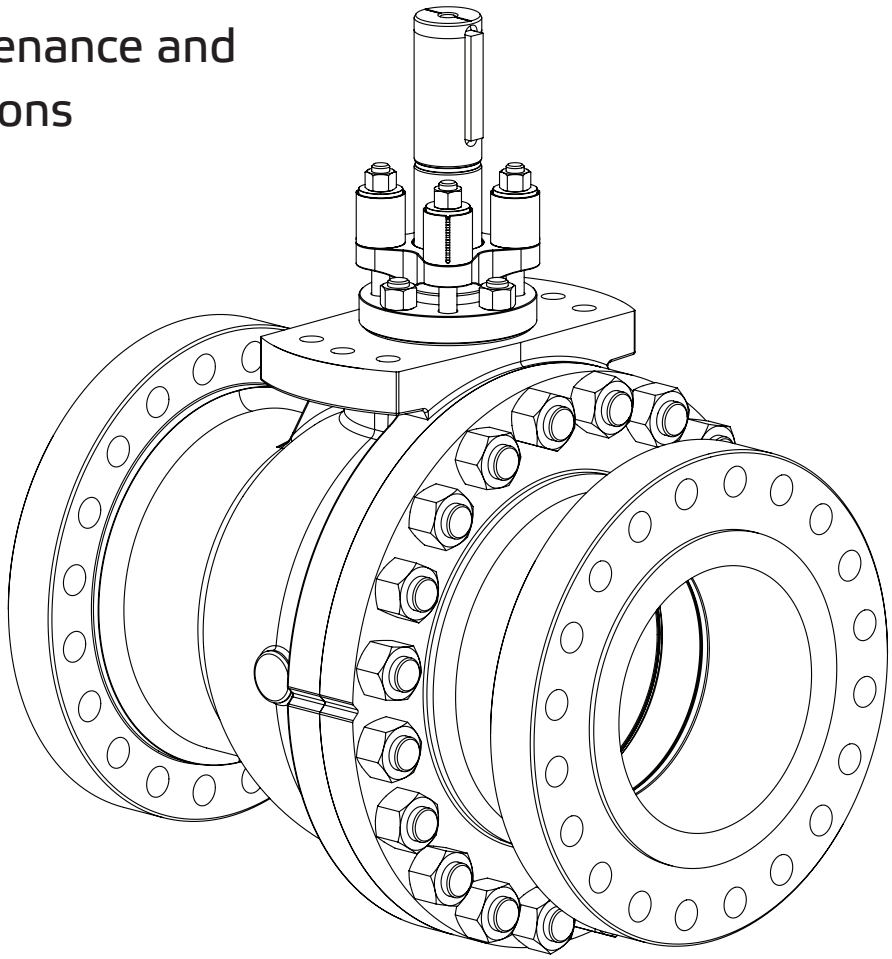
Neles™ trunnion mounted ball valve

Series XH Class 600

Installation, maintenance and operating instructions



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This product meets the requirements set by the Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation.

READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 Scope of the manual

This installation, operation and maintenance manual provides essential information on trunnion mounted XH series ball valves. The actuators and instrumentation to be used with these valves are also discussed briefly. Refer to the separate actuator and control equipment instruction manuals for further information.

NOTE:
Selection and use of the valve in a specific application requires close consideration of detailed aspects. Due to the nature of the product, this manual cannot cover all the individual situations that may occur when installing, using or servicing the valve.

If you are uncertain about use of the valve or its suitability for your intended purpose, please contact Valmet for more information.

For valves in oxygen service, please see also the separate installation, maintenance and operating instructions for oxygen service (see Neles document id:10O270EN.pdf).

1.2 Valve description

Trunnion mounted XH series valves are flanged full bore ball valves. The valve body is in two parts, fastened together by body-joint bolting. The ball and shaft are separate. Shaft blowout is prevented by bonnet.

The valve is metal seated. Shaft torque is transmitted to the ball through a splined bore in the ball.

The valve is 1-way or 2-way tight depending on the seat construction. Tightness direction is shown with an arrow on 1-way valves.

Construction details of individual valves are included in the type code shown on the valve identification plate. To interpret the type code, please refer to the type coding key in this manual.

Trunnion mounted XH series ball valves are specially designed for demanding throttling and shut-off service with high pressure differentials.

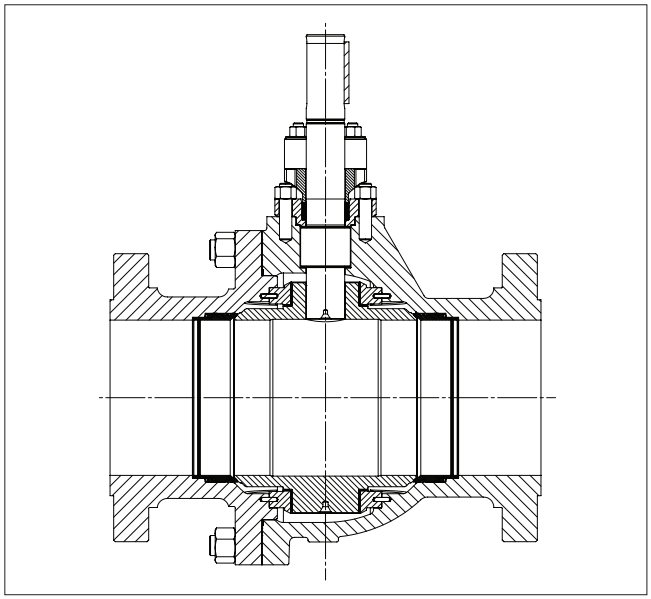


Fig. 1 Construction of a trunnion mounted XH Class 600 series ball valve

1.3 Markings

Body markings are stamped on the body (see Fig. 2).

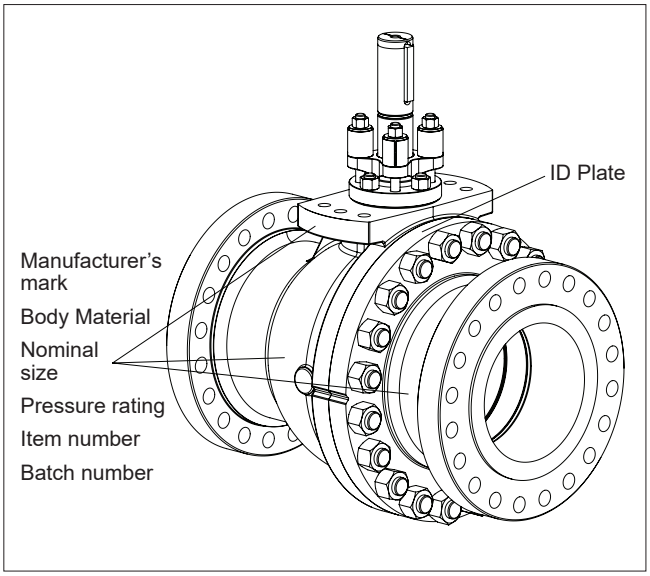


Fig. 2 Valve markings

The identification plate (Fig. 3) is attached to the flange. Identification plate markings are:

1. Body material
2. Ball material
3. Stem material
4. Seat material
5. Maximum operating temperature
6. Minimum operating temperature
7. Maximum shut-off pressure differential
8. Type code
9. Number of the list of valve manufacturing parts
10. Pressure class
11. Model
12. Certification and approvals, eg. CE, ATEX etc.

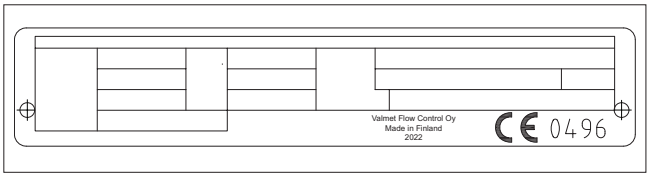


Fig. 3 Identification plate

1.4 Specifications

Product type

Full bore trunnion mounted ball valve.

Side entry, two-piece bolted body.

Flanged.

Pressure ratings

ASME Class 600 / EN PN63, 100

Size range

6”...24” / DN 150 - 600.

Standard temperature range

-50 …+425 °C, consult factory for higher temperature

Applications

Material and test certification

EN10204-3.1 material certificates for body and bonnet.

Design standard

Valve body ASME B16.34.

Valve flanges ASME B16.5.

Face-to-face ASME B16.10 long pattern.

Actuator mounting ISO 5211.

Compliance to other standards

API 608

API 607

Standard materials

Body	ASTM A216 gr. WCB
	ASTM A351 gr. CF8M.
Ball	CF8M/AISI 316 + Hard chrome or other coating options with metal seats.
Bearings	RPTFE or AISI 316 + hard facing.
Seats	AISI 316 + cobalt based alloy or other coating options.
Seals/gaskets	PTFE or Graphite.
Body gaskets	Spiral wound with PTFE or graphite filler.
Gland packing	Graphite or PTFE with live loaded construction.
Bolting	B8M/8M with stainless steel body.
	L7M/7M with carbon steel body.

NOTE:
Final valve materials may vary due to application and customer requirements. The final selected materials are shown in the bill of materials of delivered valve.

Standard options

High temperature linkages.

High temperature design.

Hard chrome or carbide ball coating.

NACE MR 0103 and MR 0175.

Valve testing

Each valve is tested for body integrity and seat tightness.

The body test pressure is 1,5 x pressure class. The seat test is done according to selected standard. Test medium is inhibited water or air depending on standard.

Standard tightness

ISO 5208 Rate C or Class V for metal seats.

Optional API 598 and ISO 5208 Rate B or FCI 70.2 Class VI

Other tightness rates upon request.

1.5 CE and ATEX marking

The valve meets the requirements of the European Directive 2014/68/EU relating to pressure equipment, and has been marked according to the Directive.

When applicable, the valve meets the requirements of the European Directive 2014/34/EU relating to equipment and protective systems intended for use in potentially explosive atmospheres, and has been marked according to the Directive.

