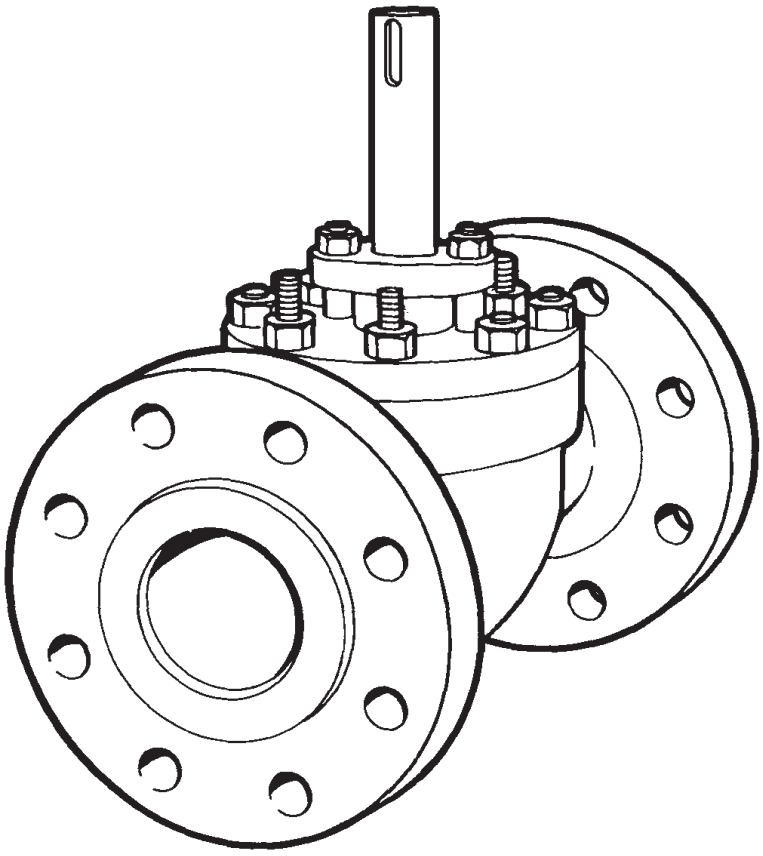
Neles™ top entry rotary control valve

Series Top5™

Installation, maintenance and operating instructions



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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 Introduction

These instructions describe the installation, operation and maintenance of series Top5™ top entry rotary control valves.

Neles™ Top5™ is a generic name for a product series group comprising the following valve series:

- T5 — flanged, reduced bore, single seated
- T4 — like T5, with weld ends

When the valve is equipped with a control ball reducing the flow rate and thus preventing noise and cavitation, it is called Q-T5 etc.

Further information on the installation, operation and maintenance of actuators is given in the individual manuals for each actuator model.

NOTE:
Selection and use of the valve in a specific application requires close consideration of detailed aspects. E.g. Q2G-trim is for relatively clean gas applications, note possibility of clogging. 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 structure

The Top5 valve series is intended for either control or special shut-off applications. It is tight in one direction. The ball may be equipped with an attenuator element (Q attenuator). The ball has been mounted on the body and on the bonnet with bearings.

Thanks to its top entry structure, the valve is also applicable for use as a butt weld end version, because the valve can be serviced without removing it from the pipeline.

