

Ball valves for all applications with an anti blow-out stem, a fire safe design and an automatic relief body cavity.

1. General

For the safety and reliability of ball valve delivered by Raimondi, we recommend you to follow the directions for use described in this manual.
Proper maintenance is a guarantee for a correct operation of the equipment.

2. Subject

This manual deals only with the maintenance of Raimondi valves.
The electrical, pneumatic or hydraulic actuators are described in their own maintenance manuals supplied by their manufacturers.

3. Storage

Each valve is protected in our workshop by means of:

- Plastic plugs on both ends (temporary)
- Peel-off varnish on the clamps (temporary)
- An external painting
- The lubrication of the passage port (temporary)

The temporary protections have to be removed before installing the valve on the pipe.

4. Operation/utilization

4.1. The valves must be installed in open position (as delivered)



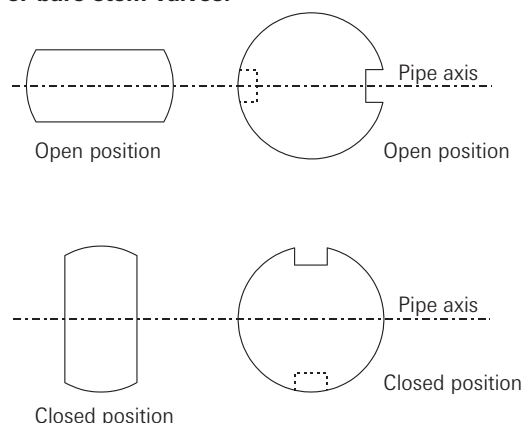
Warning

Do not operate the valves before the line is cleaned. Do not keep the valves in middle position.

The seats would be damaged and tightness would be altered. The normal positions are: open position or closed position.

4.2. The closing or opening of the valve is obtained by a 90° rotation of the ball/stem assembly. The valve is closed clockwise. The position of the ball ("open" or "closed" position) is indicated as follow:

For bare stem valves:



For gear operated valves:

With a position indicator fitted at the top of gear

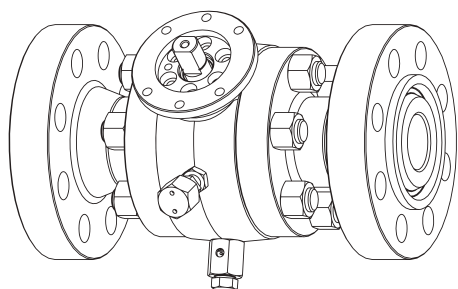
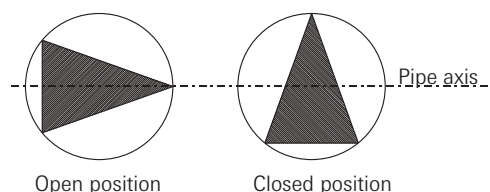


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5. Overhaul procedures

(See also drawing Appendix B)

5.1. External leaks (location and repair)

In most cases, a simple check is sufficient to locate and correct the defects.

5.1.1. Checking for external leaks

These leaks may occur:

- On the flange/body interface (seal) (106) (115).
- On the screwed fittings (injections, relief plug or valves, drain plug or valve) (108), (118), (602), (605).
- On the upper stem seals (100) (102) (116) (56).
- On the lower stem seals (111) (128).

5.1.2. Repairing external leaks

5.1.2.1. Flanges/ body interfaces

In this case, it is necessary to remove the parts as follows:

- remove the valve in open position
- remove the gear operator and actuator if necessary.
Mark with indelible ink the position of the flange with respect to the body.
- disconnect the flange(s) (2) after having unscrewed the nuts (113).
- replace the seal(s) (106 or/and 115) after having cleaned the grooves.
- reinstall the flange(s) (2) after having cleaned the seals bearing surface in the body.
Before reinstalling, slightly lubricate the O-ring (106) with "Elf Proteran DN35X" lubricant or equivalent.
- reinstall and tighten the nuts (113) according to the tightening torque values mentioned in Appendix A tables.

5.1.2.2. Screwed fittings (injections, relief plug or valves, drain plug or valve) (108), (118), (602), (605).

If there is any leak at the screwed fittings, simply tighten them slightly to obtain a good seal.