1.6 Recycling and disposal

Most valve parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the valve. In addition, separate recycling and disposal instructions are available from the manufacturer.

A valve can also be returned to the manufacturer for recycling and disposal against a fee.

1.7 Safety precautions

CAUTION:
Do not exceed the valve performance limitations!
Exceeding the limitations marked on the valve may cause damage and lead to uncontrolled pressure release.
Damage or personal injury may result.

CAUTION:
Do not dismantle the valve or remove it from the pipeline while the valve is pressurized!
Dismantling or removing a pressurized valve will result in uncontrolled pressure release. Always isolate the relevant part of the pipeline, release the pressure from the valve and remove the medium before dismantling the valve. Be aware of the type of medium involved. Protect people and the environment from any harmful or poisonous substances. Make sure that no medium can enter the pipeline during valve maintenance.
Failure to do this may result in damage or personal injury.

CAUTION:
Beware of the ball cutting movement!
Keep hands, other parts of the body, tools and other objects out of the open flow port. Leave no foreign objects inside the pipeline. When the valve is actuated, the ball functions as a cutting device. Close and detach the actuator pressure supply pipeline for valve maintenance. Failure to do this may result in damage or personal injury.

CAUTION:
Beware of noise emission!
The valve may produce noise in the pipeline. The noise level depends on the application. It can be measured or calculated using the Neles Nelprof computer program.
Observe the relevant work environment regulations on noise emission.

CAUTION:
Beware of extreme temperatures!
The valve body may be very hot or very cold during use.
Protect people against cold injuries or burns.

CAUTION:
When handling the valve or the valve package, bear in mind its weight!
Never lift the valve or valve package by the actuator, positioner, limit switch or their piping. Place the lifting slings securely around the valve body. Damage or personal injury may result from falling parts.
The weights are shown in Section 11.

CAUTION:
Lifting threads in pipe flanges are not to be used for lifting the entire valve assembly with actuator.

CAUTION:
Follow the proper procedures when handling and servicing oxygen valves.

NOTE:
Contact Valmet experts for dead-end service compliance.
Wafer type is not applicable for dead-end service

ATEX/Ex Safety

CAUTION:
Potential electrostatic hazard, ensure the protection (grounding, etc.) in the process.

CAUTION:
The actual surface temperature of valve is depended on the process temperature. The protection from high or low temperature must be considered by the end user before valve is put into service.

CAUTION:
Ensure the general process and worker protection from static electricity in the facilities.
Note! Within series there is possibility to Category 2, Category 3 and non-ATEX valve.

1.8 Welding notes

WARNING:
Welding and/or grinding stainless steel and other alloys containing chromium metal may cause the release of hexavalent chromium. Hexavalent chromium(VI) or Cr(VI), is known to cause cancer. Be sure to use all appropriate personal protective equipment (PPE) when welding metals containing chromium.

NOTE:
A qualified welder must do the installation welding. The welder and welding procedure should be qualified in accordance with the ASME Boiler and Pressure Vessel Code Section IX or other applicable regulation.

CAUTION:
To prevent damage to the seat and seals, do not allow the temperature of the seat and body seal area to exceed 94 °C (200 °F). It is recommended that thermal chalks be used to check the temperature in these areas during welding.

CAUTION:
Ensure that any weld splatter does not fall onto the valve closing members eg. ball or seats. This may damage critical seating surfaces and cause leaks.

2. TRANSPORTATION, RECEPTION AND STORAGE

Check the valve and the accompanying device for any damage that may have occurred during transport.

Store the valve carefully. We recommend storing indoors in a dry place.

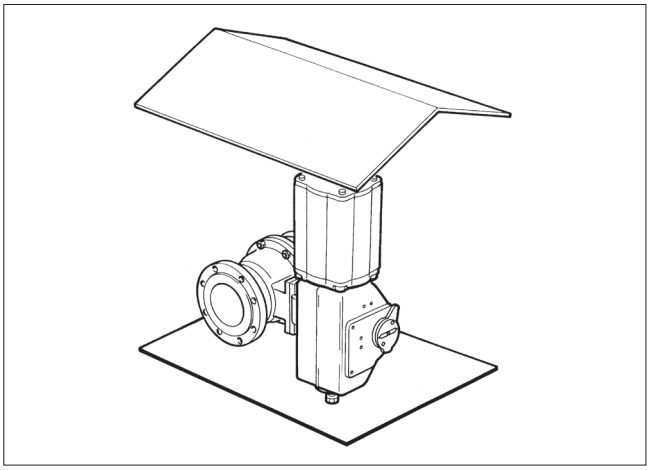


Fig. 4 Storing the valve

Do not remove the flow port protectors until installing the valve.

Move the valve to its intended location just before installation.

The valve is usually delivered in the open position.

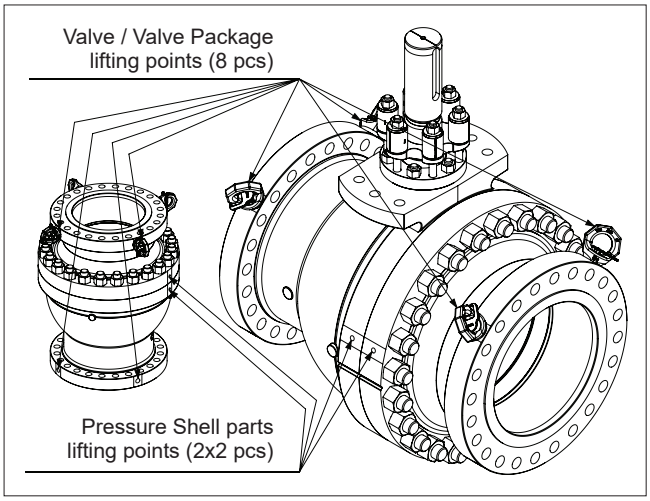


Fig. 5 Valve lifting points

Table 1 Lifting threads

Size		Valve package lifting thread	Working load limit RUD lifting point
NPS	DN		
6	150	M12	VRS 0,75t
8	200	M12	VRS 0,75t
10	250	M16	VRS 1,5t
12	300	M20	VRS 2,3t
14	350	M20	VRS 2.3t
16	400	M24	VRS 3.2t
18	450	M30	VRS 4.5t
20	500	M30	VRS 4.5t
24	600	M42	VLBG+ 10t

Valve should be lifted using four of the lifting points located on the pipeline flange. Do not lift the valve from the pressure shell parts lifting points or any of the other threaded holes intended for individual part handling. When lifting a valve package with actuator take note of the combined mass.

Other types of load rings can be used if sufficient WLL (working load limit) is specified.

3. INSTALLATION AND USE

3.1 General

Remove the flow bore protectors and check that the valve is clean inside. Clean the valve if necessary.

3.2 Installing in the pipeline

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

Flush the pipeline carefully before installing the valve. Make sure the valve is entirely open when flushing. Foreign particles, such as sand or pieces of welding electrode, will damage the ball and seats.

NOTE:
Use screws, nuts, bolts and gaskets equivalent to the fastenings used elsewhere in the pipeline. Center the flange gaskets carefully when fitting the valve between flanges.

NOTE:
Do not attempt to correct pipeline misalignment by means of flange bolting.

The valve may be installed in any position and offers 1-way or 2-way tightness, see Sections 1.2 and 1.4. However we do not recommend installing the valve with the actuator on the underneath side because dirt in the pipeline may then enter the body cavity and damage the gland packing. The position to be avoided is shown in Fig. 6.

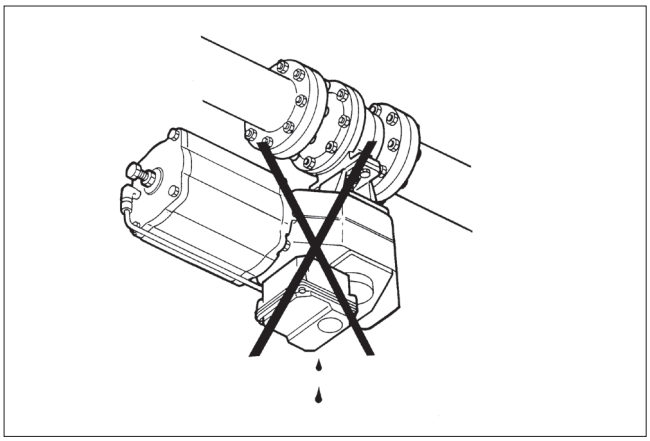


Fig. 6 Avoid this mounting position

It may be necessary to firmly support the pipeline in order to protect the valve from excess stress. Sufficient support will also reduce pipeline vibration and thus ensures proper functioning of the positioner.

To facilitate servicing, it is preferable that the valve be supported by the body, using pipe clamps and supports. Do not fasten supports to the flange bolting or to the actuator, see Fig. 7.

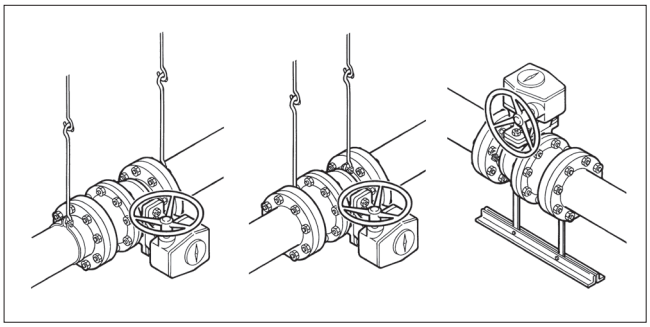


Fig. 7 Supporting the valve

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Figure 8.

