Seat supported Neles™ ball valves

Series XT/XA and XB/XC

Installation, maintenance and operating instructions

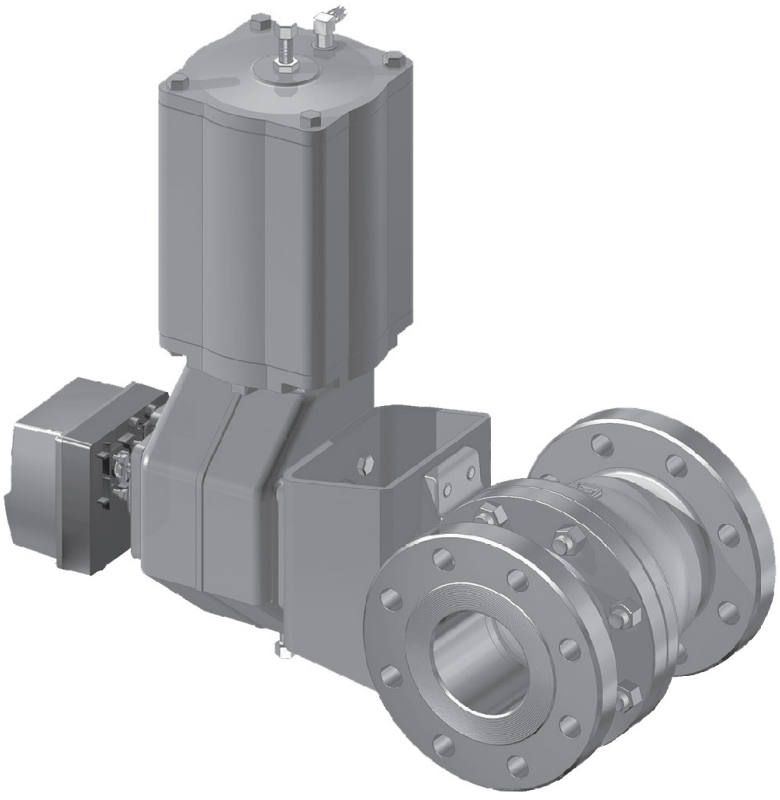


Table of contents

EAC 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 manual provides the essential information on the use of XT/XA and XB/XC series seat supported ball valves. For further information on actuators and other instruments, which are covered only briefly, please refer to separate manuals on their installation, use and maintenance.

NOTE:
As the use of the valve is application-specific, a number of factors should be taken into account when selecting the application. Therefore, some of the situations in which the valves are used are outside the scope of this manual.

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

Neles™ XT/XA series valves are full bore and XB/XC series valves are reduced bore flanged ball valves. The valves are either metal or soft seated. All XT/XA valves and XB/XC valves size 08” have two-piece bodies with bolted body joints. XB/XC valves sizes 3”, 4” and 6” comprise a single part. The ball and the shaft are separate parts and a shaft blow-out is prevented by a separate thrust ring/pin and retaining plates.

A spline driver transmitting the shaft torque to the ball connects the shaft with the ball. In 1” and 1 1/2” valves the shaft directly drives the slot in the ball (no separate driver).

The valve is tight in both flow directions. Tightness is based on pipe pressure, i.e. the pressure differential over the valve forces the ball against the downstream seat. The arrow in Figs. 1, 2 and 3 shows the recommended flow direction with H and G seat construction.

The construction of the valves may vary in accordance with customers’ wishes. The construction details are indicated in the type code in the identification plate. For more information about the type code, see Section 12.

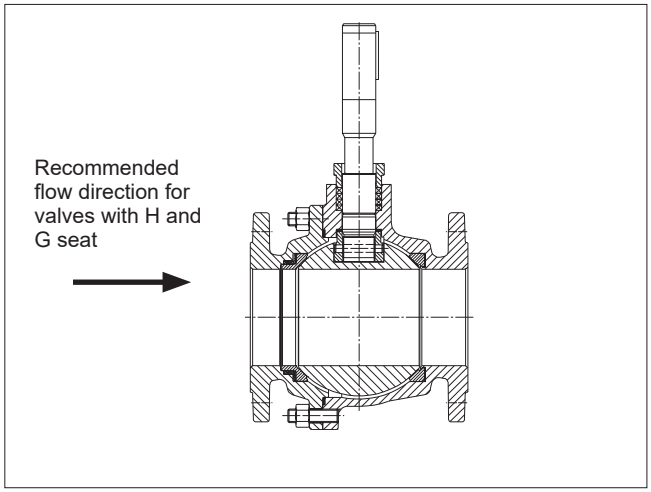


Fig. 1 Construction of an XT/XA-series valve, sizes 1”-8”

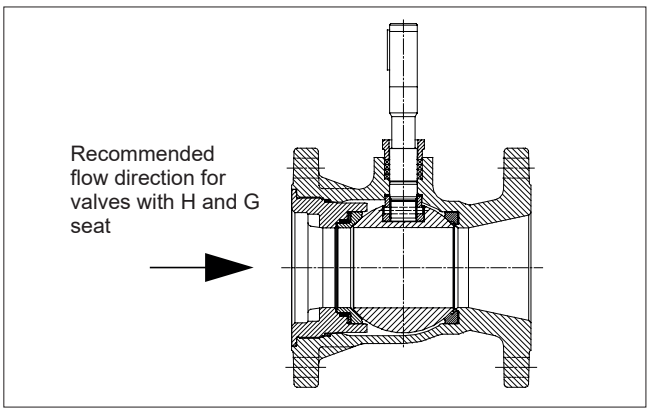


Fig. 2 Construction of an XB/XC series valve, sizes 3”, 4” and 6”

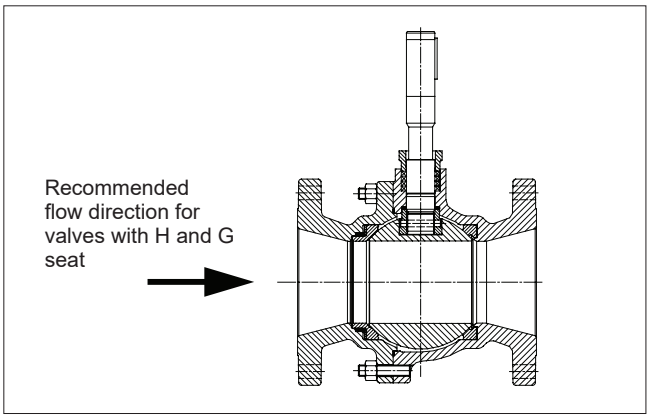


Fig. 3 Construction of an XB/XC series valve, size 8”

1.3 Valve markings

Body markings are cast or stamped on the body (see Fig. 4). The identification plate (Fig. 5) is on the valve flange.

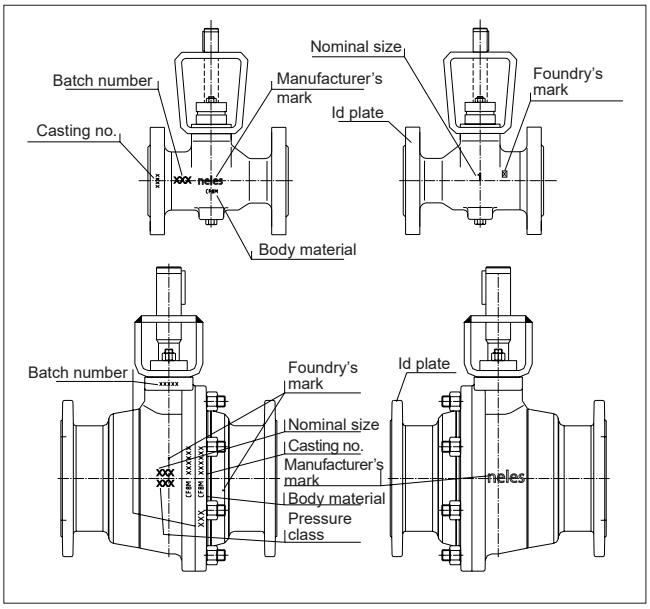


Fig. 4 Valve markings

The identification plate (Fig. 5) is attached to the flange. Identification plate markings are:

1. Body material
2. Shaft material
3. Trim material
4. Seat material
5. Max and min operating temperature
6. Max shut-off pressure at room temperature
7. Pressure class
8. Type designation
9. Valve manufacturing parts list no.
10. Model
11. Certification and approvals, eg. CE, Atex etc.

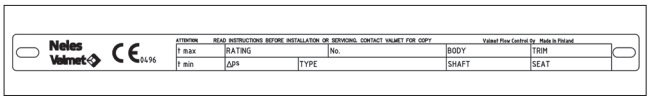


Fig. 5 Example of identification plate

1.4 Technical specifications

Product type

Full bore, seat supported ball valve

Floating ball design

Split body design

Pressure ratings

ASME 150 and 300

Size range

1” – 8” / DN25 - 200 in full bore

3” - 8” / DN80 - 200 in reduced bore

Temperature range

-200 … +600 °C / -330 … +1110 °F, consult factory for higher temperature applications.

Design standards

Valve body	ASME B16.34
Valve flanges	ASME B16.5
Face-to-face	ASME B16.10 long pattern, full bore, except class 150 NPS01” acc.to Table 2, same as in class 300.
	ASME B16.10 short pattern, reduced bore
Actuator mounting	ISO 5211

Standard materials

Body:	WCB and CF8M
Ball:	CF8M + hard chrome or other special coatings with metal seats
Bearings:	PTFE or cobalt based alloy
Seats:	Stainless steel + cobalt based alloy
Seals/gaskets:	PTFE or graphite
Body gasket:	Spiral wound with PTFE or graphite filler
Gland packing:	PTFE (V-rings) or graphite
Standard bolting:	L7M/2HM, B8M/8M.

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.

Material and test certification

EN 10204-3.1 material certificates for body and bonnet.

Tightness test certificate.

Standard options

Carbide or NiBo ball and seat coatings

Spring loaded seat

Solid proof seat

Q-Trim

High temperature linkages (temperatures above +300 °C/+570 °F)

Anti-static

Oxygen construction for gaseous oxygen service.

Cryogenic version (temperatures below -50 °C/-58 °F)

Steam jacket

Fire tested API 607, with selected constructions and seat designs

NACE MR 0103 and MR 0175 on request based on application.

Valve testing

Each valve is tested for body integrity and seat tightness.

The body test pressure is 1.5 x PN. The seat test pressure for metal seated valves is 1.1 x PN.

The test medium is inhibited water. Air test upon request.