5.1.2.3. Stem (upper and lower)

If there is any leak at the stems, correct as follows:

- 5.1.2.3.1. For valves with a gel injection device (on the upper stem only) inject sealant in order to obtain a good seal (type Desco 800, Chemola or equivalent). As soon as possible, recondition/replace the seals according to the procedure described hereafter.
- 5.1.2.3.2. For valves without gel injection device and valves the replacement of the seal(s) is (are) necessary.

To replace these parts, it is MANDATORY that there is no pressure at the stem.

For this purpose:

- Either isolate the valve from the system and bleed it with the pressure relief plug or drain plug (108 or 118) (main valve in open position or closed position).
- Or "close" the valve and bleed it with the pressure relief plug or drain plug (108 or 118) of the dead chamber.



Warning

Do not change a packing gland or rod seal if the pressure relief plug or valve (108 or 118) is not in open position or if bleeding cannot be obtained.

Do not confuse the pressure relief plug or valve (108 or 602) and the drain plug or valve (118 or 605).

Then proceed as follows:

For the upper stem

- Remove the actuator, the gear operator or the lever.
- Remove the key (127) or the stopper spring (119) for lever operated valves.
- Remove the quarter-turn stop plate (7) for lever operated valves.
- Remove the Allen screws (101).
- Mark the position of the adaptor flange (9) or the cap (6) with respect to the body.
- Remove the adaptor flange (9) or the cap (6) by sliding it axially to extract the shear pin (117).
- Remove the seals (100, 102 and 129) (primary sealing) and if necessary the seals (56 and 116) (secondary sealing, fire safety).
- Before reinstalling the new seals, carefully clean the parts and the sealing surfaces.
- If there is any corrosion on these surfaces, use an emery paper grade 500 or 1000 to obtain a clean and smooth surface (maximum surface roughness Ra 1.6). Clean carefully.
- Dry install the scraper ring (129) into its housing. Slightly lubricate the internal surfaces of the ring with "Elf Proteran DN35X" lubricant or equivalent.
- Carefully install the lip seals (100) into the recess in the body. Slightly lubricate it before installing. Do not use any metallic tool which could damage the seal.

- Reinstall the adaptor flange (9) or cap (6) taking into account the shear pins and observing the marks made during removal.
- The tightening torque values of Allen screws are mentioned in the table of Appendix A.

For the lower stem:

- Remove the Allen screw (122).
- Mark the position of the lower stem (5) on the body (1).
- Remove lower stem by sliding it axially.
- Remove the seals (111 and 128).
- Before reinstalling the new seals, carefully clean the parts and the sealing surfaces.
- If there is any corrosion on these surfaces, use an emery cloth grade 500 or 1000 to obtain a surface consistent with Ra 1.6 maximum surface roughness. Clean carefully after sanding.
- Lubricate slightly the O-ring (111) with "Elf Proteran DN35X" or equivalent.
- Check that the anti-static device (179) is into its housing.
- Check lower stem bearing.
- Slightly fit the lower stem by sliding it axially into body (1).
- Tighten Allen screws (122) according to tightening torque values of Appendix A tables.

5.2. Internal "in line" leaks

To check the tightness of the line, a simple test can be carried out the valve must be fitted with a pressure relief plug or valve (108 or 118) and must be in closed position.

Typical procedure:

After complete closing of the valve, depressurize the internal volume of the "body" by means of the pressure relief plug or drain plug (108 or 118). This depressurization must be performed gradually and completely.

This operation may be dangerous if any toxic or dangerous liquid is used. In this case, the regulations applicable to the site must be strictly observed.

When the pressure relief device is in open position, a volume equal to the leakage of one or two seats according to the pressure differential of the valve will be delivered.

Example:

If the upstream pressure amounts to 100 bar and the downstream pressure is 0, the leakage will have to be considered on the upstream seat. If the upstream pressure amounts to 100 bar and the downstream pressure is 50, the leakage will have to be considered on the upstream and downstream seats.

If the leakage rate is not permissible and if it cannot be reduced by the gel-injection device, or by adjusting the ball closing position (stoppers on gear and actuated valves) the seats, and if necessary the ball, must be replaced.



Warning

This operation can only be performed with a pressure relief device. Do not use the drain plug to relieve the cavity.