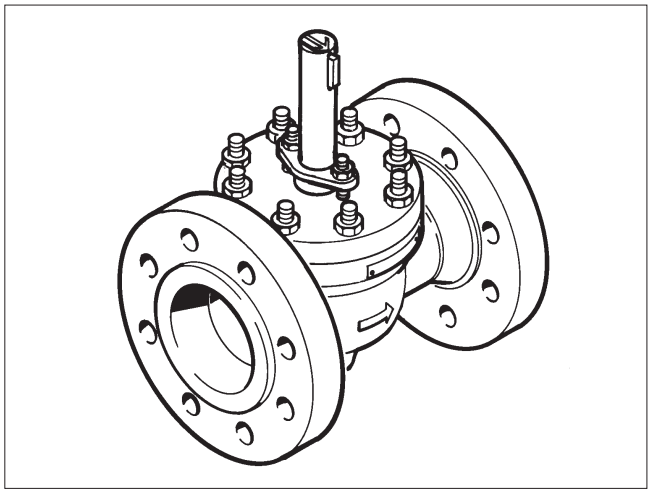


Fig. 1 The valve bonnet is bolted to the body

1.3 Markings

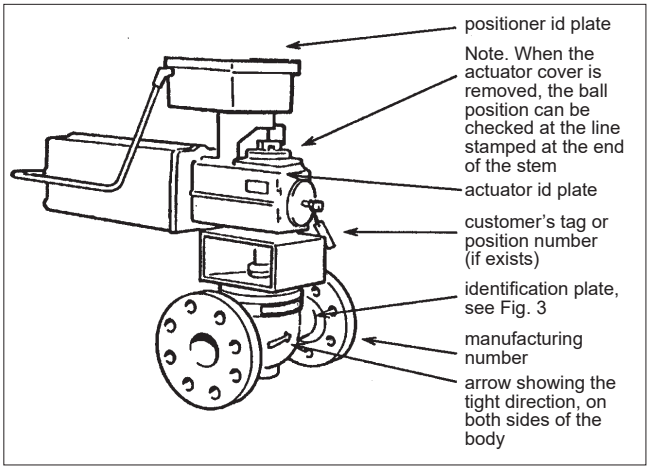
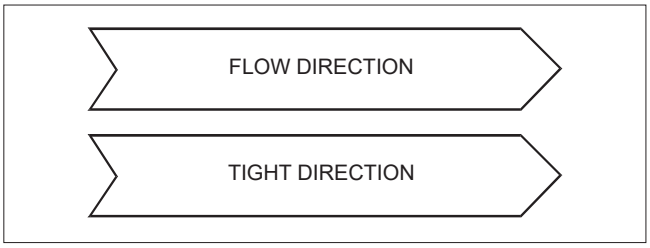


Fig. 2 Valve markings

In addition to the markings shown in Figure 2, the valve may have directional arrows:



When standard seats are used, the arrow on the body shows the tight direction.

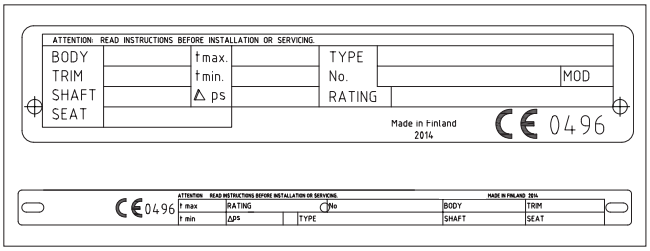


Fig. 3 Identification plate markings

Identification plate markings:

1. Body material
2. Ball material (TRIM)
3. Stem material (SHAFT)
4. Seat material
5. Maximum operating temperature
6. Minimum operating temperature
7. Maximum shut-off pressure differential at room temperature
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.

The type designation is explained in Section 14.

1.4 Technical specifications

The identification plate must be checked for the essential safety limits in the extreme range, such as pressure and temperature resistance and the highest operable pressure difference.

The selected actuator size or the available instrument air pressure may place restrictions on the highest operable pressure so that it becomes lower than the limits determined by the mechanical strength of the valve.

Face-to-face length:	
series T5	ANSI/ISA S75.03, IEC 534-3-3
series T4	API Class 600
Body pressure and temperature rating:	ASME B16.34*), see Table 1
Bearings:	
code E	Metal-reinforced PTFE easy, low ∆p use: max. +230 °C demanding, high Dp use: max +200 °C
code B	Cobalt based alloy +450 °C max. pressure difference according to a separate specification
Dimensions:	See pages 14...20
Weights:	See pages 14...20

*) Unless the selected bearings or flange standards impose a lower pressure and temperature restriction.