Valve tightness

ISO 5208 Rate C or ANSI/FCI 70-2 class V for metal seats

Other tightness rates upon request

- Rate B
- ANSI Class VI
- API 598

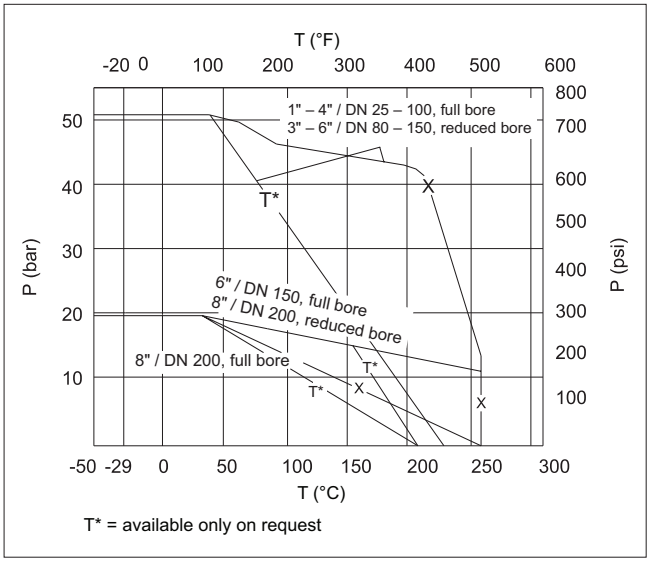


Fig. 6 Valve seat rating, soft seats

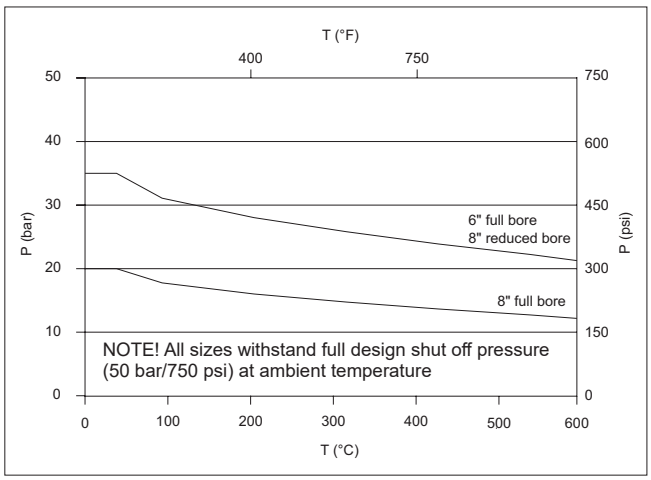


Fig. 7 Maximum operational pressure differential, metal-seated ASME Class 300 valves. Smaller sizes and ASME Class 150 valves are full rated.

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 ropes securely around the valve body. Please consult separate document: Instructions for lifting Neles products. (See Neles document id: 10LIFT70en.pdf). Damage or personal injury may result from falling parts.
The weights are shown in Section 11.

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

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.

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

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.

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

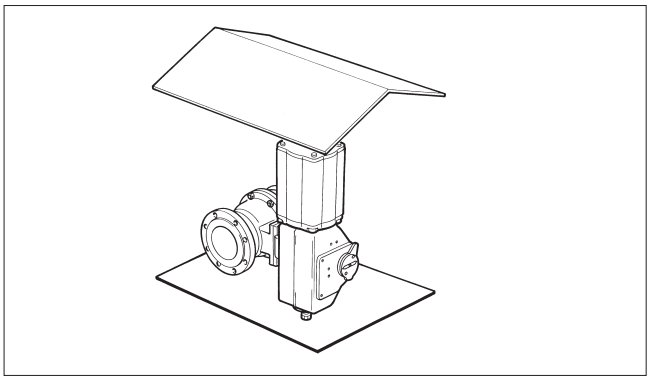


Fig. 8 Storing the valve

Move the valve to its intended location just before installation.

The valve is usually delivered in the open position.

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.

Please consult separate document: Instructions for lifting Neles products. (See Neles document id: 10LIFT70en.pdf)

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 tightness in both directions. 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 Figure 9.

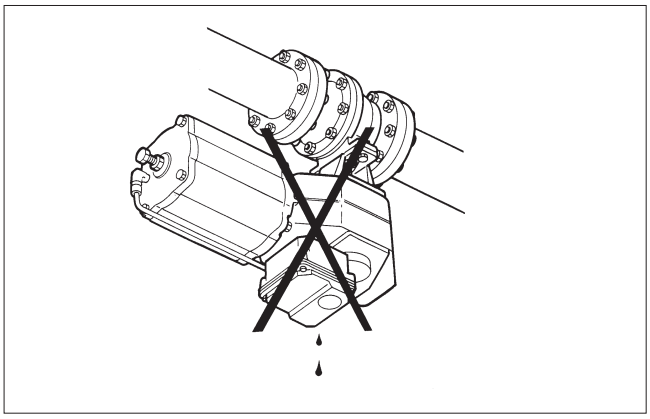


Fig. 9 Avoid this mounting position

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 Figure 10.

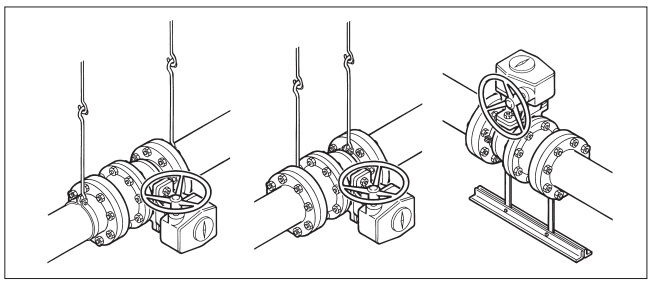


Fig. 10 Supporting the valve

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Figure 11.

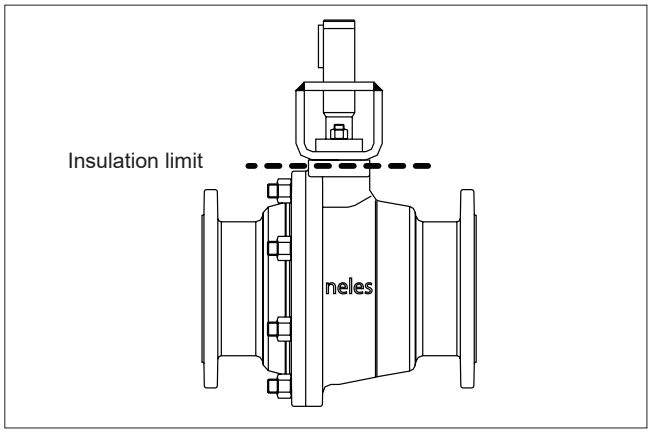


Fig. 11 Insulation of the valve

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 1.7 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 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.

4.2 Replacing the packing without removing the valve from the pipeline

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

CAUTION:
For safety reasons the retaining plates (42) MUST always be installed as shown in Section 4.2.

The V-ring gland packing requires no regular tightening. The gland packing tightness is provided by the pipeline pressure together with gland pressure against the packing rings. 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. The V-ring gland packing must be tightened with care because excess force may damage the V-rings.

- Make sure that the valve is not pressurized.
- Detach the actuator and bracket according to the instructions in section 4.4.
- Remove the hexagon nuts (18), the disc spring sets (150), the studs (14), the retaining plates (42) and the gland (9).
- 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 follower may be used for pushing the rings into the counterbore.
- Do not damage packing rings in the shaft keyway. See Fig. 13 for proper orientation. Please note that the support ring (67) may come off as you remove the packing in GA construction 2”-8” (type code 5th sign). It should be placed back in its position before installing the new packing. See Fig. 13. Screw down the removed studs.
- Pre-compress the packing rings first by tightening the gland nuts without disc spring sets to the torque Tt, see value from table 1 or table 2.
- Remove the gland nuts, mount the retaining plates and place the disc spring sets on the gland studs. Tighten the nuts so that the disc spring sets are compressed to the height H2, see table 1 or table 2 depending on which disc spring set material is in use. Lock the nuts with locking compound e.g. Loctite 221.
- Check leakage when the valve is pressurized.

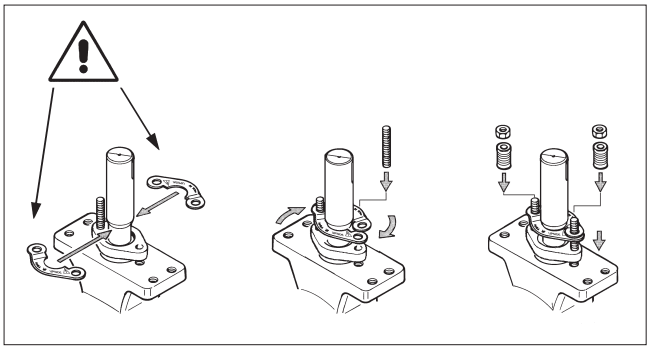


Fig. 12 Installing the retainer plates

Table 1 Tightening of the gland packing with stainless steel disc spring sets (*)

Valve size		Shaft dia (mm)	Spring dimensions		PTFE V-ring		Graphite		ID code of disc spring set
DN	NPS		A (mm)	H1 (mm)	H2 (mm)	Tt (Nm)	H2 (mm)	Tt (Nm)	
25	01”	15	20	24	23.3	3	22.6	6	H148583
40	1 1/2”	20	20	24	23.1	4	22.3	7	H148583
50	02”	25	25	33.4	32.4	7	31.4	14	H148584
80	03”	25	25	33.4	32.4	7	31.4	14	H148584
100	04”	35	25	33.4	32.1	10	31.4	19	H148584
150	06”	45	35.5	43.5	42.0	21	40.6	43	H148585
200	08”	55	35.5	43.5	41.8	25	40.5	51	H148585

(*) Disc spring set material change has been done in mid 2019

Table 2 Tightening of the gland packing with carbon steel+ENP coated disc spring sets

Valve size		Shaft dia (mm)	Spring dimensions		PTFE V-ring		Graphite		ID code of disc spring set
DN	NPS		A (mm)	H1 (mm)	H2 (mm)	Tt (Nm)	H2 (mm)	Tt (Nm)	
25	01"	15	20	22	21.2	3	20.3	6	979540
40	1 1/2"	20	20	22	21.0	4	20.2	7	979540
50	02"	25	25	30.5	29.4	7	28.4	14	979560
80	03"	25	25	30.5	29.4	7	28.4	14	979560
100	04"	35	25	30.5	29.1	10	28.2	19	979560
150	06"	45	35.5	41	39.1	21	37.6	43	979580
200	08"	55	35.5	41	38.8	25	37.4	51	979580

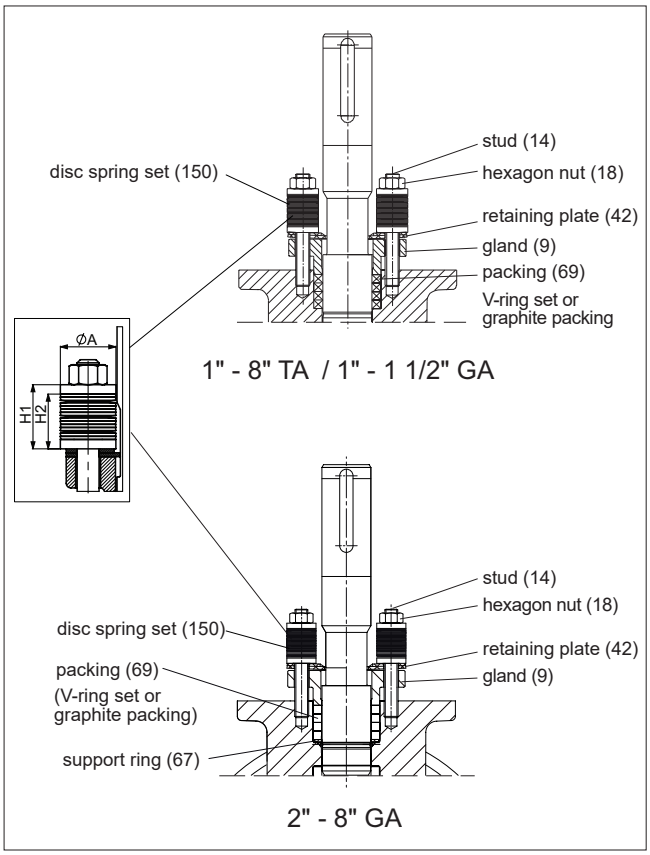


Fig. 13 Packing

4.3 Repairing a jammed or stiff valve without removing it from the pipeline

Jamming or stiff function may be caused by a flow medium clogging the seat (7, 25) and the ball (3). The ball and the seats can be cleaned without removing the valve from the pipeline by turning the ball to a partly open position and flushing the pipes.