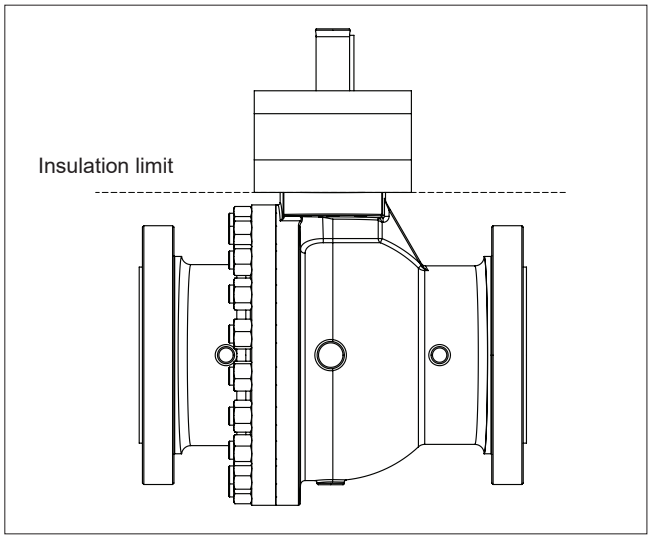


Fig. 8 Insulation of the valve

3.3 Actuator

NOTE:
When installing the actuator on the valve, make sure that the valve package functions properly. Detailed information on actuator installation is given in Section 6 or in the separate actuator instructions.

The valve open/closed position is indicated as follows:

- by an indicator on the actuator
  or
- by a groove at the end of the ball shaft (parallel to the ball flow opening).

If there is any uncertainty about the indicator, check the ball position by the groove.

The actuator should be installed in a manner that allows plenty of room for its removal.

The upright position is recommended for the actuator cylinder.

The actuator must not touch the pipeline, because pipeline vibration may interfere with its operation.

In certain cases it may be considered advantageous to provide additional support to the actuator. These cases will normally be associated with large actuators, extended shafts, or where severe vibration is present. Please contact Valmet for advice.

3.4 Commissioning

Ensure that there is no dirt or foreign objects left inside the valve or pipeline. Flush the pipeline carefully. Make sure that the valve is entirely open when flushing.

Ensure that all nuts, pipings, and cables are properly fastened.

Check that the actuator, positioner, and switch are correctly adjusted. Actuator adjustment is explained in Section 6. To adjust the accompanying device refer to the separate control equipment instruction manuals.

4. MAINTENANCE

CAUTION:
Observe the safety precautions mentioned in Section 1.8 before maintenance!

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

4.1 Maintenance general

Although Neles brand valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership. Valmet recommends inspecting the valves at least every five (5) years. The inspection and maintenance interval depends on the actual application and process condition. The inspection and maintenance intervals can be specified together with your local Valmet experts. During this periodic inspection the parts detailed in the Spare Part Set should be replaced. Time in storage should be included in the inspection interval.

Maintenance can be performed as presented below. For maintenance assistance, please contact your local Valmet office. The part numbers in the text refer to the exploded view and to the parts list in Section 10, unless otherwise stated.

NOTE:
When sending goods to the manufacturer for repair, do not disassemble them. Clean the valve carefully and flush the valve internals. For safety reasons, inform the manufacturer of the type of medium used in the valve (include material safety datasheets (MSDS)).

NOTE:
In order to ensure safe and effective operation, always use original spare parts to make sure that the valve functions as intended.

NOTE:
For safety reasons, replace pressure retaining bolting if the threads are damaged, have been heated, stretched or corroded.
A practical way to check the condition of the thread: Try to rotate a new, unused nut with a thread. The condition of the thread is good if the nut rotates smoothly and does not get stuck.

4.2 Changing the gland packing while the valve is in the pipeline

CAUTION:
Do not dismantle the valve or remove it from the pipeline while the valve is pressurized!

In graphite gland packings, tightness is ensured by contact between the gland follower and the packing rings.

The gland packing (69) must be changed if leakage occurs even after the hex nuts (18) have been tightened.

- Make sure that the valve is not pressurized.
- Detach the actuator and bracket according to the instructions in Section 4.4.
- Remove the key (10).
- Remove the nuts (18), the disc spring sets (150), washers 150B, anti static springs (150C), the gland (9), and anti extrusion ring (9A).
- Remove old packing rings (69). Do not damage the surfaces of the packing ring counterbore and shaft.
- Clean the packing ring counterbore.
- Place the new packing rings (69) over the shaft (5). The gland (9) may be used for pushing the rings into the counterbore. Do not damage packing rings in the shaft keyway.
- Install Washers (150B), anti static springs (150C) in opposite side studs (14).
- Pre-compress the packing rings first by tightening the gland with disc springs (150) to the height X. See Fig. 9 and the value from Table 2.
- Carry out 3…5 operation cycles with the valve. Suitable range of movement is about 80 %.
  It is not necessary to fully close or open the valve during the operation.
- Loosen the gland nuts. Retighten the nuts (18) so that the disc springs are compressed to the height X, see Table 2.
- If the leakage still occurs when the valve is pressurized, re-tighten the nuts but don't exceed the value in the Table 2 by 50 % or do not fully compress the disc springs.

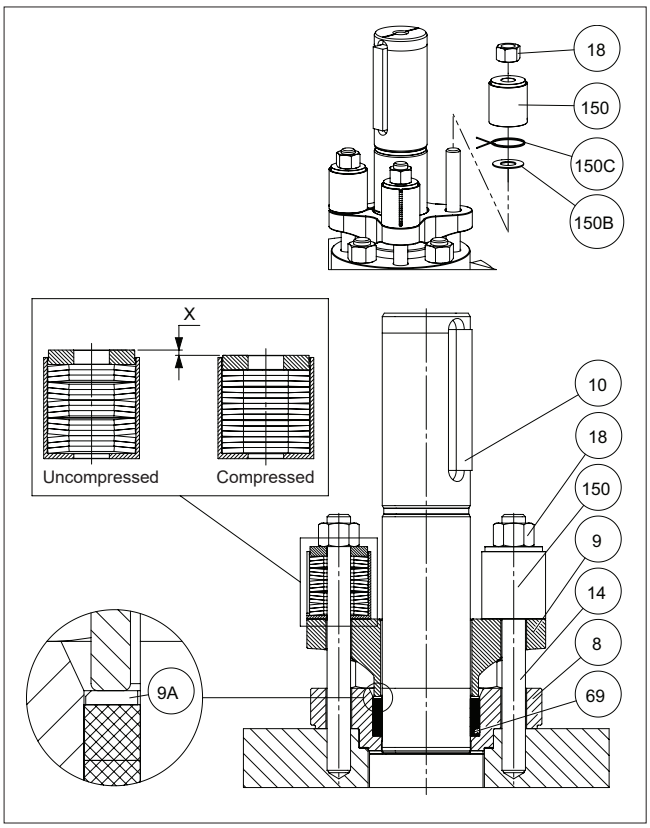


Fig. 9 Gland packing

Table 2 Tightening of gland packing

Valve size		Shaft diameter	Gland bolting	Target compression length (graphite)
DN	NPS	mm	Thread	X, mm
150	6	45	M16	3.1
200	8	55	M16	3.9
250	10	65	M16	4.7
300	12	75	M20	3.6
350	14	85	M20	4.1
400	16	95	M20	5.7
450	18	120	M24	6.5
500	20	120	M24	6.5
600	24	150	M30	8.5

Note: PTFE packing tightening, please consult manufacturer.

4.3 Repair of a jammed or stuck valve while it is in the pipeline

Jamming may be due to the ball (3) and seats (7) becoming clogged with flow medium. They may be cleaned by turning the ball to the partly open position and flushing the pipeline. If this does not help, follow the instructions in the following sections.

4.4 Detaching the actuator

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

CAUTION:
Do not detach a spring-return actuator unless a stop-screw is carrying the spring force!

NOTE:
Before dismantling, carefully observe the position of the valve with respect to the actuator and positioner/limit switch so as to make sure that the package can be properly re-assembled.

It is generally most convenient to detach the actuator before removing the valve from the pipeline. If the valve is small or if it is difficult to access, it may be more practical to remove the entire package at the same time.

- Close and detach the actuator pressure supply pipeline and remove control cables.
- Unscrew the bracket screws.

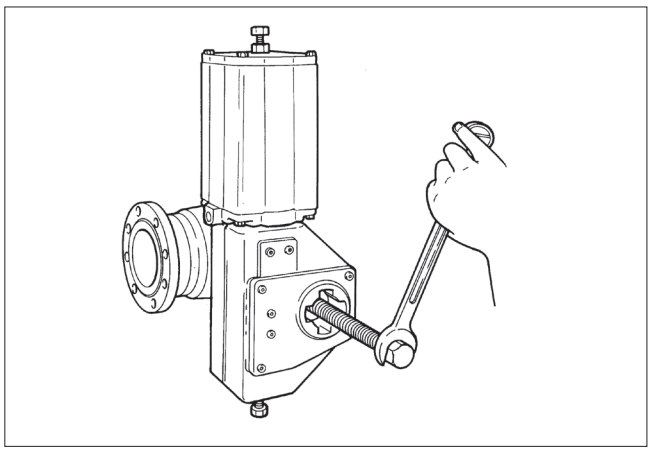


Fig. 10 Removing the actuator with an extractor

- Detach the actuator. The actuator can be removed by hand or with a special tool made for this purpose. The tool can be ordered from the manufacturer (see Section 8 “Tools”).
- Remove the bracket.

4.5 Removing the valve from the pipeline

CAUTION:
Do not dismantle the valve or remove pipeline while the valve is pressurized!

- Make sure that the valve is not pressurized and that the pipeline is empty. Make sure that the medium cannot flow into the section where servicing is to take place.
- Support the valve carefully with a hoist. Place lifting slings carefully and unscrew the pipe flange bolts.