1.5 Valve approvals

The valve is fire safe for hydrocarbon applications according to API 607, 4th edition and BS 6755, part 2. Packing constructions to meet German “TA-Luft” and US Clean Air Act requirements..

1.6 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.

1.7 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.

1.8 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 yourself and the environment from any harmful or poisonous substances. If the valve is equipped with an actuator, do not forget to close and detach the actuator pressure supply pipeline. Failure to do this may result in damage or personal injury.

CAUTION:

Beware of the cutting movement of the ball!

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:

Protect yourself from noise!

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 software. Observe the relevant work environment regulations on noise emission.

CAUTION:

Beware of a very cold or hot valve!

The valve body may be very cold or very hot during use. Protect yourself against cold injuries or burns.

NOTE:

Contact Valmet experts for dead-end service compliance.

Wafer type is not applicable for dead-end service

ATEX/Ex Safety

CAUTION:

Potential electrostatic charging hazard. Ensure the protection 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.

Table 1 Body materials commonly used by Neles valves and their resistance to pressure and temperature according ASME 16.34, (bar)

Pressure class 1)	Flange code 1)	Body material	Material code	°C								
				38	50	100	150	200	250	300	350	400
ASME 300	D	A216 gr WCB Carbon steel	D	51.1	50.1	46.6	45.1	43.8	41.9	39.8	37.6	34.7
		A351 gr CF8M Stainless steel	A	49.6	48.1	42.2	38.5	35.7	33.4	31.6	30.3	29.4
ASME 600	F	A216 gr WCB Carbon steel	D	102.1	100.2	93.2	90.2	87.6	83.9	79.6	75.1	69.4
		A351 gr CF8M Stainless steel	A	99.3	96.2	84.4	77.0	71.3	66.8	63.2	60.7	58.9

1) Flange codes according to PN standards, see Chapter 14. Max resistance to pressure and temperature depending to the flange and its material. Resistance in the middle part of the valve up to size DN 400 (16”) according to table A600.

1.9 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 devices for any damage that may have occurred during transport. Store the valve carefully before installation, preferably indoors in a dry place. Do not take the valve to the intended location and do not remove the flow port protectors until the valve is installed. The valve is delivered in the open position, with the exception of valve packages where the actuator spring closes the valve.

NOTE:
Valves with a carbon steel body may become badly corroded on the inside if the inside is left damp during storing.

CAUTION:
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. More detailed information see Instructions for lifting Neles products 10LIFT70en.

3. INSTALLATION IN THE PIPELINE

Remove the protecting plates around the valve and check that the valve is clean. Flush and blow the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the valve.

Check that the pipeline is supported properly. Do not attempt to correct any pipeline misalignment by means of the flange bolting or welding of the valve. Do not support the pipeline using the valve as help.

An arrow pointing at the tight direction of a seat that is tight in one direction (the most commonly used version) is cast on both sides of the valve. This is usually the flow direction. If the flow direction and the tight direction can be opposite to each other, the piping plan must be checked for the correct position.

Check that the unbroken side of the ball faces the seat when the valve is in the CLOSED position.

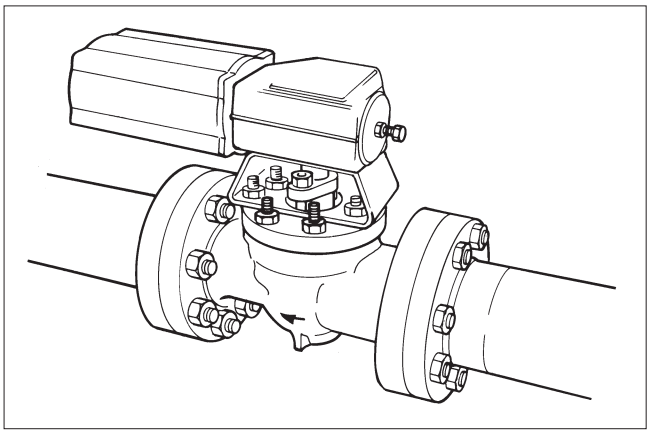


Fig. 4 Installation of the valve into the pipeline

Install the valve in the position shown in the piping installation drawing. The position code shows the installation position that should be used when the actuator has been installed at the factory. The position code has been given either on the specification sheet or in the dimensional drawing of the valve.

