

Installation, Operating & Maintenance

3-Piece Trunnion Mounted Valve

Series included:

Series 91 - ANSI 150/PN20

Series 92 - ANSI 300/PN50

Series 93 - ANSI 600/PN100

Series 94 - ANSI 900/PN150

Series 95 - ANSI 1500/PN250

Series 96 - ANSI 2500/PN400

Sizes Included:

2"-12" (DN50 – DN300)



1. General

This Installation, Operating & Maintenance manual presents the instructions required for safe use of Habonim 3-piece trunnion mounted ball valves type 91-96 series. The manual relates to reduced bore and full bore. Before using any of these series valves, read the entire IOM carefully and make sure you understand everything. Where in doubt, please consult with Habonim Engineering team.

WARNINGS & SAFETY INSTRUCTIONS

Habonim cannot anticipate all of the situations a user may encounter while installing and using Habonim valves. The user **MUST** know and follow all applicable industry specifications on the safe installation and use of these valves. Misapplication of the product may result in injuries or property damage. Refer to Habonim product catalogues, product brochures and installation, operating and maintenance manuals for additional product safety information or contact Habonim.

1. Keep hands and objects away from the valve ports at all times. Actuated valves could be accidentally operated, resulting in serious injury or valve damage.
2. Before removing a valve from the line, always make sure the line has been depressurized and drained. Cycle the valve a few times to relieve any pressure that could be trapped in the body cavity.
3. Utmost caution must be taken when handling a valve that has toxic, corrosive, flammable or a contaminant nature media flowing through its pipeline. The following safety precautions are recommended when dismantling valves with hazardous media:
 - d. Wear eye shield, protective headgear, clothing, gloves and footwear.
 - e. Have available running water.
 - f. Have a suitable fire extinguisher when media is flammable.
4. Do not try to operate a valve that exhibits any sign of leakage. Isolate the valve and either repair or replace it.
5. Do not use or substitute non Habonim components or parts in Habonim valves and assemblies.

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2. SIL

Under normal operating conditions the Habonim valve should be inspected for proper functioning and signs of deterioration every 6 months. Under severe operating conditions inspection should be more frequently; detected defects should be repaired promptly.

Severe operating conditions can be defined as:

- Flow velocity higher than 5 m/sec for liquids, and 200 m/sec for gaseous
- Acidic media PH < 5 or alkaline media PH > 9

Habonim recommend a proof test interval of 12 months; in case of Fail to Open ESD system a partial stroke is acceptable to confirm that the installation is functioning properly.

For ESD systems with a Fail-To-Close demand, it is necessary to plan a system shut-down; de-energize the system and inspect the valve turning to its fully closed position.

It is essential to log-in the following parameters on site QA records as a proof for preserving SIL capabilities: date, hour, name and signature of the responsible engineer, air pressure on site, time to close the valve, time to open the valve.

Habonim recommend valve full maintenance operation every 7 years. (Refer to para. (8) in this IOM for maintenance instructions). The combined corrosion and erosion allowance for the valve body wall thickness is 3mm. When this allowance has been eroded or corroded, mechanically removed or otherwise, the valve should no longer be used. Inspect the valve wall thickness every time the valve is maintained. Refer to Habonim Corrosion Data Chart T-614 to determine the corrosion rate for your application.

The estimated mean time to repair (MTTR) a valve, i.e. time net (line draining or cooling down time excluded from the valve MTTR) of replacing old valve with a new one is 8 hours. Maintenance team must read and understand the Habonim product IOM before starting the operation. In case of a doubt please consult the Habonim engineering team.

When a valve has been repaired or any maintenance is performed, check the valve for proper function (proof testing). Any failures affecting functional safety should be reported to the Habonim factory.

Client should consult the Habonim factory in order to obtain the product assessment, FMEDA report, and other associated statistical data to satisfy SIL level.

3. Limitations

The correct selection of materials of construction, seats and seals, internal valve components and pressure/temperature ratings determines the safe use of the valve and the particular performance requirements for the application. This information can be found on the nameplate welded/riveted to the valve body.

As the extent of applications that these valves can be used in, is large, it is not possible to cover all installation and maintenance instructions for service of the valves. It is the user's responsibility to use the valves as recommended and in accordance with the pressure and temperature limits as indicated on valve tag. Where in doubt, please consult with Habonim.