4.6 Dismantling the valve

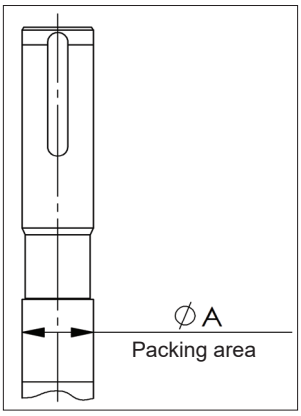
- Place the valve in a standing position on the pipe flange end. Use a level surface that will not scratch the flanges. See that the body stud nuts (16) are facing upward.
- Mark the the body halves for correct orientation during re-assembly.
- Turn the ball to the closed position.
- Remove the key (10).
- Unscrew the gland nuts (18). Remove the the disc spring sets (150), washers (150B), anti static springs (150C), the gland (9), retainer ring (42) and anti extrusion ring (9A).
- Unscrew the body stud nuts (16).
- Remove the body cap (2). If the seat (7) is not lying on the ball (3), prevent the seat from falling from the body cap and detach it later. **Don’t leave your fingers between the body cap and the surface!**
- Stand the removed body cap on its pipe flange.
- Remove the seat (7) from body cap (2) if it is still in place.
- Unscrew the bonnet stud nuts (17). Remove the shaft (5) and bonnet (8). Knock the bonnet off with a piece of wood and a hammer, if needed.
- Lift the ball (3) along with the trunnion plates (89) and bearings (91, 99) out of the body (1) Handle the ball carefully and place it on a soft surface.
- Remove the seat (7) from the body (1).
- Remove the trunnion plates (89) from the hubs of the ball.
- Remove the trunnion bearings (99) and the thrust bearing (91) from each trunnion.
- Push the shaft out of the bonnet.
- Remove thrust bearings (70) from the shaft and packing rings (69) from the bonnet (8).
- Remove the body gasket (65) and the bonnet gasket (66).

4.7 Inspection of removed parts

- Clean removed parts.
- Check the shaft (5) and thrust bearings (70, 71). If the shaft is worn in the packing area, it can be repaired by machining, but the diameter must be no less than given in below. If less, replace the shaft with new one. **Note!** Machining the shaft to smaller diameter is not allowed if the valve has been delivered as ISO 15848 type approved (fugitive emission). Do not repair worn shaft by welding.

Shaft nominal diameter ØA [mm]	Tolerance for remachining [mm]
15 - 80	0/-0.1
85 - 200	0/-0.2

- See if the ball (3) or seats (7) are damaged (scratched), by examining them under bright light. The ball and the seat can be replaced if necessary.
- See if the body joint sealing surfaces are damaged.



4.8 Replacing parts

We recommend that soft material parts be replaced whenever the valve is dismantled for servicing. Other parts may be replaced if necessary. Always use genuine spare parts to ensure proper functioning of the valve (see section “Ordering spare parts”).

4.9 Assembly

- Place the valve body (1) and the body cap (2) on the pipe flange end. Use a level surface that will not scratch the flanges.

S seat:

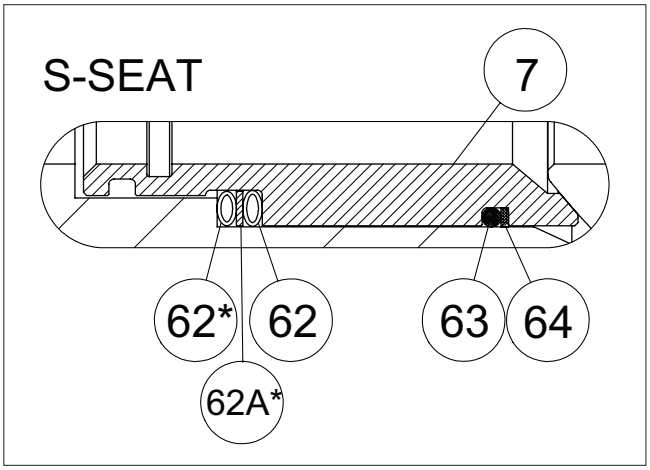


Fig. 11 S seat

- Check the sealing surfaces.
- Place the back seal (O-ring) (63) into the groove in the seat. See Figure 11.
- Place the back-up rings (64) made of PTFE strips at the side of the O-ring. To ensure that the seam becomes flexible, the strip must have slanted ends.
- For easier assembly, lubricate the O-ring and back-up ring surfaces facing the seats with silicone grease or another suitable substance.
- Place the spring (62) into the groove in the seat (7). NPS06 has 2 pcs spring (62) separated with spacer ring (62A).
  1. Cut the spring to the correct length.
  2. Cut one end of the spring at the 9 o'clock position and the other at the 6 o'clock position.
  3. Turn the spring counterclockwise two turns and release it with the ends overlapping.
  4. When attaching the spring, ensure 2-3 braids are overlapping.
  5. Pay attention to the direction of the spring and tilt it to the right.

- Place the seats into the body and body cap by hand or if necessary, using a plastic mallet. The seat is in correct position when the spring touches the body shoulder.
- S-seat has groove on the back that is normally left empty. This groove is for late configuration if solids proof seal is needed.

B seat:

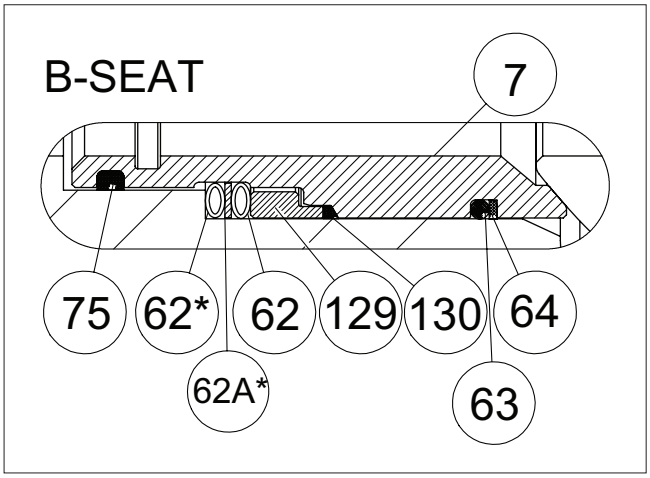


Fig. 12 B seat

- Check the sealing surfaces.
- Place the back seal (O-ring) (63) into the groove in the seat. See Figure 12.
- Place the back-up rings (64) made of PTFE strips at the side of the O-ring. To ensure that the seam becomes flexible, the strip must have slanted ends.
- For easier assembly, lubricate the O-ring and back-up ring surfaces facing the seats with silicone grease or another suitable substance. Please ensure the compatibility with the flow medium. Place the backseal (130) and ring (129) on the seat.
- Place the spring (62) on the seat (7). NPS06 has 2 pcs spring (62) separated with spacer ring (62A). See section S seat for installation of part (62).
- Place the braided graphite (75) into the groove in the seat.
- Place the seats into the body and body cap by hand or if necessary, using a plastic mallet. The seat is in correct position when the spring touches the body shoulder.

G seats:

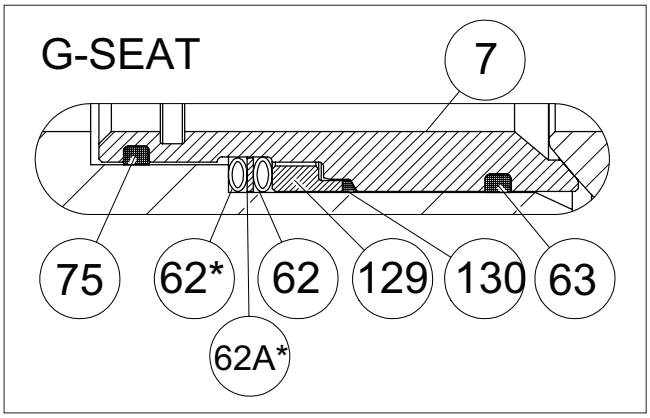


Fig. 13 G seat

- Check the sealing surfaces.
- Place the backseal (130) and ring (129) on the seat.
- Place the spring (62) on the seat (7). NPS06 has 2 pcs spring (62) separated with spacer ring (62A). See section S seat for installation of part (62).
- Place the braided graphites (63) (75) into the grooves in the seat.
- Place the seats into the body and body cap by hand or if necessary, using a plastic mallet. The seat is in correct position when the spring touches the body shoulder.

CAUTION:
Be careful not to damage the lapped surfaces of the seat.

All versions:

- Place a trunnion bearing (99) into each trunnion plate (89) counterbore.
- Place a thrust bearing (91) over each ball trunnion, bearing surface facing the ball.
- Fit a trunnion plate over each ball trunnion until the plate rests against the thrust bearing (91). This operation must be performed with care and without excessive force or the bearing will be damaged. It may be necessary to tap the plate on with a plastic mallet.
- Align the trunnion plates (89) relative to the ball port in the closed position.

NOTE:
The shaft will fit into the ball in one position only. There's a larger cog in the splined bore and a matching groove in the splined shaft. It is essential to note the groove's position during the next assembly step.

- With the ball (3) in the "closed" position, and trunnion plate pins (89A) installed to holes in body (1), lower the ball/trunnion plate subassembly into the body (1). **NOTE:** This procedure is critical and careful attention is a must. The outside diameter of the trunnion plates must pilot in the body counterbore and the pins need to align with the holes in trunnion plate. Carefully lower the subassembly until a trunnion plate enters the counterbore and pins go inside the trunnion plate. (Usually one trunnion plate will enter the counterbore and the other will be out of position.) Use a plastic mallet or a block of wood to rotate the second trunnion into position. Once trunnion plates are aligned, lower the subassembly until the trunnion plates are seated in the bottom of the counterbore.
- Slide the thrust bearings (70 and 71) over the shaft (5). See the exploded view for proper orientation.
- Insert shaft subassembly through the shaft bore of the body (1). Note the correct shaft position!
- Install the bonnet gasket (66) and then bonnet (8) over the shaft and the bonnet studs (10) .
- Lubricate the threads of studs (13) and tighten the nuts (17) according to values in Table 2.
- Install the packing (69). Refer to Fig. 11 for proper orientation of packing
- Install the gland (9) over shaft (5) and gland studs. Install the disc springs sets (150) and the gland stud nuts (18) on studs and tighten "finger tight."
- Install the body gasket (65) in the body groove.
- Install trunnion pins (89A) in trunnion plate
- Place the body cap (2) carefully over the body studs (12) and the body (1). See that the flange holes are aligned acc. to the mark made during the dismatling. Take care not to damage the body gasket and the seat (7) in the body cap.
- Check that trunnion pins (89A) align with the holes in body cap (2).
- Fasten the body nuts (16). Tighten the nuts gradually, always switching to other side of the valve after every nut. The recommended torques is given in Table 3. The flange faces must in even contact with each other.
- Mount the key (10).
- Cycle the valve slowly a couple of times to insure correct position of the ball between the two seats.