If this does not help, follow the instructions below.

4.4 Detaching the B series 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 usually easiest to detach the actuator and support equipment before removing the valve from the pipeline. If the package is small or not easily accessible, it is better to remove the entire package at the same time.

Please note that the ball seats can be replaced without detaching the actuator.

- Close and detach the actuator pressure supply and disconnect the control cables and pipes.
- Loosen the bracket screws.

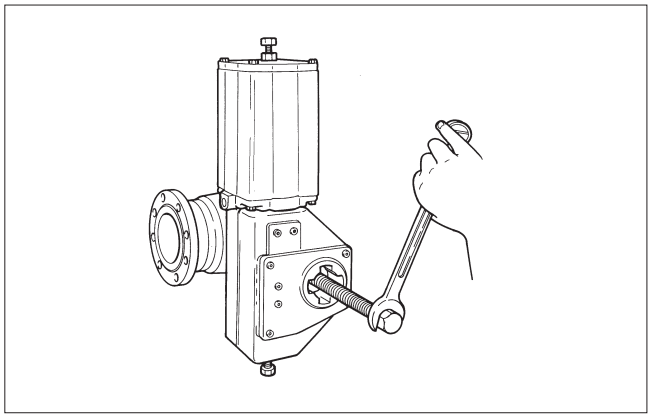


Fig. 14 Detaching a B series actuator with an extractor

- Detach the actuator from the valve with an extractor that 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 it from the pipeline while the valve is pressurized!

- Make sure that the pipeline is empty and unpressurized and that there is no medium flowing to the pipeline while the valve is being serviced.
- Support the valve carefully with a hoist. Place ropes carefully and unscrew the pipe flange bolts. Place the lifting sling around body, avoid any contact with the instrumentation. Lift valve down. Please consult separate document: Instructions for lifting Neles products. (See Neles document id: 10LIFT70en.pdf)

4.6 Dismantling the valve

Sizes 1” - 8” (XT/XA), 8” (XB/XC)

- Place the valve so that the body’s hexagon nuts (16) / body cap (2) point upwards. Use a surface that does not damage the flanges.
- Mark the body halves for correct orientation during reassembly.
- Loosen the gland nuts (18).
- Turn the ball to the closed position.
- Loosen the body nuts (16).
- Remove the body cap (2) from the valve. Ball seat (7, 25) should stay on the body cap, keep it from falling while you are lifting it out by putting your fingers under the body cap (small sizes) or in the flow bore (large sizes). **Watch out for your hand!** Lower the body cap onto the surface in a standing position, i.e. onto its flange. See Figure 15.
- Remove the seat (7, 25) from the body cap making sure that it is not damaged during the operation. If the seat is a locked type, use a special tool which can be ordered from the manufacturer. See Figure 16 and Section 8 ’Tools’.

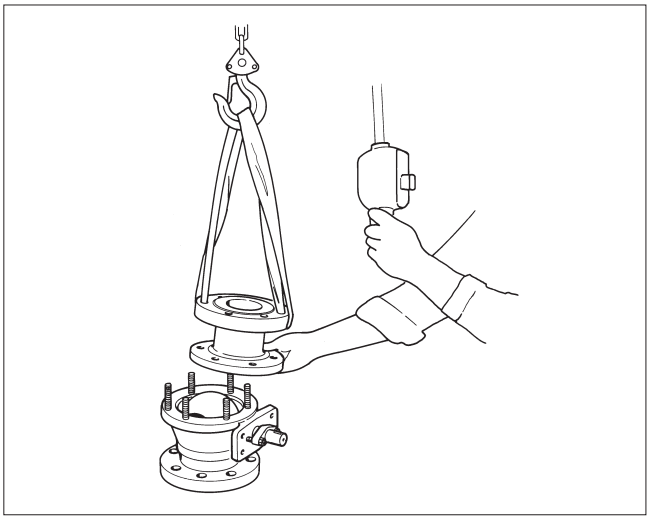


Fig. 15 Lifting the body cap

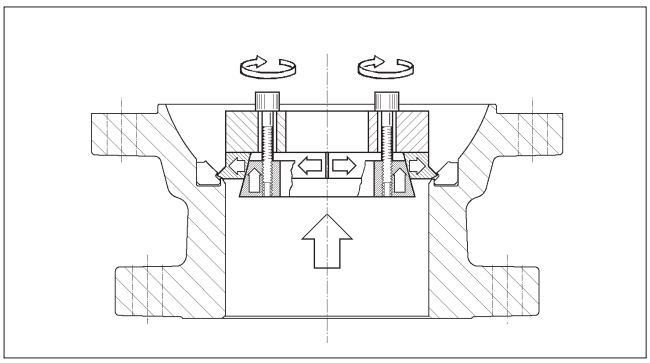


Fig. 16 Removing a locked seat

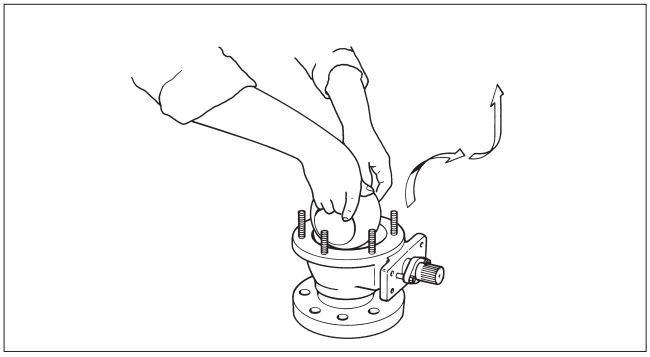


Fig. 17 Removing the ball from the body

- Remove the ball (3) from the body (1) by gripping the edges of the flow bore (small sizes) or by passing a rope through the bore (large sizes). To detach the ball from the spline driver (4) in sizes 2”-8” or from shaft/thrust ring (4) in sizes 1”-1 1/2”, turn the ball to the closed position before lifting. Make sure that the ball is not damaged and put it onto a soft surface. See Figure 17.
- Remove the key (10).
- Remove the gland nuts (18), spring sets (150), studs (14), retaining plates (42) and gland (9). Remove the packing (69). Remove the pin (50). Remove the spline driver (2”-8”) or thrust ring (1”-1 1/2”) inside the body. For detailed figures to remove the thrust ring see Figure 18. Remove the shaft (5) by pulling it outwards. Please note that this will detach the thrust bearings (70) from around the shaft.

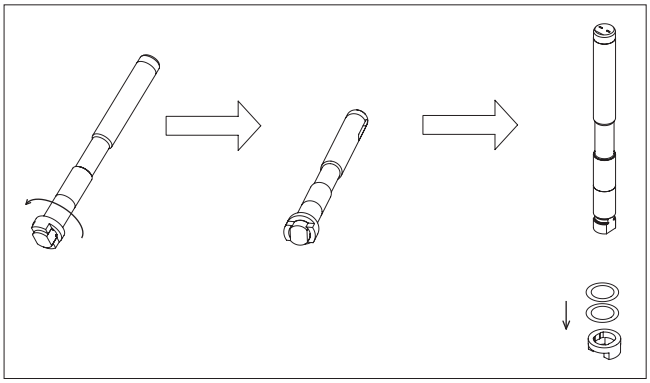


Fig. 18 Detaching the thrust ring in sizes 1” and 1 1/2”

- Remove the ball seat (7) from the body (1), if necessary with a special tool. Also remove the back seals (63) from the ball seats and the body gasket (65).

Sizes 3”- 6” (XB/XC)

- Place the valve in a standing position on the pipe flange end so that the insert points upwards. Use a level surface that does not scratch the flange surfaces.
- Unscrew the insert (2) using a special tool. See Section 8 ’Tools’.
- Remove the gaskets (65, 135), seat (7) and ball (3). The ball should be in the closed position for removal.
- Remove the key (10).
- Unfasten the the gland nuts (18). Remove the disc spring sets (150), studs (14), retainer plates (42), the gland (9) and the packing rings (69).
- Remove the pin (50) and then the spline driver.
- Remove the stem (5) by pulling it outwards. The thrust bearings (70) will be detached around the stem.
- Remove the locked seat (7) using an outpulling tool, see Figure 19. See also Section 8 ’Tools’.

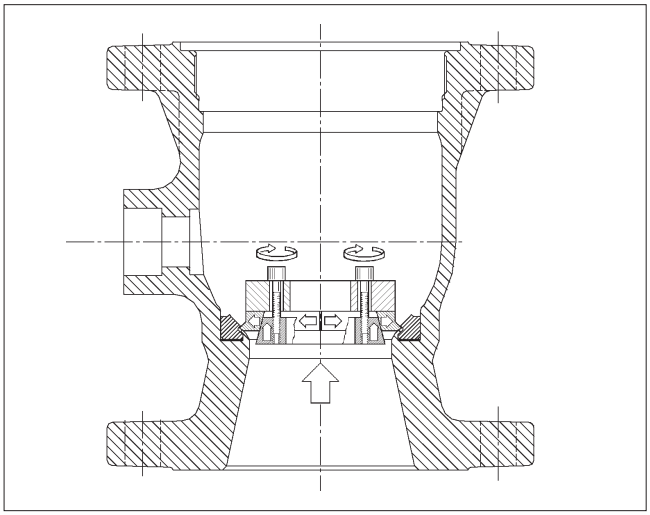


Fig. 19 Removing a locked seat

4.7 Checking the parts of a dismantled valve

- Clean the removed parts.
- Check the shaft (5) and the thrust bearings (70).
- Check the ball (3) and the ball seats (7, 25).
- Check the body gasket surfaces.
- Replace any damaged parts.