5.3. Restoring the line tightness

- 5.3.1. Use "HPA line sealing kits" consisting of item 11 (11A), 10, 109, (if safety fire valve item 53 is used).
- 5.3.2. Before removal, it is necessary to apply following preliminary procedure.
 - 5.3.2.1. Before removing the valve from the piping, mark the initial position of the assembly with indelible ink (up stream, down stream, up/down). Bleed the line, put the valve in open position.
 - 5.3.2.2. Remove the gear operator or the actuator system and follow the instructions given by the manufacturer of the equipment if necessary.
 - 5.3.2.3. Mark with indelible ink the flange/body position of the valve and the lateral sides of the flanges in order to preserve this correct position when reinstalling.
 - 5.3.2.4. Set-up the lifting slings and transport the assembly in accordance with the elementary precautions applying to this type of equipment.
 - 5.3.2.5. Completely bleed the internal volume by opening the pressure relief general device (108 or 118) of the body provided for that purpose.
 - 5.3.3. Disassembly of the valve and re-assembly
 - 5.3.3.1. Disconnect the flanges (2) by unscrewing the bolts and nuts (112 and 113).

5.3.3.2. Check carefully:

- The sealing contact area of the seats (11A) (scores, creepling, sinking). The sealing contacts may not be scored or damaged and must be recessed with respect to the metallic support (see drawing Appendix B).
- The surface of the ball. The part in contact with the seat may not be damaged and may not show any scores or impact marks.
- O-ring at back section of seat (109).

It must not be porous or broken and the contact surface must not show any scores or corrosion marks.

After these check, three cases may occur:

Case Nr. 1

The ball and the seats are not damaged, the O-ring item 109 is defective.

Case Nr. 2

The ball is not damaged, the seats are defective.

Note: the O-ring must be systematically replaced with the seats, we recommend also to change the seats spring washers (10).

Case Nr. 3

The ball is damaged and the seats are consequently also damaged.

5.3.3.3. Repairing

Case Nr. 1

- Replace the seal (109 and/or 53) of the seat (11) and lubricate it slightly with "Elf Proteran DN35X" lubricant or equivalent.
- If necessary, sandpaper the surface of the flange in contact with the seal (109) and clear it carefully.
- Install the seat in the flange after having installed the spring washer (10). This operation must be performed very carefully in order not to damage the O-rings (109).
- Body/flanges seal (see paragraph 5.3.1)
- Reinstall the flanges (2) after having cleaned the seals in the body. Before reinstalling, slightly lubricate the O-ring (106).
- Reinstall and tighten the nuts (113) according to the torque load mentioned in Appendix A tables (see also paragraph 6).

Case Nr. 2

- Apply the same procedure but with a new seat (11) and new spring washer (10).

Case Nr. 3

- Carry out procedure described in Cases Nr. 1 and Nr. 2 for the removal of flanges and the replacement of seats.
- Remove the adaptor flanges (9) according to procedure paragraph 5.1.2.3.2.
- Remove the lower stem according to paragraph 5.1.2.3.2.
- Put the ball in open position.
- Attach the upper stem with a flexible sling through the passage or put stem axis in horizontal position to avoid it to fall down into body access.
- Remove the ball from the body.
- Install a new ball.
- Put the ball in open position.
- Reinstall the flanges (2), the bolts (112) and nuts (113).
- Reinstall the lower stem.

All bolts must be tightened following diametrically opposite positions, as usual with all bolted devices fitted with seals

Tightening torque values: see tables of Appendix A.

6. Seat replacement

- 6.1. Remove a flange (2) by unscrewing assembly bolts (112) and nuts (113).
- 6.2. Remove the flange by acting axially. Carry out this operation very carefully.
- 6.3. Remove the flange seat assembly:
 - Flange seal (106), safety fire (115)
 - Seat (11)
 - Seat O-ring (109)
 - Seat spring washer (10)
- 6.4. Reinstall the O-ring (109) on seat (11). Place the spring washer (10) on the flange. Engage the seat in the flange.
- 6.5. Place the flange O-ring (106) in its housing and if necessary, the graphite seal (115) for fire safety valve.
- 6.6. Replace the flange on the body and observe the previously plotted orientation
- 6.7. Put the nuts on the assembly bolts. Screw manually until obtaining proper contact between nut and flange. The bolts may not be lubricated if a torque load is applied.
- 6.8. Rotate the ball to the closed position
- 6.9. Gradually tighten nuts and bolts. Apply the tightening torque values specified in the tables of Appendix A.
- 6.10. Overhauling of the second side of the valve is carried out by repeating the previously described procedure
- 6.11. Reinstall the lever, gear operator or actuator.

7. Upper stem replacement

Remove the upper part according to paragraph 5.1.2.3.2.