Table 3 Recommended tightening torques of the body stud nuts

Material	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 2 ASTM A193 *gr. B8M cl. 2B*
Bolt Size	**Tightening Torque (Nm)**	**Tightening Torque (Nm)**
M16	210	260
M20	420	420
M24	720	720
M30	1400	1200
M33	2000	1200
M39	3300	*3100*
M42	4200	*3900*
M48	6400	*6000*
M52	8300	*6800*
M64	16000	*13000*

- Tighten the gland nuts (18) acc. to Section 4.2 . Pull on the shaft (5) while tightening to assure that shaft and thrust bearings are always in contact with the body. Check for leakage once the valve is pressurized.
- Install the valve in the pipeline as carefully and accurately as when removing it. Follow the instructions given in Section 3.

5. TESTING THE VALVE

CAUTION:
Pressure testing should be carried out using equipment conforming to the correct pressure class!

We recommend that the valve body be pressure tested after the valve has been assembled.

The pressure test should be carried out in accordance with an applicable standard using the pressure rating required by the pressure class or flange drilling of the valve. The valve must be in a half-open position during the test.

If you also want to test the tightness of the closure member, contact the manufacturer.

6. INSTALLING THE ACTUATOR

6.1 General

CAUTION:
Beware of ball cutting movement!

Different Neles brand actuators can be mounted using suitable brackets and couplings. The valve can be actuated by an M-handwheel operator or B1-series actuators.

Table 4 Tightening torques for bracket bolting (for lubricated screws) (Nm)

Screw / Material	M12	M16	M20	M24	M30	M36	M42	M48
A2/A4	70	170	340	590	1200	2100	3400	5300
B8M Cl.1	38	95	190	320	650	1100	1900	2900
Gr.660	91	230	440	770	1500	2700	4500	6900

Please use tightening torques given in table 4 when bolting the bracket on to valve.

6.2 Installing the M-handwheel operator

- The mark at the end of the shaft indicates the direction of the ball flow bore. Turn the valve to the closed position.
- Lubricate the grooves of the actuator and the couplings. Place the coupling on the shaft and lock it. Place the bracket on the valve and turn the lubricated screws a few times.
- Turn the actuator to the closed position and push it carefully onto the valve shaft on which the coupling has been mounted. Please note the marks on the handwheel and the coupling.
- Lubricate the actuator screws. Tighten all screws.

- Adjust the ball open and closed positions with the hexagon screws located at the side of the housing (see Figure 14). The stop-screw for the open position is nearest to the handwheel on the side of the housing and the screw for the closed position is at the opposite end. The turning directions for the handwheel are marked on the wheel.
- Check the handwheel by turning the valve to the extreme positions. The yellow arrow should indicate the direction of the ball flow bore.

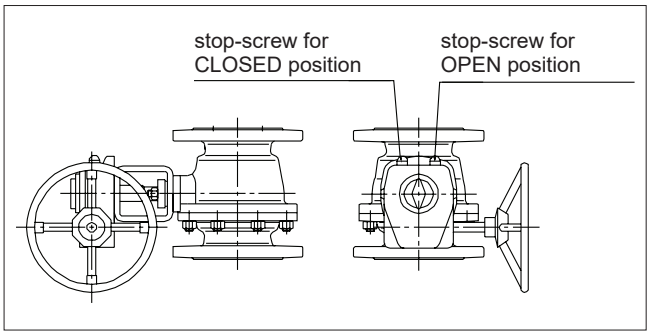


Fig. 14 Open and closed positions of the M actuator

6.3 Installing the B1C-series actuator

- Turn the valve to the closed position and drive actuator piston to the extreme outward position.
- File off any burrs and clean the shaft bore.
- The line at the end of the shaft indicates the direction of the ball flow bore.
- Lubricate the actuator shaft bore. Fasten the bracket loosely to the valve.
- Slip the actuator carefully onto the valve shaft. Avoid forcing it since this may damage the ball and seats. We recommend mounting the actuator so that the cylinder is pointing upwards.
- Position the actuator parallel or perpendicular to the pipeline as accurately as possible. Lubricate the actuator mounting screws and then fasten all screws.

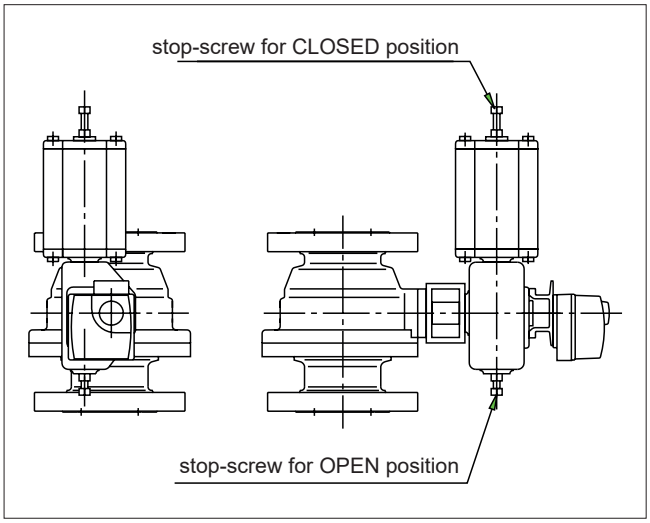


Fig. 15 Open and closed positions of the B1C/B1J actuator

- Adjust the ball open and closed positions by means of the actuator stop screws located at both ends (see Fig. 15). An accurate open position can be seen in the body flow bore. Check that the yellow arrow on the actuator indicates the ball flow opening position. **Keep fingers out of the flow bore!**

There is no need for stop screw adjustment if the actuator is re-installed in the same valve. Drive actuator piston to the housing end (open position). Turn the actuator by hand until the valve is in the open position. Fasten the actuator in this position as explained above.

- Check the stop screw thread tightness. An O-ring is used for sealing.
- Check that the actuator is functioning correctly. Drive the actuator piston to both cylinder ends and check the ball position and its movement with respect to the actuator (close: clockwise; open: counterclockwise). The valve should be closed when the piston is in the extreme outward position.
- If necessary, change the position of the actuator pointing cover to correctly indicate the valve open/closed position.

6.4 Installing the B1J-series actuator

Spring-return actuators are used in applications where valve opening or closing movement is needed in case the air supply is interrupted. The B1J type is used for spring-to-close operation; the spring pushes the piston towards the cylinder end, the extreme outward position. In turn, the B1JA type is used for spring-to-open operation; the spring pushes the piston towards the housing. Spring-return actuators are installed in a manner similar to B1C-series actuators, taking into account the following.

B1J type

- Install the actuator so that the piston is in the extreme outward position. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the **closed** position.

B1JA type

- Install the actuator so that the piston is in the cylinder end position at housing side. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the **open** position.

The rest of the installation procedure is the same as in Section 6.3.

6.5 Installing other makes of actuators

NOTE:
Valmet accepts no responsibility for compatibility of actuators not installed by Valmet.

Other actuators can be installed only if they have an ISO 5211 actuator connection.

7. TROUBLE SHOOTING TABLE

The following Table 5 lists malfunctions that might occur after prolonged use.

Table 5 Trouble shooting

Symptom	Possible fault	Recommended action
Leakage through a closed valve	Wrong stop screw adjustment of the actuator	Adjust the stop screw for closed position
	Faulty zero setting of the positioner	Adjust the positioner
	Damaged seat	Replace seat
	Damaged closing member	Replace the closing member
	Closing member in a wrong position relative to the actuator	Select the correct keyway in the actuator
Leakage through body joint	Damaged gasket	Replace the gasket
	Loose body joint	Tighten the nuts or screws
Irregular valve movements	Actuator or positioner malfunction	Check the operation of the actuator and positioner
	Process medium accumulated on the sealing surface	Clean the sealing surfaces
	Closing member or seat damaged	Replace the closing member or seat
	Crystallizing medium has entered the bearing spaces	Flush the bearing spaces
Gland packing leaking	Gland packing worn or damaged	Replace the gland packing
	Loose packing	Tighten the packing nuts

8. TOOLS

In addition to standard tools, the following special tools might facilitate some phases of the work.

- For removal of the actuator:
  - extractor (ID-code table in actuator's IMO).
- For installation/removal of the large NPS 18-24 ball seat:
  - Insertion tool 18"-24" (ID-code H235907)

This tool can be ordered from the manufacturer. Always give the valve type designation when ordering.