4.8 Replacing parts

Replace soft parts whenever you dismantle the valve for maintenance. Replace other parts when necessary. By using original spare parts, you can ensure proper functioning of the valve. For ordering the spare parts, see Section 9 (’Ordering spare parts’).

4.9 Reassembling the valve

CAUTION:
For safety reasons the retaining plates (42) MUST always be installed as shown in Section 4.2.

Sizes 1” - 8” (XT/XA), 8” (XB/XC)

- Place the valve body on its pipe flange. Use a surface that does not damage the pipe flanges.

S seats:

- Place the back seal (63) in the ball seat (7); see Fig. 20. Place the seat in the body (1).

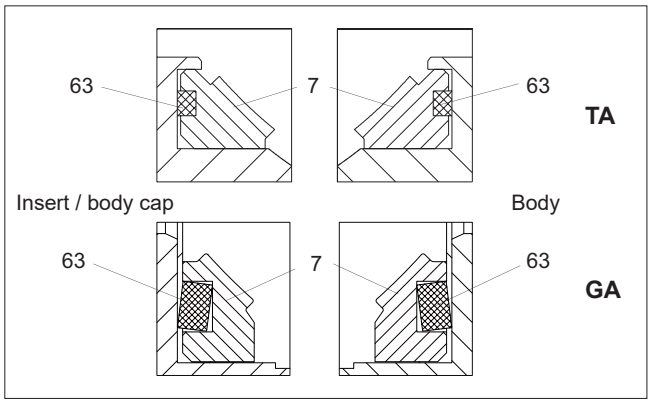


Fig. 20 S seats

Soft seats (X, T):

- Place the seat in the body (1).

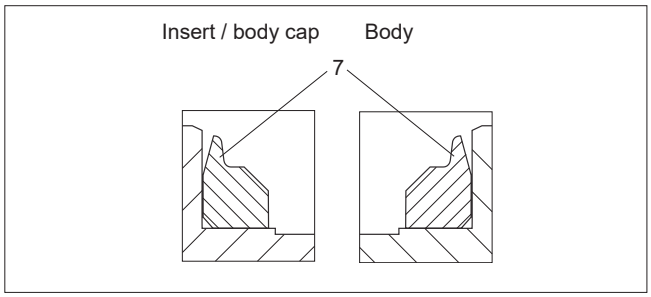


Fig. 21 X and T seats

K seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 22.
- Lock the seat into the body using a special tool. See Section 4.9.3 for instructions.
- Place the back seal (63) in the ball seat (7); see Figure 22. Place the seat in the body cap (2). Lock the seat with a special tool. See Section 4.9.3 for instructions.

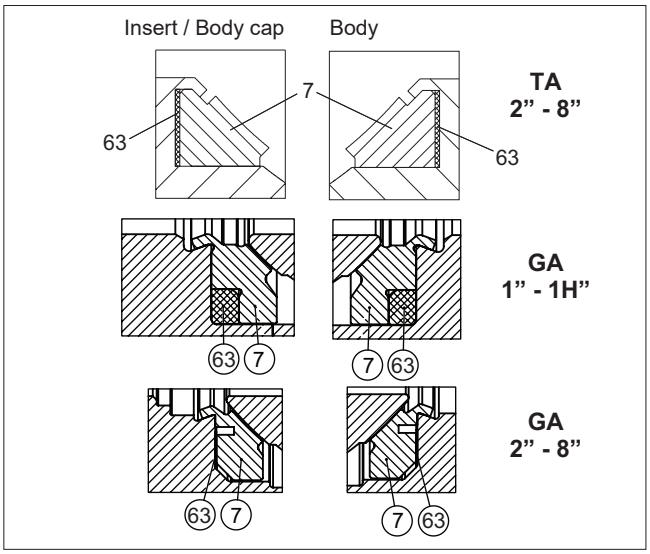


Fig. 22 K seats

H seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 23.
- Lock the seat into the body using a special tool. See Section 4.9.3 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) into body cap, Figure 23.

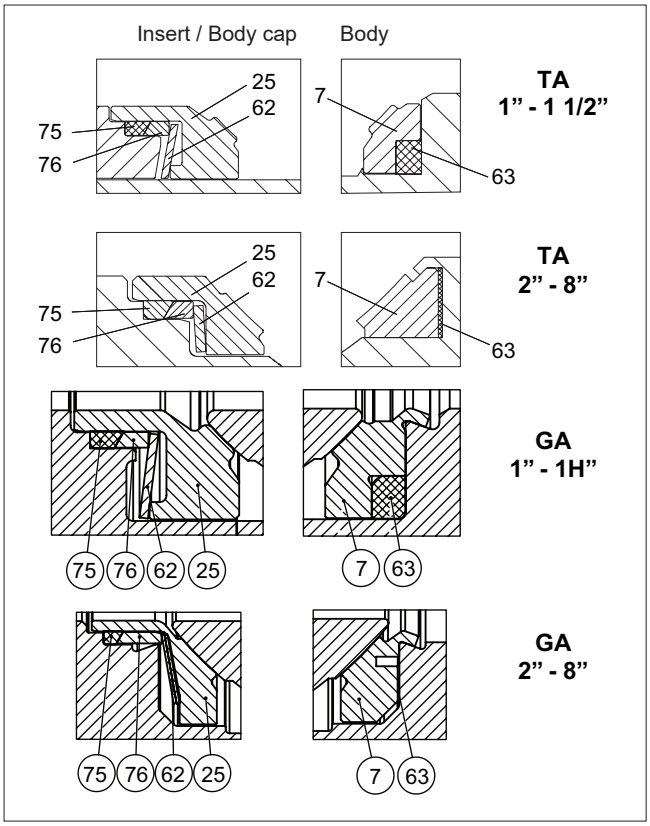


Fig. 23 H seats

G seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 24.
- Lock the seat into the body using a special tool. See Section 4.9.3 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) with back seal (64) into body cap, see Figure 24.

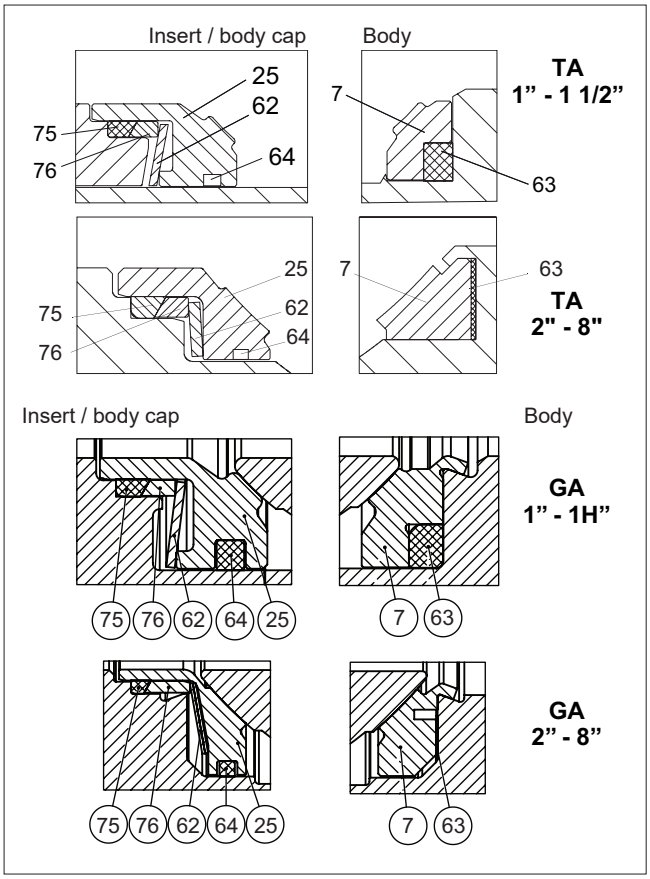


Fig. 24 G seats

J seats:

- Install back seals (63a, 63b & 63c) as per Table 3 to both body halves. The seal on top of stack shall always be 1 mm thick and the others are either 1mm, 0.4mm or 0.2mm.

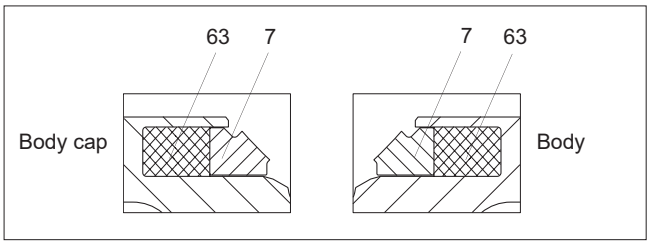


Fig. 25 J seat

Table 3 Seal thicknesses

Size	1mm (63a)	0,4mm (63b)	0,2mm (63c)
1"	2 pcs	4 pcs	2 pcs
1H"	5 pcs	4 pcs	2 pcs
2"	7 pcs	6 pcs	2 pcs
3"	12 pcs	7 pcs	2 pcs
4"	16 pcs	3 pcs	2 pcs
6"	23 pcs	6 pcs	2 pcs
8"	28 pcs	4 pcs	2 pcs

- Set back seal pressing tool on top of seal stack as seen in Figure 26.
- Compress back seal stack with pressing tool using forces found on the Table 4. Avoid damaging sealing faces of the flange during compression. Let the compression of the back seal stack effect about 5 minutes. Repeat same procedure to the other body half.

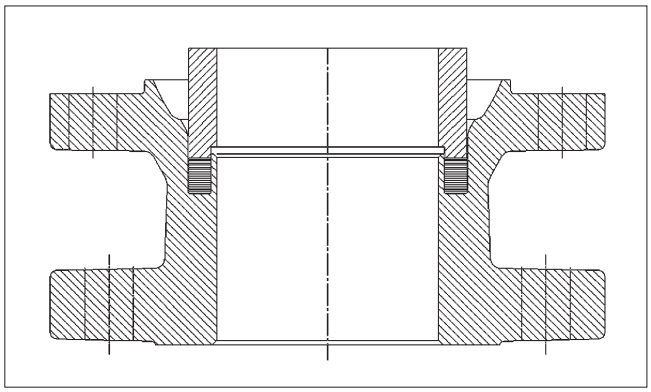


Fig. 26 Compressing the J seat

- Set body seat to its cavity.
- Add bearings, spline driver, locking pin, shaft and key.
- Install the ball.
- Install the gland packing. Use V-ring set (if available) or graphite packing **without** any tightening of packing rings.
- Set the other seat on top of the ball.
- Add body gasket.

Table 4 Compression force

Valve size	Tool ID	Force (kN / lbf)
1"	H087299	8 / 1800
1H"	H087298	17 / 3822
2"	H087297	20 / 4497
3"	H097570	35 / 7869
4"	H087295	50 / 11241
6"	H087296	70 / 15738
8"	H135972	100 / 22481

- Lift the body cap on top of body and smoothly attach body halves.
- Tighten at least 2 body flange joint nut at opposite sides.
- Lift the valve under the clamp and compress body flanges together (metal to metal contact).
- Operate the valve and if the torque is reasonable (operable with hand lever), tighten all body flange nuts.
- Measure the torque and compare it to values in Table 5.