Any unstable fluid or gas should be identified by its manufacturer and must not be used with Habonim valves.

CAUTION:

The valves should be used in a well designed, adequately protected system to ensure that external and internal pressure and temperature limits do not exceed the valve limits.

Valve surface temperature may become extremely hot or cold due to ambient or operating conditions. Prevent any type of direct contact with the valve that may cause harm or injury. Avoid direct contact with the valve by wearing protective gloves. The valves should be used in a well designed, adequately supported piping system such that it will not be subjected to undue forces, stresses or shock loads during service.

The valves are not designed to operate during or after earthquakes or under fatigue conditions. It is the responsibility of the owner to determine if fatigue conditions exist.

Do not allow dust layers to build up on the equipment.

The process fluid temperature shall not exceed the ignition temperature of the dust.

4. Storage

Prior to storage, inspect the valve for shipping damage. Keep all protective packaging, flange covers and end caps attached to the valves during storage. It is recommended to keep the valves in a clean and dry environment until ready for use.

5. Long term storage

- 5.1. It is advisable to store the valves in waterproof conditions. Ball valves should be protected to safeguard against humidity, moisture, dust, dirt, sand, mud, salt spray, and sea water.
- 5.2. Manual ball valves must remain in the open position during the period of storage.
- 5.3. Actuated valves (fail to close position) remain in closed position during this time.
- 5.4. Valves may be stored as shipped, provided the above storage location and equipment orientation instructions are followed
- 5.5. In order to prevent damage, protective covers on valve ends should not be removed until immediately prior to installation.
- 5.6. Visual inspection should be performed on a semi-annual basis and results recorded.
- 5.7. If the actuated valve (fail to close position) is planned for long storage after dispatch it will be necessary to operate once in 6 months for fully open/close position.
- 5.8. Ball valves should be operated for at least two complete cycles before installing or returning to storage.

6. Installation

The installation procedure for ball valves is critical to ensuring both long life and satisfying performance. Valves stored on site awaiting installation should be kept in their original packing, in dry conditions, where damage cannot occur (see para. (4) & (5)). Before carrying out the installation, it is important to follow the basic procedures described below:

6.1. General

- 6.1.1. It is essential to flush the line prior to assembling any valve on the line.
- 6.1.2. Carefully unpack the valve and check valve nameplate for identification of materials (see **Figure 9**).
- 6.1.3. Remove all packing materials.
- 6.1.4. Check the valve for any flow direction indication marks. Appropriate care must be taken, to install the valve for proper flow orientation.
- 6.1.5. Inspect the valve interior through the end ports to determine it is clean and free from foreign matter according to ASME G93-03E1.
- 6.1.6. Cycle the valve and inspect any functionally significant features.
- 6.1.7. Read all the literature and note any special warning tags or plates attached to the valve.
- 6.1.8. Before installation check to insure the ball is in the fully open position in order to prevent possible damage to the ball and seats. The valve performance depends on its original conditions. At any stage do not leave the valve in the partially open position.

6.2. Threaded End Valves

- 6.2.1. Valves with threaded ends should be treated as a single unit and should not be dismantled when installing to pipeline.
- 6.2.2. Before installing the valves, make sure that the threads on the mating pipe are free from excessive grit, dirt or burrs.
- 6.2.3. When tightening the valve, apply a pipe wrench or spanner to the end connector closest to the pipe being worked, using standard piping practices.
- 6.2.4. Use appropriate joining sealants material in correct quantities.
- 6.2.5. If "back-welding" is required on threaded end valves, refer to the instructions for Weld End valves or to the "Habonim Welding Instructions" bulletin.

6.3. Weld End Valves in-line

- 6.3.1. Welding of valves shall be performed by a qualified person according to the ASME Boiler Construction Code Section IX. For valves to be welded within the EEA, refer to the requirements of ESR 3.1.2 of the Pressure Equipment Directive 97/23/EC.
- 6.3.2. Valves that will be welded directly to the line must be in the fully open position to protect the ball and seats from excessive temperatures during the welding procedures.
- 6.3.3. Protect or remove actuators from weld splatter or arc strikes. Valves in the "Fail Close" position should be cycled to the open position.