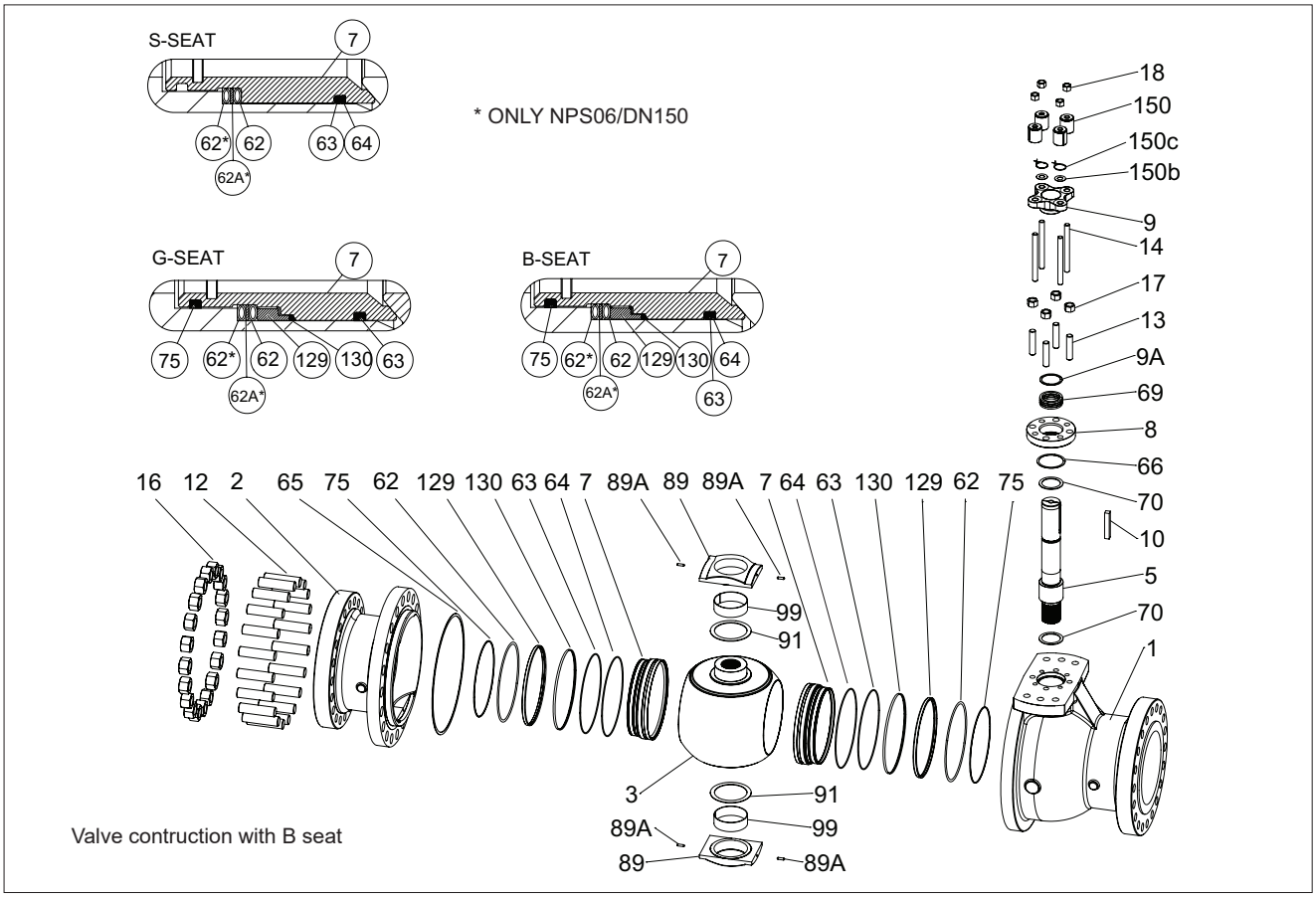
9. ORDERING SPARE PARTS

When ordering spare parts, always include the following information:

- type code, sales order number, serial number
- number of the parts list, part number, name of the part and quantity required

This information can be found from the identification plate or documents.

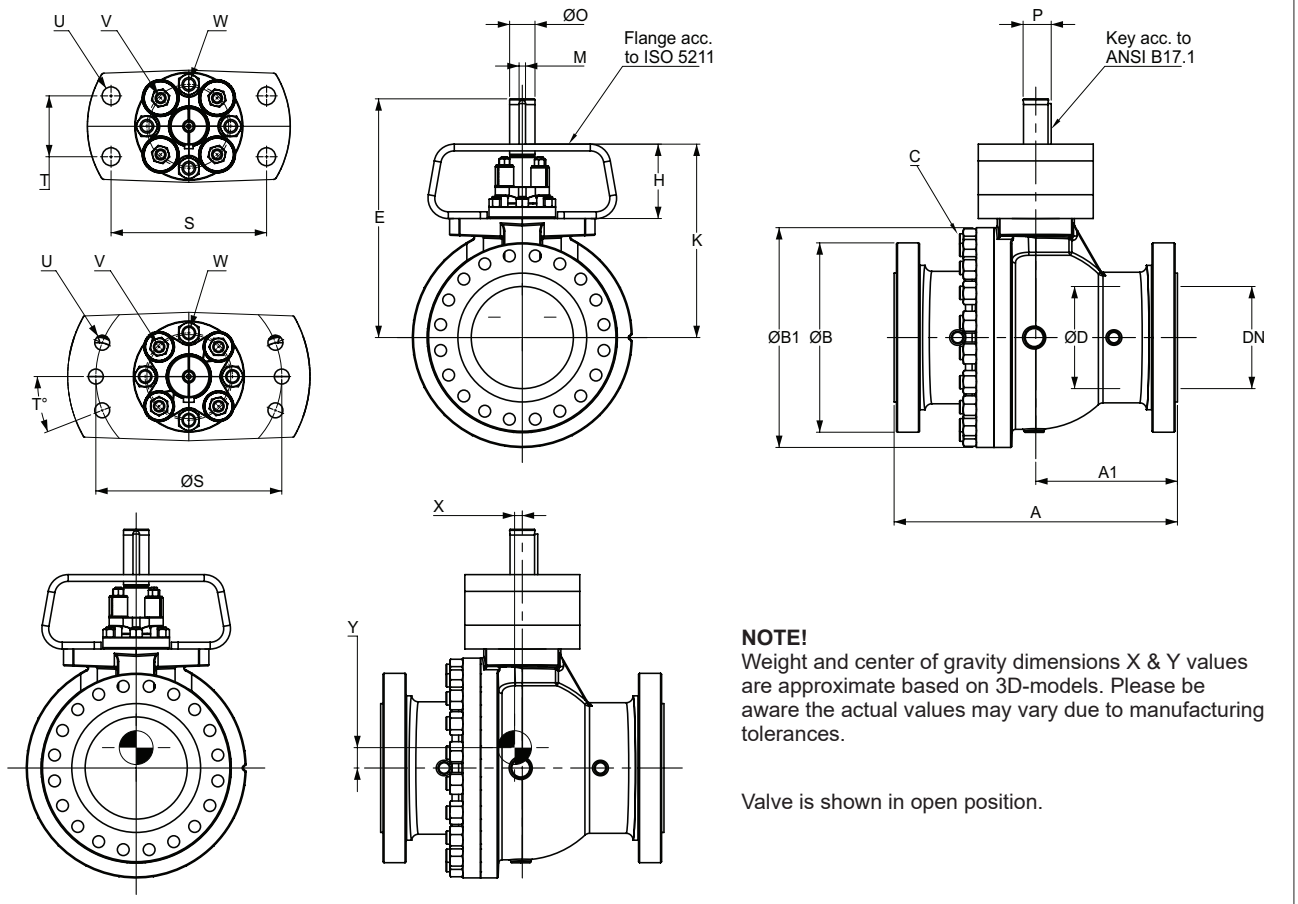
10. EXPLODED VIEW AND PARTS LIST



Item	Qty	Part Description	Spare part category
1	1	BODY	
2	1	BODY CAP	
3	1	BALL	3
5	1	SHAFT	3
7	1 or 2	SEAT (B)	
	1 or 2	SEAT (G)	2
	1 or 2	SEAT (S)	
8	1	BONNET	
9	1	GLAND	
9A	1	ANTI-EXTRUSION RING	
10	1	KEY	3
12		STUD	
13		STUD	
14		STUD	
16		HEXAGON NUT	
17		HEXAGON NUT	
18		HEXAGON NUT	
19	1	IDENTIFICATION PLATE	
62	1, 2 or 4	SPRING	2
62A	0, 1 or 2	SPACER RING	2
63	1 or 2 1 or 2	O-RING (S, B) BRAIDED SEAL SQUARE (G)	1 1
64	1 or 2	BACK-UP RING	1
65	1	BODY SEAL SPIRAL WOUND	1
66	1	SHEET RING	1
69	1	PACKING RING/V-RING SET	1
70	2	THRUST BEARING	1
75	1 or 2	BRAIDED SEAL SQUARE (G, B)	1
89	2	TRUNNION PLATE	
89A	4	PIN	1
91	2	THRUST BEARING	1
99	2	TRUNNION BEARING	1
129	1 or 2	SUPPORT RING (G, B)	2
130	1 or 2	BACK SEAL (G, B)	1
150		DISC SPRING SET	
150B	2	WASHER	
150C	2	ANTI-STATIC SPRING	

Spare part category 1: (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.
Spare part category 2: Parts for replacing of the seat. Available also as a set.
Spare part category 3: Parts for replacing of the closing element.
Spares for the full overhaul: All parts from the categories 1, 2 and 3.

11. DIMENSIONS AND WEIGHTS



NOTE!
Weight and center of gravity dimensions X & Y values are approximate based on 3D-models. Please be aware the actual values may vary due to manufacturing tolerances.

Valve is shown in open position.