Table 5 Testing torques

Valve size	Torque (Nm / lbf•ft)
1"	10 ± 2 / 8 ± 2
1H"	20 ± 4 / 15 ± 3
2"	30 ± 7 / 23 ± 6
3"	70 ± 14 / 52 ± 11
4"	150 ± 20 / 111 ± 15
6"	460 ± 60 / 340 ± 45
8"	925 ± 120 / 682 ± 89

- If the measured torque meets the value given in the table, finish the assembly (see below).
- If the measured torque exceeds these limits, dismantle body flange joint and lift body cap on the table (do not drop seat). Remove from body cap back seal stack one 0.4mm or 0.2mm shim. Repeat the assembly as described earlier. If the torque is still too high remove one 0.4mm or 0.2mm shim from body back seal stack. Continue until appropriate torque is achieved. Accordingly, if the torque is too low, add one 0.4mm or 0.2mm shim.
- Finish the assembly, see below.
  Do not forget to change the V-ring set, if used, back to graphite rings.

Tightness requirement meets ISO 5208 Rate D. Test pressure is 6 bar with air. If the valve leak exceeds the allowable limits, relap seats, check the torque and measure tightness again.

(**NOTE:** Torque values on Table 5 do not include torque caused by graphite packing).

All versions:

- Place the shaft partly inside the body from above and place the thrust bearings (70, 71) on the shaft from inside the body. Place the spline driver (part 4, sizes 2”-8”) on the shaft spline and lock it with a pin (50). Place the thrust ring (4, sizes 1”-1 1/2”) on the shaft and lock it as illustrated in Figure 27. Put the ball (3) in its position so that the spline driver is in the ball slot. Pull the shaft to make sure that the pin locks the spline driver properly to the shaft. Place the packing (69), the removed studs (14) and the gland (9) in their position. Place the nuts (18) on the studs (14) and screw down them gently.

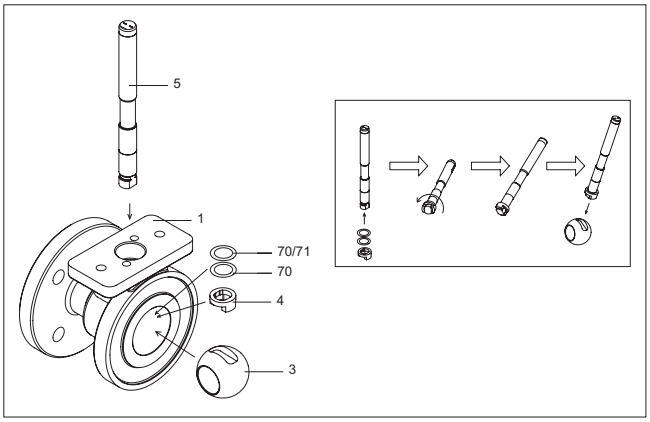


Fig. 27 Assembling the shaft in sizes 1” and 1 1/2”

- Place the body gasket (65) in the body groove.

S seats:

- Place the seat on the ball.

Soft seats (X, T):

- Place the seat on the ball.

All versions:

- Carefully place the body cap (2) on the body. Make sure that the marks made during dismantling are aligned. **Do not drop the H seat or G seat from the body cap!**
- Fasten the body nuts (16). Tighten the nuts gradually, always switching to other side of the valve after every nut. In sizes 1” and 1 1/2” there are through holes both in body and cap and the joint is made with nuts in both ends of the studs. The recommended torques are given in Table 6. The flange faces must be in even contact with each other.

Table 6 Recommended tightening torques of body joint bolting

Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1	Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1
	Tightening torque (Nm)	Tightening torque (Nm)		Tightening torque (Nm)	Tightening torque (Nm)
M12	85	38	1/2UNC	99	44
M14	140	61	5/8UNC	200	88
M16	210	95	3/4UNC	350	160
M20	420	190	7/8UNC	560	250
M30	1400	650	1 1/8-8UN	1200	560

NOTE: Check the correct bolt material from valve bill of materials. If material is not shown above table, please consult the manufacturer.
NOTE: Threads must be well lubricated

- Mount the key (10).
- To make sure that the ball lies properly between the seats, turn the shaft slowly in both directions two or three times.
- Pre-compress the packing rings first by tightening the gland nuts without disc spring sets to the torque Tt, see value from table 1 or table 2, Section 4.2
- Remove the gland nuts, mount the retaining plates and place the disc spring sets on the gland studs. Tighten the nuts so that the disc spring sets are compressed to the height H2, see table 1 or table 2 depending on which disc spring set material is in use. Lock the nuts with locking compound e.g. Loctite 221.
- Observe the same caution in reinstalling the valve that you used in dismantling it. Please also note the instructions in Section 3.

Sizes 3” - 6” (XB/XC)

- Place the valve in a standing position on the pipe flange end so that the insert thread points upwards. Use a surface that will not scratch the flanges.
- Screw the insert (2) into the body (1). Tighten the insert slightly to ensure that it has gone all the way in. Mark the position, e.g. with a felt tip marker against the body at the point of the mark on the insert, Figure 28. Unscrew the insert and remove it from the body.

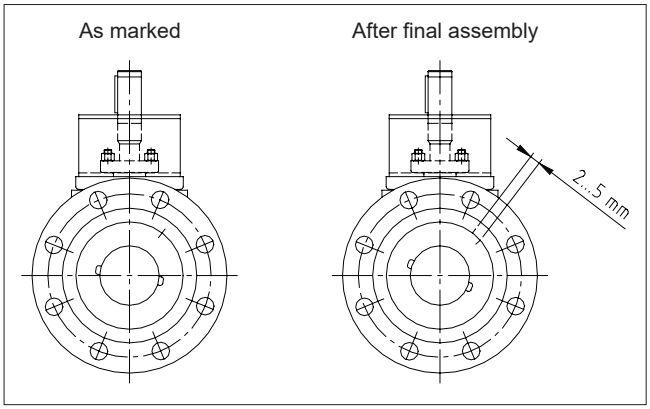


Fig. 28 Marking for the insert position

S seats:

- Place the back seal (63) in the ball seat (7); see Figure 20. Place the seat in the body (1).

Soft seats (X, T):

- Place the seat in the body (1). See Figure 21.

K seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 22.
- Lock the seat into the body using a special tool. See section 4.9.3 for instructions.
- Place the back seal (63) in the ball seat (7); see Figure 22. Place the seat in the insert (2). Lock the seat with a special tool. See Section 4.9.3 for instructions.

H seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 23.
- Lock the seat into the body using a special tool. See Section 4.9.3 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) into insert, Figure 23.

G seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Figure 24.
- Lock the seat into the body using a special tool. See Section 4.9.3 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) with back seal (64) into insert, see Figure 24.

All seat versions:

- Place the shaft partly inside the body from above and place the thrust bearings (70, 71) on the shaft from inside the body. Place the spline driver (4) on the shaft spline and lock it with a pin (50). Put the ball (3) in its position so that the spline driver is in the ball slot. Pull the shaft to make sure that the pin locks the spline driver properly to the shaft. Place the packing (69), the studs (14) and the gland (9) in their position. Place the nuts (18) on the studs (14) and screw down them gently.
- Place the body gasket (65) and gasket (135) into the body.

S seats:

- Place the seat on the ball.

Soft seats (X, T):

- Place the seat on the ball.

All seat versions:

- Carefully place the insert (2) in the body.
  Do not drop the H or G seat from the insert!
- Screw the insert and seat assembly into the body. This is easiest to do if the valve is horizontal. Tighten the insert using a special tool until the cap reaches 2-5 mm past the mark made earlier, Fig. 32.
- To make sure that the ball lies properly between the seats, turn the shaft slowly in both directions two or three times.
- Pre-compress the packing rings first by tightening the gland nuts without disc spring sets to the torque Tt, see value from table 1 or table 2, Section 4.2

- Remove the gland nuts, mount the retaining plates and place the disc spring sets on the gland studs. Tighten the nuts so that the disc spring sets are compressed to the height H2, see see table 1 or table 2 depending on which disc spring set material is in use. Lock the nuts with locking compound e.g. Loctite 221.
- Observe the same caution in reinstalling the valve that you used in dismantling it. Please also note the instructions in Section 3.

Locking of the seat

A seat locking tool (can be ordered from the manufacturer) and a hydraulic press with suitable capacity are needed for locking.

- Mount the seat with the back seal as described in the earlier section.
- Mount the locking tool carefully over the seat, see Figure 29.
- Place the valve body/body cap on the bed of the press. The bed surface must be level and non-scratching.
- Align the valve and locking tool properly with the piston of the press.
- Press the tool to lock the seat. See Table 7 for pressing forces.
- Remove the body/body cap from the press and continue the reassembly as described in the earlier section.

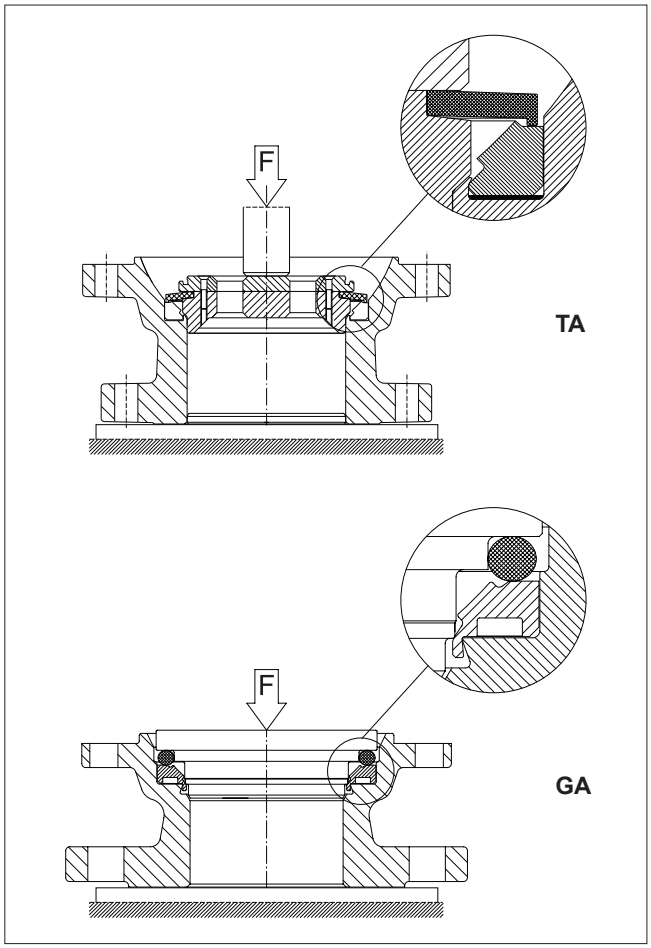


Fig. 29 Locking of the seat

Table 7 Pressing forces for seat locking

Valve size	Force (kN)
TA construction	
02	70
03	140
04	160
06	250
08	370
GA construction	
01	55
1H	75
02	130
03	110
04	125
06	200
08	400

5. TESTING THE VALVE

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

Test the valve's body pressure after reassembly.