- 6.3.4. Allow free flow of water through the drain bottom valve and overflow through the vent valve to prevent overheating all through the welding process. **DO NOT** heat the center section over 150°C (300°F).
- 6.3.5. Align valve to pipe line, ensuring proper fit to minimize pipe load. Tack weld only.
- 6.3.6. Complete welding in small segments. Allow enough time for cooling between each segment.
- 6.3.7. Do not rotate the valve before flushing the line.

6.4. Flanged End Valves

- 6.4.1. Valves with flanged ends should be treated as a single unit and should not be dismantled when installing to pipeline.
- 6.4.2. Before installing the valves, make sure that the flanges on the mating pipe are free from excessive grit, dirt or burrs, and that there is no mechanical damage to the flanges on the pipe.
- 6.4.3. When inserting the flange bolts, make sure the bolts are correct size to hold pressure and axial forces.

7. OPERATING INSTRUCTIONS

Habonim Valves provide tight shut off when used under normal conditions and in accordance with Habonim's published pressure/temperature chart. If these valves are used in a partially open (throttled) position, seat life may be reduced. Consult with Habonim for the proper seat material selection.

Valve operation works by operating the valve handle 90° turn counter-clockwise to open, and 90° turn clockwise to close.

All standard valves are bidirectional and as such, can be installed for flow in either direction. Valves which are unidirectional will have a flow direction arrow welded to the body and separate assembly instructions.

A lubricant is applied through grease fittings on both ends and gland, to assist valve break in. The lubricant, if unacceptable, may be removed by a solvent wash.

If a shut-off valve is installed for end of line service, it must be ensured that it is closed with a blind end connection and the valve is secured against being opened unintentionally.

WARNING: Never look into the valve bore while the valve is in a flow-line. Pressure and fluids could escape from the valve causing injury.

To prevent leakage, malfunctions resulting from internal wear or seal degradation, the user must establish a preventive maintenance and inspection program. This program must include:

- a. Inspection of parts to detect loss of wall thickness which may result in decreased pressure capacity (see para. 2 for acceptable reduction of wall thickness).
- b. Routine replacement of seals and inspection for proper operation (See para. 7 for maintenance instructions).

The valve operating torques, as published in the Habonim literature, are the normal expected maximum break-away torques. These torques have been confirmed by laboratory testing of each valve under controlled conditions. Highly viscous or abrasive media, frequency of operation and temperature fluctuations could cause an increase in valve torque.

8. Maintenance

HABONIM valves have a long and trouble free life, and maintenance is seldom required. When maintenance is necessary, valves can be refurbished on site.

To extend valve performance and reduce possible plant problems, the following procedures should be followed:

- 8.1. If the valve is removed from the line and disassembled, replacement of all seats and seals is recommended using the appropriate Habonim Repair kit. Examine all metallic sealing surfaces such as ball, stem, and the surfaces on the end connectors that contact the seats for wear, corrosion or damage.
- 8.2. For valves at size 8" DN200 and above (reduced bore) or 6" DN150 (full bore) and above, grease can be applied to the seats with MOLIKOTE 33 from the grease fittings on valve ends.
- 8.3. Only Habonim's authorized spare parts should be used. Repair kits from Habonim consist of the parts with the "*" added on the part/material list at the end of this IOM. The standard repair kit consists only of seats, seals, gaskets and bearings.
- 8.4. In addition to repair kits, other spare parts available from Habonim are: valve balls, stems, glands, bolts, fittings, check valves, spring, screws and nuts. Should additional parts be required, it is recommended that the complete valve be replaced.
- 8.5. When ordering repair kits, please provide the valve size and full valve description as etched on valve nameplate.

9. Disassembly

The following instructions are for off-line disassembly of valves sizes 2" DN50 to 12" DN300

- 9.1. Cycle the valve with the line pressure fully relieved before attempting to remove the valve from the pipeline, to insure pressure has also been discharged from the valve cavity. Leave the valve at open position.
- 9.2. Drain the center section by opening the vent and drain valves.
- 9.3. Disconnect end connections from pipe line by removing nuts, washers and bolts for flanged valves, unthreading mating pipes or cutting pipe for welded ends.
- 9.4. Mark the studs used for lifting lugs and support legs.
- 9.5. Bring the valve out of the line, and place it on a firm and rigid prism so the valve supports do not touch the ground. Secure the center section to the prism so it won't fall off during removal of ends.
- 9.6. Remove all body nuts, washers, lifting lugs and support legs so the valve ends can be pulled away from the center section maintained.
- 9.7. Remove the seats from the end connection, and place the springs in a clean surface.
- 9.8. Remove and discard the seat rings and body seals. Be careful not to damage the sealing surfaces.
- 9.9. Place the center section on an adequate flat surface with the bore facing up (lean the center section on the studs). Pay attention not to damage or bend the studs).