Size		Dimensions in mm																				
NPS	DN	ØD	A (RF)	A (RTJ)	A1 (RF)	A1 (RTJ)	ØB	ØB1	E	K	H	M	ØO	P	S	T	U	V	W	C	Weight kg	X	Y
6	150	151	559	562	279.5	281	355	390	475	395	180	12.7	45	50.4	230	90	M24	M16	M16	M33	229.7	23	26
8	200	202	660	663	330	331.5	420	472	536	446	180	12.7	55	60.6	230	90	M30	M16	M20	M33	362.6	21	29
10	250	252	787	790	393.5	395	510	570	597	485	180	15.875	65	71.875	230	90	M30	M16	M20	M39	603.6	26	23
12	300	303	838	841	419	420.5	560	650	706	572	220	19.05	75	83.15	330	21.3	M30	M20	M24	M39	821.9	25	34
14	350	334	889	892	444.5	446	605	716	752	606	220	22.225	85	94.625	330	21.3	M30	M20	M24	M42	1123	36	28
16	400	385	991	994	495.5	497	685	804	843	687	250	22.225	95	104.825	400	23.6	M36	M20	M30	M48	1599	42	37
18	450	436	1092	1095	546	547.5	745	888	1031	826	330	31.75	120	133.75	500	24.8	M42	M24	M33	M52	2221	50	54
20	500	487	1194	1200	597	600	815	995	1069	864	330	31.75	120	133.75	500	24.8	M42	M24	M33	M52	2870	53	44
24	600	589	1397	1407	698.5	703.5	940	1172	1281	1031	380	38.1	150	166.6	550	24.7	M48	M30	M33	M64	4548	57	59

Size		Dimensions in inch																				
NPS	DN	ØD	A (RF)	A (RTJ)	A1 (RF)	A1 (RTJ)	ØB	ØB1	E	K	H	M	ØO	P	S	T	U	V	W	C	Weight, lbs	X	Y
6	150	5.94	22.01	22.13	11.00	11.06	13.98	15.35	18.70	15.55	7.09	0.50	1.77	1.98	9.06	3.54	M24	M16	M16	M33	505	0.91	1.02
8	200	7.95	25.98	26.10	12.99	13.05	16.54	18.58	21.10	17.56	7.09	0.50	2.17	2.39	9.06	3.54	M30	M16	M20	M33	798	0.83	1.14
10	250	9.92	30.98	31.10	15.49	15.55	20.08	22.44	23.50	19.09	7.09	0.63	2.56	2.83	9.06	3.54	M30	M16	M20	M39	1328	1.02	0.91
12	300	11.93	32.99	33.11	16.50	16.56	22.05	25.59	27.80	22.52	8.66	0.75	2.95	3.27	12.99	21.3	M30	M20	M24	M39	1808	0.98	1.34
14	350	13.15	35.00	35.12	17.50	17.56	23.82	28.19	29.61	23.86	8.66	0.88	3.35	3.73	12.99	21.3	M30	M20	M24	M42	2471	1.43	1.09
16	400	15.16	39.02	39.13	19.51	19.57	26.97	31.65	33.19	27.05	9.84	0.88	3.74	4.13	15.75	23.6	M36	M20	M30	M48	3518	1.65	1.44
18	450	17.17	42.99	43.11	21.50	21.56	29.33	34.96	40.59	32.52	12.99	1.25	4.72	5.27	19.69	24.8	M42	M24	M33	M52	4886	1.96	2.14
20	500	19.17	47.01	47.24	23.50	23.62	32.09	39.17	42.09	34.02	12.99	1.25	4.72	5.27	19.69	24.8	M42	M24	M33	M52	6314	2.10	1.74
24	600	23.19	55.00	55.39	27.50	27.70	37.01	46.14	50.43	40.59	14.96	1.50	5.91	6.56	21.65	24.7	M48	M30	M33	M64	10005	2.24	2.32

12. EU DECLARATION OF CONFORMITY FOR ATEX APPROVED VALVES

EU DECLARATION OF CONFORMITY

for ATEX approved valves

Manufacturer:
Valmet Flow Control Oy,
01380 Vantaa, Finland
*Valmet Flow Control (Jiaxing) Co., Ltd.
Jiaxing, China
*) Also manufactures certain series

EU Authorised Representative: Valmet Flow Control Oy, Vanha Porvoontie 229, 01380 Vantaa, Finland. Contact details: +358 10 417 5000

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product:	Neles Ball valves
Type:	D-series (D1, D2, D3, D4, D5), E-series (E2, E6), *M-series (M1, M2, M9, MH), S6-series, T-series (T2, T3, T4, T5), *X-series (XA, XB, XC, XG, XH, XJ, XM, XT, XU)
ATEX group and category:	II 2 GD, II 3 GD
Ex GAS:	Ex h IIC 85°C…Tmax Gb/Gc
Ex DUST:	Ex h IIIC T85°C…T(Tmax) Db/Dc

Tmax= valve max. temperature in name plate

Manufacturer's certificates:

Standard / Directive	Notified Body and NoBo number	Certificate No.
ISO 9001:2015	LRQA (Certification body)	00029133 (Approval No.)
PED 2014/68/EU Module H	DNV Business Assurance Italy S.r.l. 0496	142306-2013-CE-FIN-ACCREDIA
ATEX 2014/34/EU Annex IV	DNV Product Assurance AS Norway 2460	Presafe 18 ATEX 91983Q Issue 6

ATEX 2014/34/EU Annex VIII technical files are archived by Notified Body number 0537

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

PED 2014/68/EU	Valve
ATEX 2014/34/EU	Non-electrical equipment

Main components:

Valve:
The valve is suitable for service up to PED Cat III

Valve design standard: ASME B16.34

Installation, Maintenance and Operating instructions manual (IMO) must be followed before installation in order to ensure proper and safe mounting and usage of equipment.

The product above is manufactured in compliance with the applicable European directives and technical specifications/standards EN10204:3.1. The product is in conformity with the customer order.

Instrumentation and accessories having equal protection concept, level and performance specification with the original can be presumed to be in conformity with this Declaration of Conformity.

Protection from e.g. static electricity caused by the process or connected equipment must be considered by the user (EN 60079-14 § 6). EN 60079-19 applies for modifications.

Non-electrical equipment is according EN 80079-37:2016 and EN 80079-36:2016. The actual surface temperature of non-electrical equipment is depended on the process and ambient conditions (EN 80079-36:2016 § 6.2.5 and 6.2.7). The protection from high or low temperature must be considered by the end user before put into service.

The product does not possess any residual risk according to hazard analysis conducted under the applicable directives providing that the procedures stated by the IMO are followed and the product is used under conditions mentioned in the technical specifications.

Documents with digital and/or e-signature conveyed by Valmet Flow Control conform to the Regulation (EU) No 910/2014 as well as the national code on e-signatures. In order to secure the integrity of the document, the authenticity of the sender, and indisputableness of the dispatch the identification is covered by individual ID codes, passwords, and by regularly changing passwords. The authorization to sign documents is based on organizational position and/or is task related. The impartial third party in the company bestows the access right with predefined authorities to particular databases.

Vantaa 1.10.2025

Matti Rousku, Quality Director

13. TYPE CODE

Trunnion mounted, Neles™ ball valve, series XH ASME class 600, EN PN 100												
1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**
XH	06	F	W	TA	J2	PJ	S	A	B	F	A	

1. sign	VALVE SERIES & STYLE & FACE-TO-FACE
	Flanged
XH	Full bore, trunnion bearings, f-to-f ASME B 16.10, table 3, long pattern, ASME Class 600, EN PN 63 - 100

2. sign	ASME VALVES, NPS Pressure class availability, Class 600
06	6”
08	8”
10	10”
12	12”
14	14"
16	16"
18	18"
20	20"
24	24"
	EN VALVES, DN Pressure class availability, EN PN 63 - 100
150	150
200	200
250	250
300	300
350	350
400	400
450	450
500	500
600	600

3. sign	PRESSURE CLASS
F	ASME class 600
N	PN 63
P	PN 100

4. sign	END CONNECTION STYLE
	ASME rated flanges:
W	Raised face, ASME B 16.5 (Ra 3.2-6.3), standard
Z	Ring joint, ASME B 16.5
Y	Special form or surface, to be specified, e.g. weld ends
	EN flanges:
C	EN 1092-1 Type B1 (Ra 3.2 – 12.5).

5. sign	CONSTRUCTION & APPLICATION
TA	Standard construction. Double seated. Live loaded packing.
TE	TE Single seated. Otherwise standard.
TQ	Q-Trim construction. Otherwise standard.
EQ	Single seated. Q-Trim construction
EM	Single seated. QLM-Trim construction
2G	Q2G-trim for gas application, single seated, otherwise standard.
2H	Q2GH-trim for gas application, single seated, otherwise standard.

6. sign	BODY MATERIALS, FORGINGS / CASTINGS		
	STANDARD materials		
J2	ASTM A216 gr WCB	S6	ASTM A351 gr CF8M (SS)
	NON-STANDARD materials		
J1	ASTM A216 gr WCC	S1	ASTM A351 gr CF3M (SS)
J4	ASTM A217 gr WC6	S8	ASTM A351 gr CF8C(SS)
J8	ASTM A352 gr LCC		

7. sign	BALL / COATING & STEM MATERIAL
	XH, STANDARD materials
PJ	316SS / Hard chrome & 17-4PH
PX	316SS / Chrome carbide & 17-4PH
PV	316SS / Tungsten carbide & 17-4PH

8. sign	SEAT AND BACK SEAL TYPES / SPRING MATERIALS SEAT CONSTRUCTIONS ARE SHOWN ON PAGE 9			
	Seat type	Back seal type	Spring	Back-up ring
S	Metal, general service	O-ring	Inconel 625	PTFE
B	Metal, solids proof	Graphite + O-ring	Inconel 625	PTFE
G	Metal, high temperature	Graphite	Inconel 625	----

9. sign	SEAT MATERIAL	
	Metal seats	
	Seat material	Coating
A	316SS	Cobalt based alloy
B	316SS	Chrome Carbide, CrC-LF
V	316SS	Tungsten Carbide, TC2

10. sign	BEARING AND SEAL MATERIALS				
	Trunnion bearing	Packings	Body gaskets	O-rings	Thrust bearing
A	RPTFE	V-rings	PTFE	FKM	RPTFE
B	RPTFE	Graphite	Graphite	FKM	RPTFE
C	Metal	V-rings	PTFE	FKM	Metal
D	Metal	Graphite	Graphite	FKM	Metal