Test the pressure in accordance with an applicable standard. Use the pressure required by the pressure class or the flange bore. Keep the valve in the half open position during the test.

If the tightness of the closure member is also to be tested, please contact the manufacturer.

If testing according to the UOP 671 specification is required, follow appropriate instructions.

6. INSTALLING THE ACTUATOR

6.1 General

CAUTION:
Beware of ball cutting movement!

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

Please use tightening torques given in table 8 when bolting the bracket on to valve.

Table 8 Tightening torques for bracket bolting (for lubricated screws) (Nm)

Screw / Material	M10	M12	M16	M20
A2-70/A4-70	41	70	170	340
B8M Cl.1	22	38	95	190

6.2 Installing the M-type manual gear 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. A plate should be installed between the valve flange mounting face or bracket and the actuator mounting face, see actuator's instructions for details.
- 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 30). 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 valve by turning the handwheel to the extreme positions. The yellow arrow should indicate the direction of the ball flow bore.

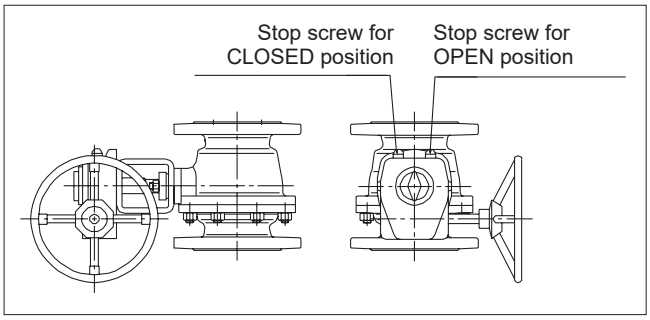


Fig. 30 Open and closed positions of the M actuator

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 vertical to the pipeline as accurately as possible. Lubricate the actuator mounting screws and then fasten all screws.
- Adjust the ball open and closed positions by means of the actuator stop screws located at both ends (see Figure 31). 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.

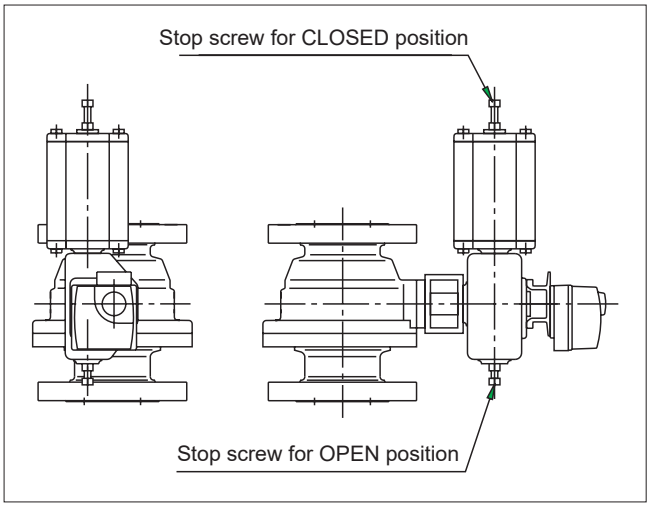


Fig. 31 Open and closed positions of the B1C/B1J actuator

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 than Neles 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 9 lists malfunctions that might occur after prolonged use.

Table 9 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 be needed.

- For removal of the actuator:
  - extractor (ID-code table in actuator's IMO).
- For removal of the locked seats:

Seat removal tools - TA and GA constructions	
Size:	**ID:**
DN 25 (1")	270073
DN 40 (1½")	270075
DN 50 (2")	270076
DN 80 (3")	270078
DN 100 (4")	270079
DN150 (6")	270083
DN200 (8")	270085

- For locking of the seats:

Seat locking tools - TA constructions	
Size:	**ID:**
DN25 (1")	279389
DN40 (1 1/2")	279411
DN50 (2")	H046569
DN80 (3")	H046570
DN100 (4")	H046571
DN150 (6")	H058427
DN200 (8")	H058428

Seat locking tools - GA constructions	
Size:	**ID:**
DN25 (1")	H018890
DN40 (1 1/2")	H018889
DN50 (2")	H018886
DN80 (3")	H018885
DN100 (4")	H018881
DN150 (6")	H016886
DN200 (8")	H018555

These tools can be ordered from the manufacturer. Always give the valve type designation when ordering.

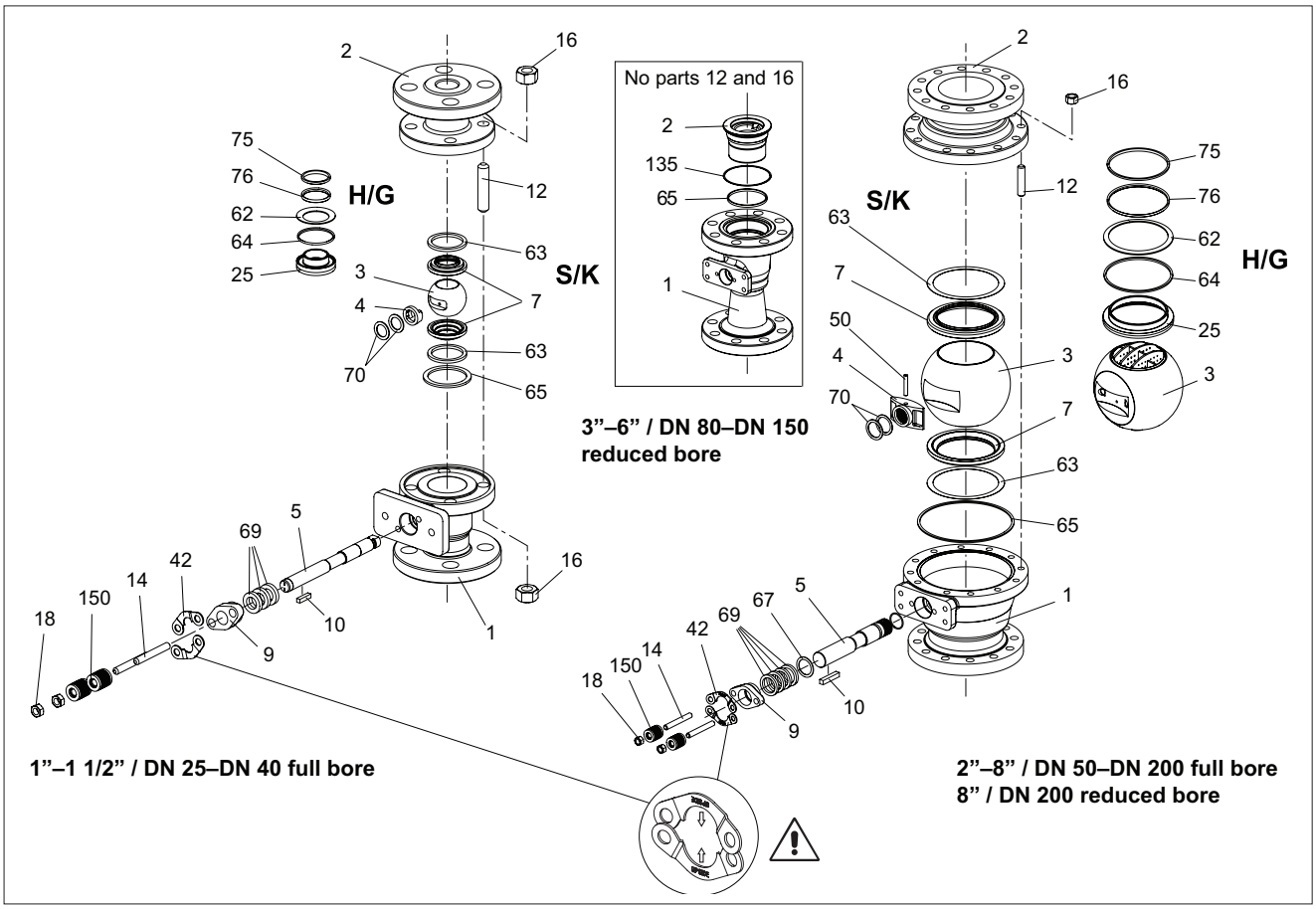
9. ORDERING SPARE PARTS

When ordering spare parts, always include the following information:

- type code, sales order number, serial number (stamped on a valve body)
- 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

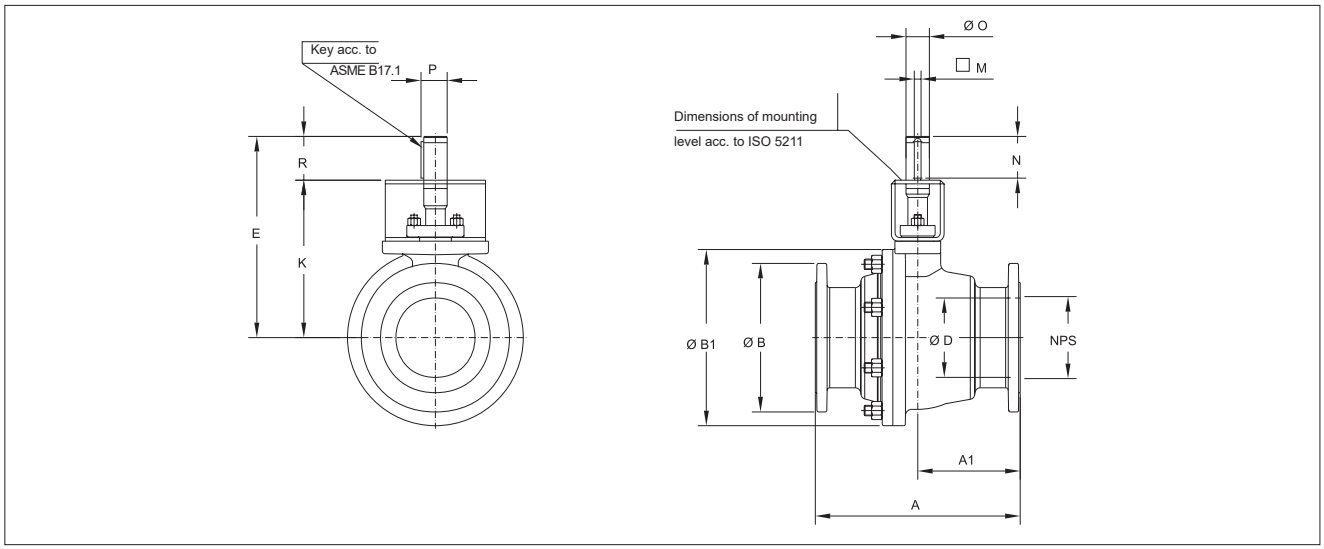


Item	Qty	Description	Spare part category
1	1	Body	
2	1	Body cap Insert (3”–6” / DN 80–150 reduced bore)	
3	1	Ball/Q-TRIM ball	3
4	1	Spline driver (2”–8” / DN 50–200) Thrust ring (1”, 1 1/2” / DN 25, DN 40)	3
5	1	Shaft	3
7	2 1	Ball seat (S/K/T/J seat) Ball seat (H/G seat)	2
9	1	Gland	
10	1	Key	3
12	4-12	Stud (quantity depends on valve size, not in reduced bore 3”–6” / DN 80–150)	
14	2	Stud	
16	6-12	Hexagon nut (quantity depends on valve size, not in reduced bore 3”–6” / DN 80–150)	
18	2	Hexagon nut	
19	1	ID plate	
25	1	Ball seat (H/G seat)	2
42	2	Retaining plate	
50	1	Locking pin	
62	1 or 2	Seat spring (1pc in sizes 1" ,1½", and 8". 2 pcs in sizes 2" - 6".	2
63	2 1	Back seal (S/K seat) Back seal (H/G seat)	1
64	1	Back seal (G seat)	
65	1	Body gasket	1
67	1	Support ring	
69	1	Packing ring (set)	1
70	2 or 4	Thrust bearing (2 pcs. in sizes 1" and 1 1/2", 4 pcs. in sizes 2"–8")	3
75	1	Seat seal (H/G seat)	1
76	1	Back-up ring (H/G seat)	2
135	1	Gasket (only in reduced bore 3"–6" / DN 80–150)	
150	2	Disc spring set	