- 9.10. Remove the ISO adapter plate bolts, gland plate bolts and external trunnion bolts. Support the ball so it does not fall out. Remove seals, gaskets and bearings from disassembled parts. Place all components removed, in clean secure area.
- 9.11. Set the ball aside in clean secure area for reuse.
- 9.12. Remove ball bearings form top and bottom of ball.

10. Assembly

The following instructions are for off-line assembly of valves sizes 2" DN50 to 12" DN300

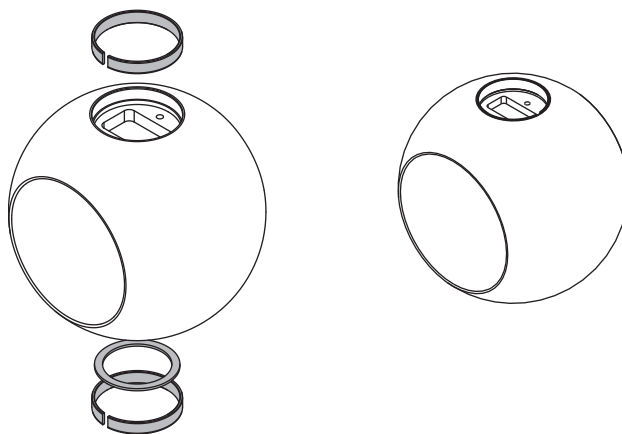
Note: Unless otherwise specified, lubrication shall be conducted by applying CORTEC VpCI-649 or Mobilarma 245/247 or an engineering approved equivalent.

- 10.1. Lubricate all seals, and bearing.

Ball Assembly (Figure 1):

- 10.2. Place all ball bearings (8) on ball. On the lower side of the ball (external trunnion side), first insert the flat thrust bearing (12), and then the slide bearing. **NOTE: The slide bearing cut should be perpendicular to the flow passage on the ball.**
- 10.3. Place the top slide bearing on the top side of the ball (stem notch side), in the orientation where the bearing cut feature is perpendicular to the flow passage of the ball.
- 10.4. Place the ball assembly in a clean and secure place until it is ready to be placed in valve body.

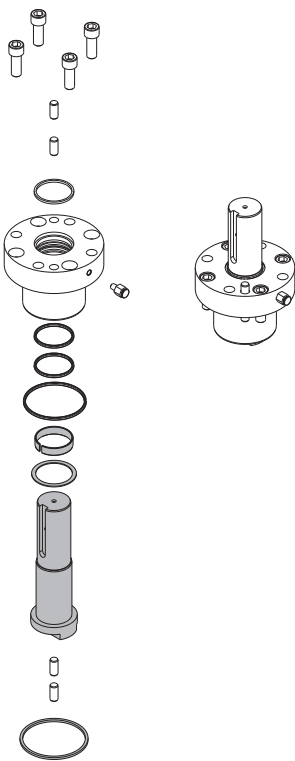
**Figure 1:
Ball/Bearing assembly**



Gland Assembly (Figure 2):

- 10.5. Check the functionality of the grease fitting (25) on the gland (18) by applying grease from the fitting. In case of blockage, remove the fitting, clean it in solvent and re assemble.
- 10.6. Lubricate the external surface of the gland neck, and all internal features of the gland.
- 10.7. Place gasket on gland (10) neck followed by the o-ring (11).
- 10.8. Place 2 o-rings (17) inside the gland (pay attention not to put an O-ring on the grease channel).
- 10.9. Place the gland slide bearing (16) into the gland plate.
- 10.10. Lubricate the stem (4) and place it into the gland plate adapter.
- 10.11. Place the assembly on a clean and secure area until its ready to be inserted to the valve body. Pay attention not to damage the grease fitting.

