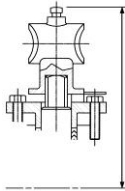
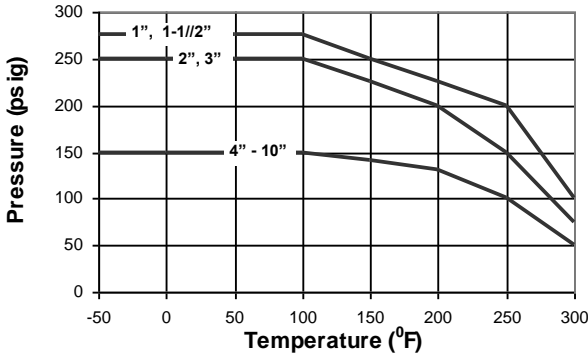


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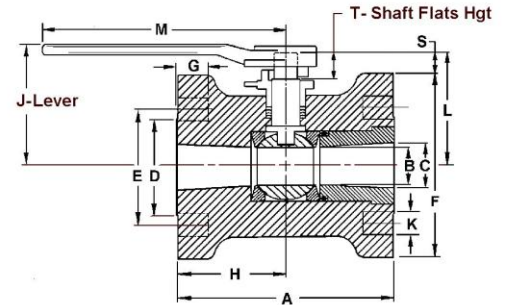
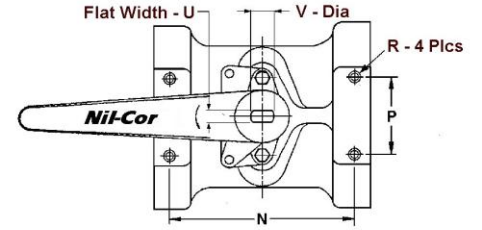
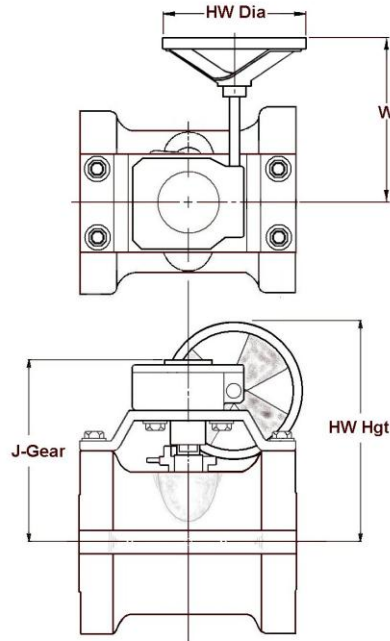
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# Flanged Ball Valve Dimensions

**Pressure/Temperature Rating**



J-For 6", 8"  
Handle  
Adapter only



Valve Size	A	B	C	D	E	F	G	H	J-Lever	J-Gear	HW Dia	HW Hgt	K	K (QTY)	L	M	W
1"	5.00	.88	1.00	2.25	3.13	4.25	.88	2.50	3.08	5.60	8	8.00	.62	4	2.77	6.25	6.32
1-1/2"	6.50	1.25	1.50	3.00	3.88	5.00	1.00	3.25	3.73	6.53	8	8.92	.62	4	3.55	6.25	6.32
2"	7.00	1.50	2.00	3.66	4.75	6.00	1.00	3.50	4.18	6.71	8	9.11	.75	4	3.96	9.00	6.32
2-1/2"	7.50	1.88	2.50	4.25	5.50	7.00	1.19	3.75	5.44	8.52	8	10.92	.75	4	5.17	9.00	6.32
3"	8.00	2.31	3.00	5.00	6.00	7.50	1.36	4.00	5.58	8.52	8	10.92	.75	4	5.42	9.00	6.32
4"	9.00	3.00	4.00	6.19	7.50	9.00	1.50	4.50	7.05	9.56	8	11.96	.75	8	6.50	11.44	6.32
5"	10	3.75	5.00	7.50	8.50	10.00	1.50	5.00	7.75	11.08	12	14.46	.88	8	7.21	<b>Note 4</b>	7.39
6"	10.50	4.50	6.00	8.50	9.50	11.00	1.63	5.25	10.51	11.58	12	14.96	.88	8	7.91	<b>Note 4</b>	7.39
8"	11.50	6.00	8.00	11.25	11.75	13.50	1.75	5.75	11.77	13.00	12	17.11	.88	8	9.21	<b>Note 4</b>	8.77
10"	13.00	7.50	10.00	14.00	14.25	16.00	2.00	6.50	NA	13.64	18	17.50	1.00	12	11.10	<b>NA</b>	8.77

Valve Size	Actuation Mounting Dimensions							Actuation Torque (in-lbs.)			Weight (lbs.)		
	N	P	R x (deep <sup>1</sup> )	S	T	+0.000-.010 U	+0.000-.010 V	Valve Running Torque <sup>(2)</sup>	Breakaway Torque <sup>(3)</sup> 0-100 psi	Breakaway Torque <sup>(3)</sup> >100 psi	Flow Coeff. Max Cv	w/o Gear (lbs.)	With Gear (lbs.)
1"	4.18	1.75	5/16 - 18 x 1/2	0.64	0.50	0.375	0.500	90	140	160	75	3	9
1-1/2"	5.62	1.75	5/16 - 18 x 1/2	1.05	0.70	0.375	0.500	125	190	230	115	6	12
2"	6.18	2.25	5/16 - 18 x 5/8	0.96	0.75	0.375	0.625	150	230	270	135	8	15
2-1/2"	6.62	2.63	3/8 - 16 x 3/4	1.67	0.75	0.50	0.88	260	400	475	250	13	20
3"	7.12	3.50	3/8 - 16 x 3/4	1.67	0.75	0.500	0.875	370	570	680	350	14	21
4"	8.00	4.00	7/16 - 14 x 7/8	2.00	1.13	0.750	1.000	680	1040	1250	540	23	30
5"	9.00	4.75	7/16 - 14 x 7/8	2.21	1.13	0.75	1.00	1000	1570	1825	1000	33	46
6"	9.00	5.25	7/16 - 14 x 1-1/8	2.41	1.13	0.750	1.000	1400	2100	2400	1240	40	53
8"	9.75	6.00	7/16 - 14 x 1-1/8	2.46	1.13	1.094	1.250	2800	4200	4800	1700	65	90
10"	11.25	7.75	1/2 - 13 - X 1-1/8	3.10	1.13	1.258	1.438	4100	6300	7200	2600	100	125

1. Minimum thread engagement required to develop design joint strength on the actuator mounting pad (composite valve body).
2. Flowing fluid, ball in motion between 0 and 90 deg.
3. Maximum breakaway torque for clean liquid service.
4. For manual 5"-8" size, use handle adapter or gear operator. Gear only on 10"

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