Spare part (Spare Part Set) 1: 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

11.1 Full bore valves



ASME Class 150

Type	Size	ISO flange	Dimensions, mm												kg
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XT_C	1	F07	165	74	110	110	25.4	175	150	4.76	25	15	17	25	6
	1 1/2	F07	165	70	125	145	38.1	202	168	4.76	35	20	22	34	8
	2	F07, F10	178	79.0	150	146	50.8	215	168	6.35	46	25	27.8	47	11
	3	F07, F10, F12, F14	203	101.5	190	190	76.2	237	190	6.35	46	25	27.8	47	25
	4	F10, F12, F14	229	110.5	230	241	101.6	309	250	9.52	58	35	39.1	59	39
	6	F14, F16	394	197.0	280	338	152.4	386	305	12.70	80	45	50.4	81	93
	8	F14, F16, F25	457	228.5	345	430	203.2	476	385	12.70	90	55	60.6	91	190

Type	Size	ISO flange	Dimensions, in												lb
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XT_C	1	F07	6.50	2.91	4.25	4.33	1.00	6.89	5.91	0.19	0.98	0.59	0.67	0.98	13
	1 1/2	F07	6.50	2.76	5.00	5.71	1.50	7.95	6.61	0.19	1.38	0.79	0.87	1.39	18
	2	F07, F10	7.00	3.11	6.00	5.75	2.00	8.46	6.61	0.25	1.81	0.98	1.09	1.85	24
	3	F07, F10, F12, F14	8.00	4.00	7.50	7.48	3.00	9.33	7.48	0.25	1.81	0.98	1.09	1.85	55
	4	F10, F12, F14	9.00	4.35	9.00	9.49	4.00	12.17	9.84	0.37	2.28	1.38	1.54	2.32	86
	6	F14, F16	15.50	7.76	11.00	13.46	6.00	15.20	12.01	0.50	3.15	1.77	1.98	3.19	205
	8	F14, F16, F25	18.00	9.00	13.50	16.93	8.00	18.74	15.16	0.50	3.54	2.17	2.39	3.58	418

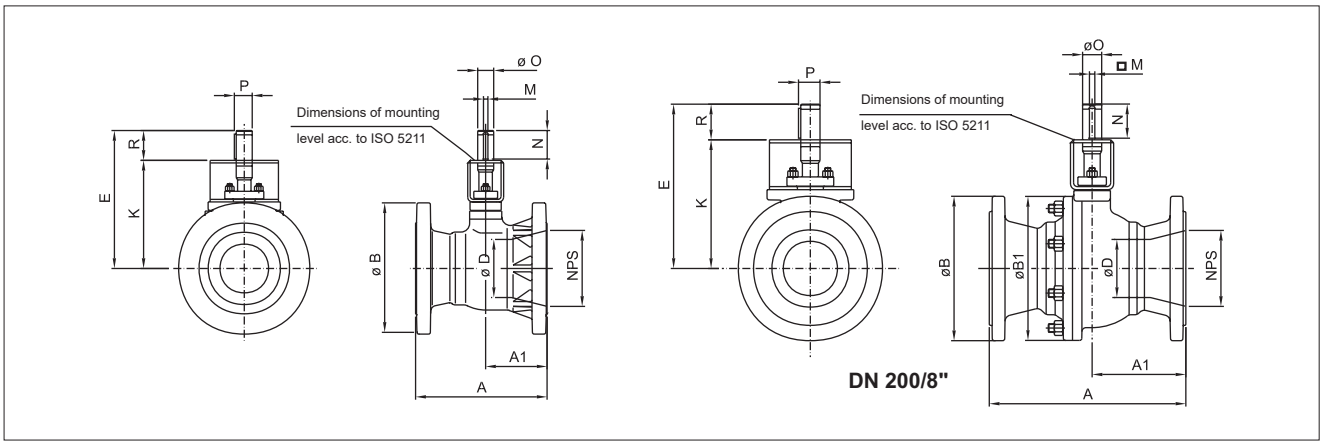
ASME Class 300

Type	Size	ISO flange	Dimensions, mm												kg
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XA_D	1	F07	165	74	125	110	25.4	175	150	4.76	25	15	17	25	7
	1 1/2	F07	190	70	155	145	38.1	202	168	4.76	35	20	22	34	11
	2	F07, F10	216	89.0	165	146	50.8	215	168	6.35	46	25	27.8	47	15
	3	F07, F10, F12, F14	282	141.0	210	195	76.2	237	190	6.35	46	25	27.8	47	35
	4	F10, F12, 14	305	152.5	255	252	101.6	309	250	9.52	58	35	39.1	59	59
	6	F14, F16	403	201.5	320	346	152.4	386	305	12.70	80	45	50.4	81	129
	8	F14, F16, F25	502	249.0	380	462	203.2	476	385	12.70	90	55	60.6	91	255

Type	Size	ISO flange	Dimensions, in												lb
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XA_D	1	F07	6.50	2.91	4.88	4.33	1.00	6.89	5.91	0.19	0.98	0.59	0.67	0.98	15
	1 1/2	F07	7.50	2.76	6.12	5.71	1.50	7.95	6.61	0.19	1.38	0.79	0.87	1.39	24
	2	F07, F10	8.50	3.50	6.50	5.75	2.00	8.46	6.61	0.25	1.81	0.98	1.09	1.85	33
	3	F07, F10, F12, F14	11.12	5.55	8.25	7.87	3.00	9.33	7.48	0.25	1.81	0.98	1.09	1.85	77
	4	F10, F12, 14	12.00	6.00	10.00	10.00	4.00	12.17	9.84	0.37	2.28	1.38	1.54	2.32	130
	6	F14, F16	15.88	7.93	12.50	13.90	6.00	15.20	12.01	0.50	3.15	1.77	1.98	3.19	284
	8	F14, F16, F25	19.75	9.80	15.00	18.19	8.00	18.74	15.16	0.50	3.54	2.17	2.39	3.58	561

Dimension A acc. to ASME B16.10, dimension ØB acc. to ASME B16.5.
Valve is shown in closed position

11.2 Reduced bore valves



ASME Class 150

Type	Size	ISO flange	Dimensions, mm												kg
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XB	3	F07, F10	203	100	190	-	50.8	215	168	6.35	46	25	27.8	47	23
	4	F07, F10, F12, F14	229	107	230	-	76.2	237	190	6.35	46	25	27.8	47	34
	6	F10, F12, F14	267	126	280	-	101.6	309	250	9.52	58	35	39.1	59	82
	8	F14, F16	292	135	345	342	152.4	386	305	12.70	80	45	50.4	81	160

Type	Size	ISO flange	Dimensions, in												lb
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XB	3	F07, F10	8.00	3.94	7.5	-	2.00	8.46	6.6	0.25	1.81	0.98	1.09	1.85	51
	4	F07, F10, F12, F14	9.00	4.21	9.0	-	3.00	9.33	7.5	0.25	1.81	0.98	1.09	1.85	75
	6	F10, F12, F14	10.50	4.98	11.0	-	4.00	12.17	9.8	0.37	2.28	1.38	1.54	2.32	180
	8	F14, F16	11.50	5.31	13.5	13.5	6.00	15.20	12.0	0.50	3.15	1.77	1.98	3.19	353

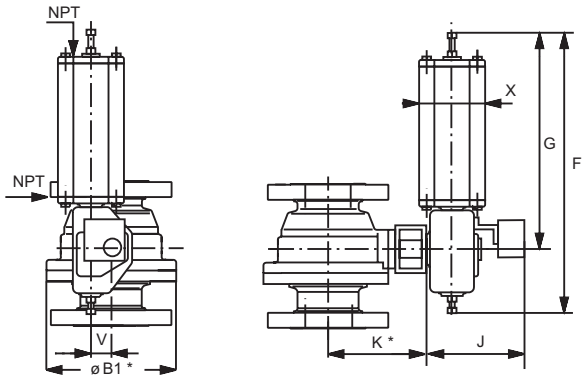
ASME Class 300

Type	Size	ISO flange	Dimensions, mm												kg
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XC	3	F07, F10	282	100	210	-	50.8	215	168	6.35	46	25	27.8	47	31
	4	F07, F10, F12, F14	305	107	255	-	76.2	237	190	6.35	46	25	27.8	47	50
	6	F10, F12, F14	403	126	320	-	101.6	309	250	9.52	58	35	39.1	59	110
	8	F14, F16	419	209.5	380	353	152.4	386	305	12.70	80	45	50.4	81	235

Type	Size	ISO flange	Dimensions, in												lb
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R	
XB	3	F07, F10	11.12	3.94	8.25	-	2.00	8.46	6.6	0.25	1.81	0.98	1.09	1.85	68
	4	F07, F10, F12, F14	12.00	4.21	10.0	-	3.00	9.33	7.5	0.25	1.81	0.98	1.09	1.85	110
	6	F10, F12, F14	15.88	4.98	12.5	-	4.00	12.17	9.8	0.37	2.28	1.38	1.54	2.32	242
	8	F14, F16	16.50	8.25	15.0	13.9	6.00	15.20	12.0	0.50	3.15	1.77	1.98	3.19	518

Dimension A acc. to ASME B16.10, dimension ØB acc. to ASME B16.5.
Valve is shown in closed position