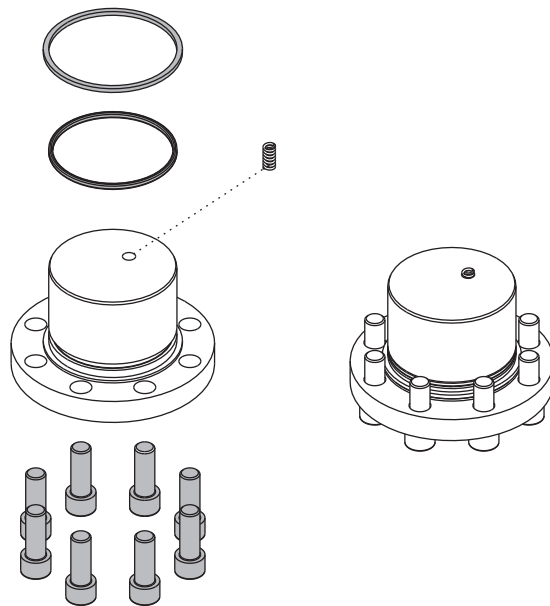
Figure 2:
Gland Assembly



External Trunnion Assembly (Figure 3):

- 10.12. Lubricate the external surface of the external trunnion (9) neck, and antistatic spring hole.
- 10.13. Place gasket (10) on gland neck followed by the o-ring (11).
- 10.14. Place the antistatic spring (29) into the hole on the external trunnion.
- 10.15. Place the assembly on a clean and secure area until its ready to be inserted to the valve body.

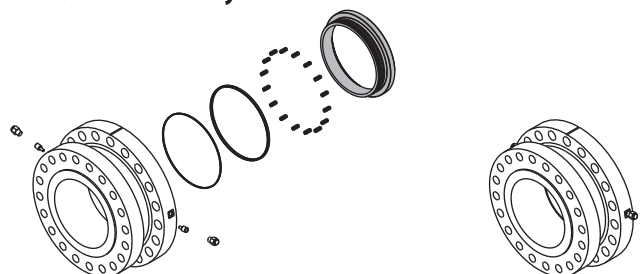
Figure 3:
External Trunnion Assembly



End/Seat Assembly (Figure 4):

- 10.16. Check the functionality of the grease fittings on end connection by applying grease from both fittings on each end. In case of blockage, remove the fitting and check valve, clean them in solvent and re assemble, where check valve is inserted first, followed by the grease fitting.
- 10.17. Lubricate the seat o-ring grooves and place o-rings (5B, 5C).
- 10.18. Lubricate the spring holes and seat sealing surface on end connection.
- 10.19. Place all seat springs (13) into appropriate holes on the end connection. Verify there are no empty holes and that all springs were inserted.
- 10.20. Place the seat into the end connection.

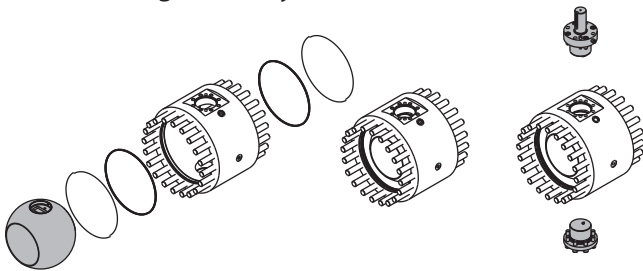
Figure 4:
Seat/End Assembly



Ball mounting Assembly (Figure 5):

- 10.21. Lubricate the external trunnion bolts and gland bolts using Molykote G-n PLUS or approved equivalent.
- 10.22. Place the external trunnion assembly half way through the bottom side of the valve body. The assembly must not protrude the inside valve cavity.
- 10.23. Place the gland assembly half way through the top side of the valve body. The assembly must not protrude the inside valve cavity.
- 10.24. Carefully lift the ball and insert it into valve body, and orient it so the the gland assembly and external trunnion can be inserted to the ball. Pay attention not to damage the ball during this process.
- 10.25. Holding the ball in correct position insert the external trunnion assembly with antistatic spring from the bottom side of the valve body. Tighten the bolts according to table 2.1 or 2.2
- 10.26. Place the gland plate assembly from the top of the valve using alignment pins and bolt. Tighten bolts according to table 2.1 or 2.2. **Make sure stem rotates while turning the ball. Make sure that the stem grease fitting is not facing the valve cavity vent valve.**

Figure 5:
Ball Mounting Assembly



Body/End Assembly (Figures 6-7):

- 10.27. Lubricate the body studs (26) using Molykote G-n Plus or approved equivalent.
- 10.28. Place the gasket (7) and o-ring (6) into the valve cavity.
- 10.29. Place end connection on the body. Make sure the nick on the end connection faces "up" (same direction as the stem).
- 10.30. Place lifting plates and support legs in correct location, as marked on 8.3. Make sure support legs are parallel and leveled to ground.
- 10.31. Place the washers (if required) and nuts, and tighten according to table 1.1 or 1.2.