Remove the flanges according to paragraph 5.1.2.1.

Remove the ball according to paragraph 5.3.3.

Pull the stem from inside

- Check if the bearings (104 and 105) and the thrust bearing (8) are damaged if necessary replace them.
- Before replacing the new stem, reinstall the bearings (104 and 105) if it has been changed.
- Reassemble the valve according to paragraphs 5.1.2. / 5.3.3.

8. Lower stem replacement

- Unscrew the Allen screws (122).
- Check if the bearing (120) and the O-ring (111) and/or the graphite seal (128) are damaged, if necessary replace them.
- Reinstall Allen screw (122) according to the tightening torque specified in Appendix A tables.



Warning

When installing or removing any parts, take care when adjusting the open or closed position of the valves. These operations must be carried out before reinstalling the valve into the line.

Tightening torque for bolts

Bolts material

For standard applications
ASTM A 193 Gr B7
ASTM A 320 Gr L7

For NACE MR0175 applications
ASTM A 193 Gr B7m
ASTM A 320 Gr L7m
ASTM A 320 Gr B8m cl2
ASTM A 193 Gr B8m cl2

Ø screw	Tightening torques (Nm)		Tightening torques (Nm)	
	min	max	min	max
8	16	24	10	20
10	32	48	30	40
12	55	80	40	60
14	90	130	70	100
16	135	200	100	150
18	180	270	140	200
20	255	380	200	300
22	340	510	250	380
24	440	660	350	520
27	640	960	480	720
30	800	1200	600	900
33	1180	1760	800	1320
36	1520	2270	1140	1700
39	1940	2910	1450	2180
42	2410	3610	1920	2880
45	2990	4480	2350	3520
48	3600	5400	2700	4050
52	4620	6940	3460	5190
56	5780	8670	4330	6500
60	7220	10830	5410	8120
64	9020	13530	6760	10150
68	11060	14380	8290	12440

Note

The torque values are valid only for non-greased bolting.

Tightening torque for bolts with PTFE coating

Bolts material

For standard applications
ASTM A 193 Gr B7 + PTFE coating
ASTM A 320 Gr L7 + PTFE coating

For NACE MR 0175 applications
ASTM A 193 Gr B7m + PTFE coating
ASTM A 320 Gr L7m + PTFE coating
ASTM A 320 Gr B8m cl2+ PTFE coating
ASTM A193 Gr B8m cl2 + PTFE coating