11.3 Valve and B1C/B1J/B1JA actuator



*) See ØB1 and K dimensions from tables in 11.1 and 11.2

B1C ACTUATOR

Type	Dimensions, mm					NPT	kg
	F	G	J	V	X		
B1C6	395	270	283	36	90	1/4	4.2
B1C9	450	315	279	43	110	1/4	9.6
B1C11	535	375	290	51	135	3/8	16
B1C13	640	445	316	65	175	3/8	31
B1C17	785	555	351	78	215	1/2	54
B1C20	880	590	385	97	215	1/2	73
B1C25	1075	725	448	121	265	1/2	131
B1C32	1370	920	525	153	395	3/4	256
B1C40	1670	1150	595	194	505	3/4	446
B1C50	2060	1390	690	242	610	1	830

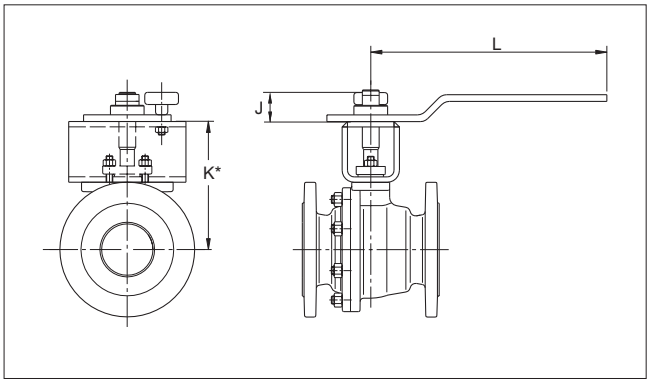
Type	Dimensions, in					NPT	lb
	F	G	J	V	X		
B1C6	15.55	10.63	11.14	1.42	3.54	1/4	9
B1C9	17.71	12.40	10.98	1.69	4.33	1/4	21
B1C11	21.06	14.76	11.42	2.01	5.31	3/8	35
B1C13	25.20	17.52	12.44	2.56	6.89	3/8	68
B1C17	30.91	21.85	13.82	3.07	8.46	1/2	119
B1C20	34.65	23.23	15.16	3.82	8.46	1/2	161
B1C25	42.32	28.54	17.64	4.76	10.43	1/2	289
B1C32	53.94	36.22	20.67	6.02	15.55	3/4	564
B1C40	65.75	45.28	23.43	7.64	19.88	3/4	983
B1C50	81.10	54.72	27.17	9.53	24.02	1	1829

B1J/B1JA ACTUATOR

Type	Dimensions, mm					NPT	kg
	F	G	J	V	X		
B1J/B1JA6	485	368	283	36	110	3/8	13
B1J/B1JA8	560	420	279	43	135	3/8	17
B1J/B1JA10	650	490	290	51	175	3/8	30
B1J/B1JA12	800	620	316	65	215	1/2	57
B1J/B1JA16	990	760	351	78	265	1/2	100
B1J/B1JA20	1200	935	358	97	395	3/4	175
B1J/B1JA25	1530	1200	448	121	505	3/4	350
B1J/B1JA32	1830	1410	525	153	540	1	671

Type	Dimensions, in					NPT	lb
	F	G	J	V	X		
B1J/B1JA6	19.09	14.49	11.14	1.42	4.33	3/8	28.5
B1J/B1JA8	22.05	16.54	10.98	1.69	5.31	3/8	37
B1J/B1JA10	25.59	19.29	11.42	2.01	6.89	3/8	66
B1J/B1JA12	31.50	24.41	12.44	2.56	8.46	1/2	126
B1J/B1JA16	38.98	29.92	13.82	3.07	10.43	1/2	220
B1J/B1JA20	47.24	36.81	14.09	3.82	15.55	3/4	386
B1J/B1JA25	60.24	47.24	17.64	4.76	19.88	3/4	771
B1J/B1JA32	72.05	55.51	20.67	6.02	21.26	1	1479

11.4 Valve and hand lever LX and LK



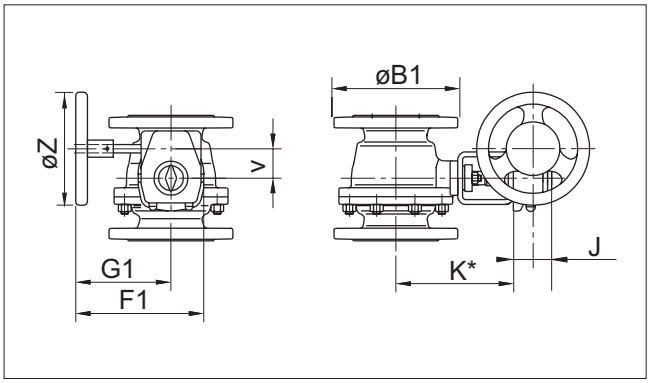
HAND LEVER LX AND LK

DN		Handlever	Dimensions, mm	
Full bore	Reduced bore		J	L
25	–	LX180A	51	180
40	–	LX220A	59	220
50	80	LK350	52	350
80	100	LK350	52	350
80	100	LK450	52	450
100	150	LK450	52	450

Size		Handlever	Dimensions, in	
Full bore	Reduced bore		J	L
1	–	LX180A	2	7.09
1 1/2	–	LX220A	2.32	8.66
2	3	LK350	2.05	13.78
3	4	LK350	2.05	13.78
3	4	LK450	2.05	17.72
4	6	LK450	2.05	17.72

*) See ØB1 and K dimensions from tables in 11.1 and 11.2

11.5 Valve and series M gear operator



MANUAL OPERATOR, SERIES M

Actuator size	Dimensions, mm					kg
	F	G	J	V	ØZ	
M07	235	184	65	52	160	3.8
M10	238	187	65	52	200	4.4
M12	307	238	88	71	315	10.1
M14	385	285	93	86	400	18.2
M15	456	346	102	105	500	26.2
M16	530	387	124	130	500	36.8
M25	597	412	160	182	600	60.8

Actuator size	Dimensions, in					lb
	F	G	J	V	ØZ	
M07	9.25	7.24	2.56	2.05	6.30	8.4
M10	9.37	7.36	2.56	2.05	7.87	9.7
M12	12.09	9.37	3.46	2.80	12.40	22.3
M14	15.16	11.22	3.66	3.39	15.75	40.1
M15	17.95	13.62	4.02	4.13	19.69	57.8
M16	20.87	15.24	4.88	5.12	19.69	81.1
M25	23.50	16.22	6.30	7.17	23.62	134.0

*) See ØB1 and K dimensions from tables in 11.1 and 11.2

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)	10531829
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 10.9.2024

Juha Virolainen, Global Quality Director

13. TYPE CODE

Modular ball valves, Series XA, XT, XB, XC, seat supported										
1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**
XT	06	D	W	GA	J2	SJ	S	A	A	F

1. sign	VALVE SERIES AND STYLE AND FACE-TO-FACE
XT	Full bore, seat supported, face-to-face ASME B 16.10, Table 1, long pattern, ASME 150 (1" acc. to EN 558-1 basic, series 4; 165 mm)
XA	Full bore, seat supported, face-to-face ASME B 16.10, Table 2, long pattern, ASME 300.
XB	Reduced bore, seat supported, face-to-face ASME B 16.10, Table 1, short pattern, ASME 150
XC	Reduced bore, seat supported, face-to-face ASME B 16.10, Table 2, short pattern, ASME 300

2. sign	SIZE	
	Full bore NPS / DN	Reduced bore NPS / DN
01/025	1"/ 25 mm	–
1H/040	1 1/2"/ 40 mm	–
02/050	2" / 50 mm	–
03/080	3" / 80 mm	3" / 80 mm
04/100	4" / 100 mm	4" / 100 mm
06/150	6" / 150 mm	6" / 150 mm
08/200	8" / 200 mm	8" / 200 mm

3. sign	PRESSURE CLASS / ASME
C	ASME Class 150 (XT)
D	ASME Class 300 (XA)
	PRESSURE CLASS / EN
J	PN 10 (XT)
K	PN 16 (XT)
L	PN 25 (XA)
M	PN 40 (XA)

4. sign	END CONNECTION STYLE
W	Raised face, ASME B 16.5, "smooth finish" (Ra 3.2-6.3), standard
C	EN 1092-1 Type B1 (Ra 3.2 – 12.5).

5. sign	CONSTRUCTION AND APPLICATION
GA	Standard construction. Live loaded TA-Luft packing.
GQ	Q-Trim construction. Otherwise standard.
UU	UOP construction with solid proof J-seat
TU	Special solids proof seat design, pressure area 0...10 bar (ambient)
TA	Standard construction. Live loaded TA-Luft packing.
TQ	Q-Trim construction. Otherwise standard
GZ	BAM tested non-metallic parts, for oxygen service. Double seated. Metal bearings; cobalt based alloy. Live loaded graphite packing. Temperature range -50 ... +200 °C
TZ	BAM tested non-metallic parts, for oxygen service. Double seated. Metal bearings. Live loaded graphite packing. Temperature range -50. ... +200 °C. Oxygen cleaning acc. to Neles internal procedure FC-QC-0001 included.

6. sign	BODY MATERIAL
J2	ASTM A216 gr WCB
S6	ASTM A351 gr CF8M
J5	ASTM A217 gr C5

7. sign	BALL / COATING AND STEM MATERIAL
SJ	316 Stainless steel / Hard Chrome and XM-19 (Nitronic 50)
SP	316 Stainless steel and XM-19 (Nitronic 50) (soft seats only)
RX	316 Stainless steel / CrC and XM-19 (Nitronic 50)
RR	316 Stainless steel / WC-CO and XM-19 (Nitronic 50)
SL	316 Stainless steel / NiBO and XM-19 (Nitronic 50)

8. sign	SEAT TYPES, BACK SEALS AND SPRING MATERIAL		
	Seat type	Back seal type	Spring
S	Metal	PTFE	-
K	Metal (locked)	PTFE	-
H	Metal	Graphite	Incoloy 825 / F6NM
G	Metal (dust proof)	Graphite	Incoloy 825 / F6NM
J	Metal	Graphite	-
T	Soft	-	-

9. sign	SEAT AND COATING MATERIAL	
	Metal seated valves	
	Seat material	Coating
A	316 Stainless steel	Cobalt based hard facing
B	316 Stainless steel	Chrome carbide, CrC-LF
R	316 Stainless steel	Tungsten Carbide, WC-Co
	Soft seated valves	
	Seat material	Filler
X	Xtreme	-

10. sign	BEARING AND SEAL MATERIALS		
	Body gasket	Packing	Thrust bearing
A	SS316+PTFE	PTFE V-rings	Carbon Filled PTFE (*
B	SS316+Graphite	Graphite	Carbon Filled PTFE (*
C	SS316+PTFE	PTFE V-rings	Cobalt based alloy (*
D	SS316+Graphite	Graphite	Cobalt based alloy (*
T	SS316+Graphite	PTFE V-rings	Cobalt based alloy (*

(* NACE compatible

11. sign	BOLTING MATERIALS			
	Bolting material with unified thread			
	Pressure retaining		Packing gland bolting	
	Studs	Nuts	Studs	Nuts
E	B8M	8 M	gr. 660	gr. 660
T	L7M	2HM	B7	2H
S	L7M	2HM	gr. 660	gr. 660
A	B7	2H	B7	2H

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