Figure 6:
Body/End Assembly

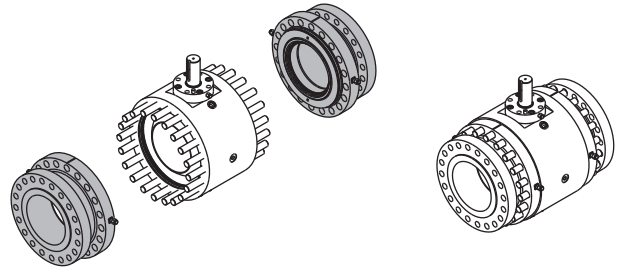
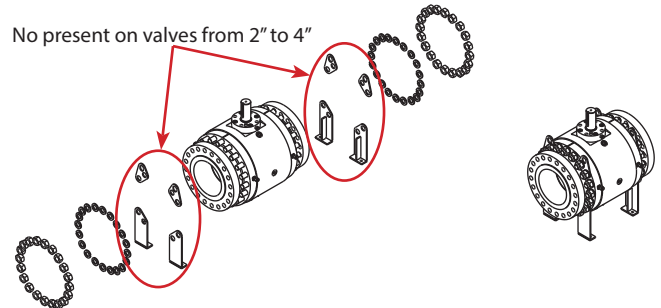


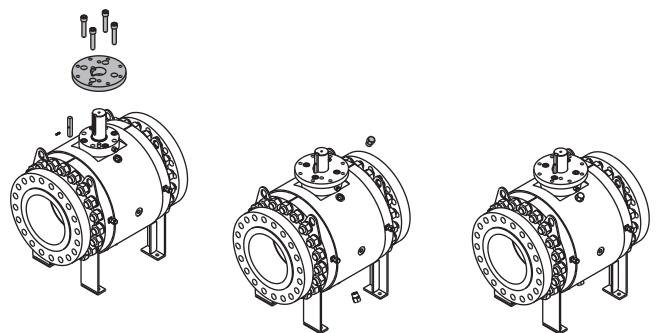
Figure 7:
Body Bolting



ISO Plate Assembly (Figure 8):

- 10.32. Lubricate the ISO plate bolts using Molykote G-n PLUS or approved equivalent.
- 10.33. Place the gasket (21) around the stem on top of the gland plate.
- 10.34. Place the ISO plate (22) on top of the gland plate. Insert the location pins (14) followed by plate bolts (23). Tighten the bolts according to table 2.1 or 2.2.
- 10.35. When the stem isn't a square, Place the stem key on stem. Where required bolt it using the required bolt.