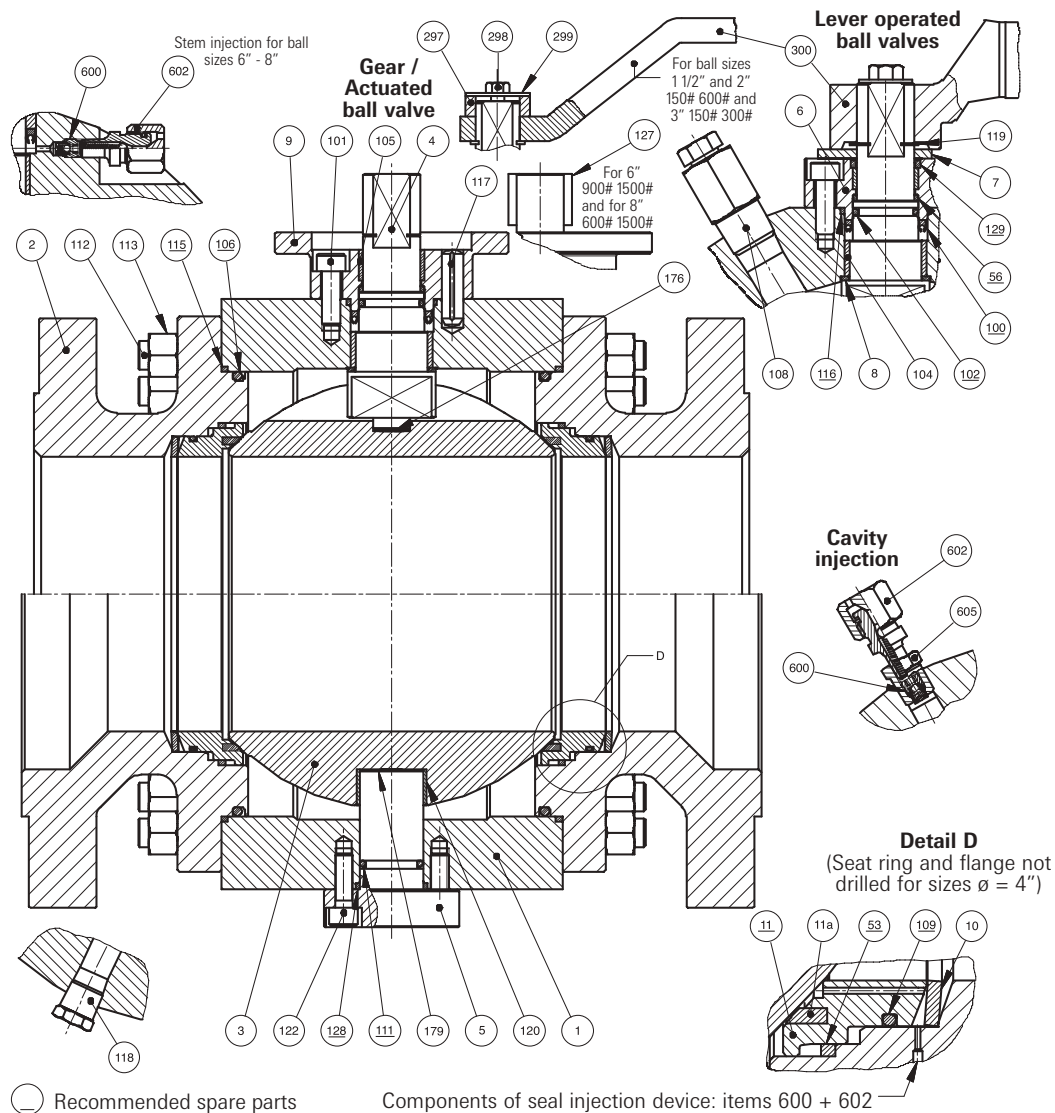
Ø screw	Tightening torques (Nm)		Tightening torques (Nm)	
	min	max	min	max
8	12	18	7,5	11,25
10	24	36	23	30
12	41	60	30	45
14	68	98	36	75
16	102	150	75	112,5
18	135	203	105	150
20	192	285	150	225
22	255	383	188	285
24	330	500	263	390
27	480	720	360	540
30	600	900	450	675
33	885	1320	600	990
36	1140	1705	885	1275
39	1455	2185	1090	1635
42	1808	2710	1440	2160
45	2243	3360	1770	2640
48	2700	4050	2030	3040
52	3465	5210	2600	3895
56	4335	6500	3250	4880
60	5415	8130	4060	6090
64	6765	10150	5070	7620
68	8295	10785	6220	9330

Note

The torque values are valid only for non-greased bolting.

Raimondi Ball Valves - type HPA - 150# to 1500#

Installation & Maintenance Instructions - Appendix B



Notes

Fire safe according to API 6FA, API 607 and BS 6755 part 2.

(1) Injection feature: 2", 3", 4" (FB) = Cavity injection

6", 8" (FB) = Stem injection (Qty = 1) and Seat injection (Qty = 2) (1 per seat)

(*) Quantity according to valve size and pressure class

Parts list

Item	Qty	Designation	Material	Notes	Item	Qty	Designation	Material	Notes
1	1	Body			112	(*)	Bolt		
2	2	Flange			113	(*)	Nut		
3	1	Ball			115	2	Flange fire safe seal		
4	1	Stem			116	1	Adaptor fire safe seal		
5	1	Trunnion			117	2	Pin		
6	1	Cap			118	1	Drain plug		
7	1	Stop plate			119	1	Circlip		
8	1	Thrust bearing			120	1	Trunnion bearing		
9	1	Adaptor flange			122	(*)	Allen screw		
10	2	Seat spring washer			127	2	Shaft key		
11	2	Seat			128	1	Trunnion fire safe seal		
11a	2	Seat insert			129	1	Scraper		
53	2	Seat fire safe seal			176	1	Anti-static device		
56	1	Stem fire safe seal			179	1	Anti-static device		
100	1	Lip seal			297	1	Spacer		
101	(*)	Allen screw			298	1	Screw		
102	1	Stem O-ring			299	1	Washer		
104	1	Stem bearing			300	1	Lever		
105	1	Stem bearing			600	•	Mini check		(1)
106	2	Flange O-ring			602	•	Injection plug		(1)
108	1	Relief plug			605	•	Injection fitting part		(1)
109	2	Seat O-ring							
111	1	Trunnion O-ring							