11. sign	BOLTING MATERIALS	
	Bolting material with unified (XH) threads	
	Studs	Nuts
D *	B8M	8M
F **	L7M	7M

*) Bolting materials for stainless steel body
**) Bolting materials for carbon and low alloy steel body

12. sign	MODEL CODE
A	XH model code A

13. sign	Option / Modifier
D	Drain plug on the body
B	Bleeder valve

14. GENERAL SAFETY WARNINGS AND DISCLAIMERS

General safety warnings

Lifting

1. Always use a lifting plan created by a qualified person to lift this equipment. Lifting guidance is provided in this IMO (Installation, Maintenance and Operation manual) to assist in lifting plan development. Think about the center of gravity (CG) of the equipment being lifted. Make sure the CG is always under the central lifting point.
2. Valves may be equipped with lifting threads on the body or on the flanges. These are intended to be used with the lifting plan.
3. Use only correct and approved lifting devices. Ensure that lifting devices and straps are securely attached to the equipment prior to lifting.
4. Check, that lifting devices are not damaged and in good condition with a valid check stamp prior to use.
5. Workers must be trained for lifting and handling valves.
6. Never lift an assembly by the instrumentation (solenoid, positioner, limit switch, etc.) or by the instrumentation piping. Straps and lifting devices should be fitted to prevent damage to instrumentation and instrumentation piping. Failure to follow the lifting guidance provided may result in damage and personal injury from falling objects.

Work activities on the valve

1. Wear your personal safety equipment. Personal safety equipment includes but is not limited to protective shoes, protective clothing, safety glasses, helmet, hearing protection and working gloves.
2. Always follow the local safety instructions in addition to the Valmet instructions. If Valmet instructions conflict with local safety instructions, stop work and contact Valmet for more information.
3. Before beginning service on the equipment, make sure that the actuator is disconnected from any kind of power source (pneumatic, hydraulic, and/or electric), and no stored energy is applied on the actuator (compressed spring, compressed air volumes, etc.). Do not attempt to remove a spring return actuator unless the stop screw is carrying the spring force.
4. Make sure that there is a LOTOTO (Lock Out / Tag Out / Try Out) procedure in place for the system in which the valve is installed and strictly follow it.
5. Always make sure that the pipeline is depressurized and in ambient temperature condition before maintenance work is started.
6. Keep hands and other body parts out of the flow port when the valve is being serviced and the actuator is connected to the valve. There is a high risk of serious injury to hands and/or fingers due to malfunction if the valve suddenly starts to operate.
7. Beware of Trim (Disc, Ball or Plug) movement even when the valve is disassembled. Trim may move simply due to the weight of the part or change in position of the valve. Keep hands or other body parts away from locations where they may be injured by movement of the trim. Do not leave objects near or in the valve port which may fall in and need to be retrieved.

General disclaimers

Receiving, handling and unpacking.

1. Respect the safety warnings above!
2. Valves are critical components for pipelines to control high pressure fluids and must therefore be handled with care.
3. Store valves and equipment in a dry and protected area until the equipment is installed.
4. Do not exceed the maximum storage temperatures given in the IMO (installation, maintenance, and operating instructions).
5. Keep the original packaging on the valve as long as possible to avoid environmental contamination by dust, water, dirt, etc.
6. Remove the valve endcaps just before mounting into the pipeline.
7. FOR YOUR SAFETY IT IS IMPORTANT TO FOLLOW THESE PRECAUTIONS BEFORE REMOVAL OF THE VALVE FROM THE PIPELINE OR ANY DISASSEMBLY:
   - Be sure you know what flow medium is in the pipeline. If there is any doubt, confirm with the proper supervisor.
   - Wear any personal protective equipment (PPE) required for working with the flow medium involved in addition to any other PPE normally required.
   - Depressurize the pipeline, bring to ambient temperature, and drain the pipeline flow medium.
   - Cycle the valve to relieve any residual pressure in the body cavity.
   - After removal but before disassembly, cycle the valve again until no evidence of trapped pressure remains.
   - The valves with offset shaft (Butterfly, eccentric rotary plug) have greater trim area on one side of the shaft. This will cause the valve to open when pressurized from the preferred direction without a locking handle or an actuator installed.
   - WARNING: DO NOT PRESSURIZE THE ECCENTRIC VALVE WITHOUT A HANDLE OR AN ACTUATOR MOUNTED ON IT!
   - WARNING: DO NOT REMOVE A HANDLE OR AN ACTUATOR FROM AN ECCENTRIC VALVE WHILE PRESSURIZED!
   - Before installing the eccentric valve in or remove it from the pipeline, cycle the valve closed. Eccentric valves must be in the closed position to bring the trim within the face to face of the valve. Failure to follow these instructions will cause damage to the valve and may result in personal injury.

Operating

8. The identification plate (ID-plate, type plate, nameplate, or engraved markings) on the valve gives the information of max. process conditions to the valve.
9. (For soft seats) The practical and safe use of this product is determined by both the temperature and pressure ratings of the seat and body. Read the identification plate and check both ratings. This product is available with a variety of seat materials. Some seat materials have pressure ratings that are lower than the body ratings. All body and seat ratings are dependent on the valve type, size and material of the body and seat. Never exceed the marked rating.
10. Temperatures and pressures must never exceed values marked on the valve. Exceeding these values may cause uncontrolled release of pressure and process medium. Damage or personal injury may result.
11. The operating torque of the valve may rise over time due to wear, particles or other damage of the seat. Never exceed the actuator torque preset values (air supply, position). Application of excessive torque may cause damage to the valve.
12. Valmet valves typically are designed to be used in atmospheric conditions. Do not use valves under external pressurized conditions unless specifically designed and explicitly marked for this service.

13. Avoid Pressure shocks or water hammer. Systems with high pressure valves should be equipped with a bypass to reduce the differential pressure before opening the valve to avoid pressure shock.
14. Avoid thermal shock. High temperature, Low temperature and cryogenic valves should be operated in a way that limits the rate of increase or decrease in temperature. The valve should be thermally stabilized before being pressurized.
15. Materials of the valve are carefully selected for the process conditions. Changes to the process media can have a major impact on function and safety of the valve. Always confirm the materials are suitable for the service prior to installation.
16. As the use of the valve is application specific, several factors should be considered when selecting a valve for a given application. Therefore, some situations in which the valves are used are outside the scope of this manual.
17. It is the end user's responsibility to confirm compatibility of the valve materials with the intended service, however if you have questions concerning the use, application, or compatibility of the valve for the intended service, contact Valmet for more information.
18. Never use a valve with enriched or pure oxygen if the valve is not explicitly designed and cleaned for oxygen. Selected materials and design have a major impact on the safety to operate the valve with oxygen.
19. Valves intended for use in or with explosive atmospheres must be equipped with a grounding device and marked according ATEX (or equivalent international standards).
20. Manual handles are available for specific butterfly valve sizes and maximum line pressures. Do not operate a valve with a handle or wrench outside the size and pressure limits stated in the IMO. High line pressure may create a large enough force to pull the handle from the operator's hands. Damage or personal injury may result.

Maintenance

21. Respect the safety warnings above!
22. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.
23. Maintain the valve within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.
24. Always make sure that the valve and the pipeline is depressurized before starting any kind of maintenance work at a valve.
25. Always check the position of the valve before starting maintenance work. Follow the Lock out /tag out (LOTO) rules at the site before starting any maintenance activity.
    - See IMO for the correct stem position.
    - Consider that the positioner may give the wrong signals.
26. Sealing materials (soft sealing parts) should be changed when the valve is in maintenance. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired valve.
27. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
28. Valve pressure retaining parts and all internals must be inspected for corrosion or erosion which may result in reduced wall thickness on pressure retaining parts. Damaged pressure retaining parts must be replaced with original equipment manufacturer's (OEM) replacement parts or repaired to factory specifications by an authorized Valmet service partner in order to maintain the warranty.
29. Do not use sharp tools, grinding machines, or files to work on functional surfaces such as sealing, seating or bearing surfaces as this can damage these surfaces.
30. Check the condition of sealing surfaces on the seats, trim (disc, ball, plug, etc.), body and body cap. Replace parts if there are significant wear, scratches, or damage.
31. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
32. Do not weld on pressure retaining parts without an ASME and PED qualified procedure and personnel.
33. Pressure retaining parts of valves in high temperature applications must be carefully examined for the effects of material creep and fatigue.
34. Make sure that the valve is positioned in the correct flow direction into the pipeline.
35. If the valves are marked to be suitable for explosive atmospheres, the correct function of the discharging device must be tested before returning to service.
36. Always work in a clean environment. Avoid getting particles inside the valve due to machining, grinding, or welding nearby.
37. Never store a valve in maintenance without flow port protection.
38. When pressure testing valve seats, never exceed the maximum operating pressure of the system or the maximum shut-off pressure marked on the valve identification plate.
39. Actuator mounting and unmounting:
    - Before installing the actuator on to the valve, be sure the actuator is properly indicating the valve position. Failure to assemble these to indicate correct valve position may result in damage or personal injury.
    - When installing or removing a linkage kit, best practice is to remove the entire linkage assembly, including couplings which may fall off the valve during lifting or when position changes.
    - Mounting sets have been designed to support the weight of the Valmet actuator and recommended accessories either as is or with additional actuator support. Use of the linkage to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.
40. The valve should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the valve between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.
41. Repairs on valves for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
    - Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
    - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
    - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test medium during the test.
    - Lubrication shall be used only if specifically required in the instructions. Where lubrication is required, the lubricant must be approved for the service by the end user.

Valmet Flow Control Oy
Vanha Porvoontie 229, 01380 Vantaa, Finland.
Tel. +358 10 417 5000.
www.valmet.com/flowcontrol

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