Figure 8:
Final Assembly



In-Line Assembly

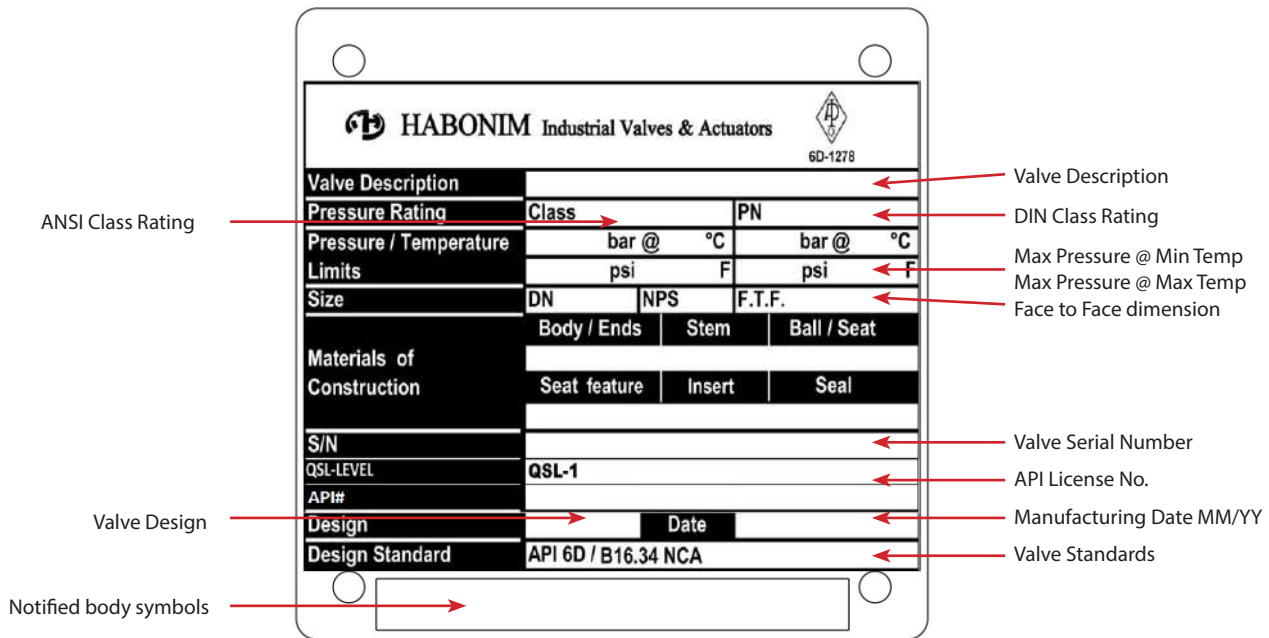
- 10.36. Assemble valve in pipeline according to para. 6
- 10.37. Leave the valve in the open position for flushing the line.

Valve Marking and Labeling

The valve markings that are according to API-6D standard are presented in order to provide the user full traceability and information regarding the valve. Unless otherwise requested, nameplates will be secured to the valve body and will be visible to user.

The information on the nameplate is as described below:

Figure 9:



2" (DN50) to 12" (DN300)

Item	Description	Material specification
1	Body	A182 F316, A105 , A350 LF2
2	End	A182 F316, A105 , A350 LF2
3	Ball	A350 LF2+ENP, A105+ENP, A182 F6A, A182 316N, A351 CF8M
4	Stem	A564 Gr 630, H1150D 17-4PH, A479 316L, A350 LF2+ENP, A182 F6A, A479 XM19, A29 4140+ENP, A276 316
5*	Seat	A350 LF2+ENP, A182 F316N, A182 F6A
5A	Seat insert	PEEK, DEVLON, ,CF PTFE, CF PEEK
5B	Seat O-ring	HNBR, VITON, PTFE
5C	Seat fire safe seal	Graphite
6*	Body fire safe seal	Graphite
7*	Body seal	HNBR, VITON, PTFE
8	Ball bearing	316L+PTFE
9	External trunnion	A350 LF2+ENP, A479 316L
10*	Gland plate & external trunnion fire safe seal	Graphite
11*	Gland plate & external trunnion seal	HNBR, VITON, PTFE LIP SEAL
12	Lower thrust washer	316L+PTFE
13	Seat spring	INCONEL 750

Item	Description	Material specification
14	Gland pin	ST.37
15	Stem thrust seal	316L+PTFE
16	Gland plate bearing	316L+PTFE
17	Stem o-ring	HNBR, VITON
18	Gland plate	A350 LF2+ENP, A479 316L, A105 +ENP
19	Stem grease fitting	316
20	Lower gland bolts	A320 L7, A193 B8M, C.St 8.8 ZP
21*	Stem gasket	Graphite
22	Iso plate	A350 LF2, A479 316L, A105
23	Upper gland bolts	A320 L7, A193 B8M, C.St 8.8 ZP
24	Plug drain valve	316
25**	Seat grease fitting + check valve	316
26	Body stud	A320 L7, A193 B8M, C.St 8.8 ZP
27	External trunnion bolts	A320 L7, A193 B8M, C.St 8.8 ZP
28	Body nut	A320 L7, A193 B8M, C.St 8.8 ZP
29	Antistatic spring	INCONEL 750
30	stem key	A29 4140+ENP, ST.37

* Repair kit components

** Available from 6" size only