There should be enough free space around the valve so that the actuator can be removed and the valve dismantled without detaching the valve from the pipeline.

Check that the indicator arrow on the actuator is parallel to the ball flow opening.

The actuator must not touch the pipeline or any permanent structures, because pipeline vibration may damage it or interfere with its operation. If the pipeline drawings show a support for the actuator, the support must be installed.

Make sure that the valve is in the OPEN position when welding a weld end valve into the pipeline.

Note! A valve equipped with a BJ actuator is in the CLOSED position when it is not pressurized. Direct compressed air into the cylinder to turn the valve open.

When welding a valve into a pipeline, protect the valve from welding spatter, see Fig. 5. Always ground the welding apparatus on the side of the pipeline.

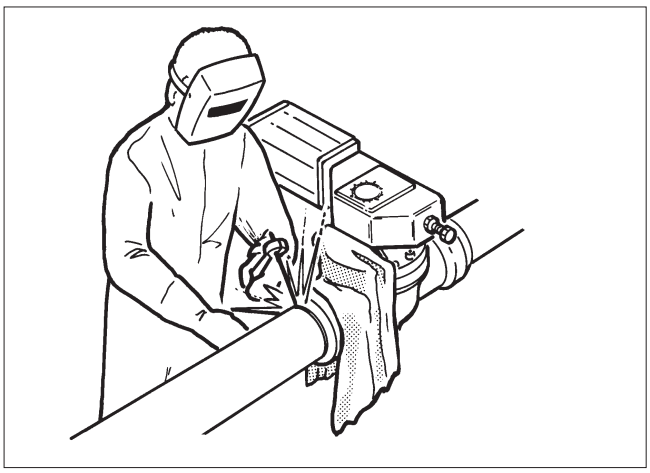


Fig. 5 Protecting the valve during welding

3.1 Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Figure 6.

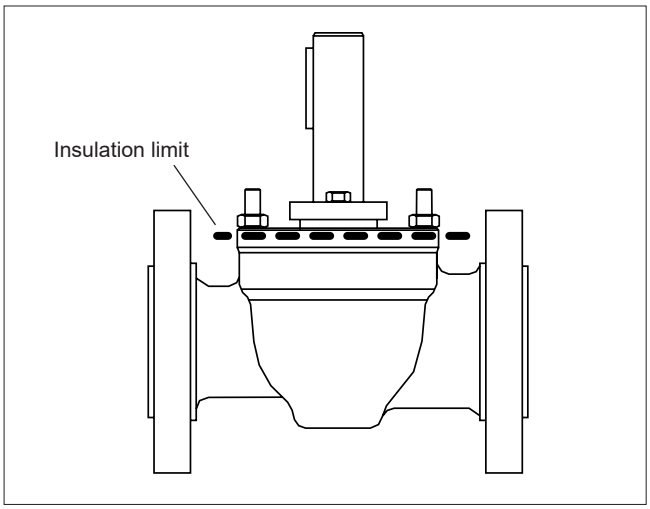


Fig. 6 Insulation of the valve

4. COMMISSIONING

The gland packing may leak after long storage. If the packing leaks, tighten it steadily until the leaking stops. Do not tighten the packing unnecessarily as this will increase the required torque and impair the control properties. (More information about the gland packing in section 5.2).

Check that the valve has been installed correctly in relation to the flow direction.

5. 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.

5.1 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.

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 in section 11 and to the parts list in section 12, 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.

5.2 Gland packing

The standard is a graphite gland packing with impregnated PTFE lubrication.

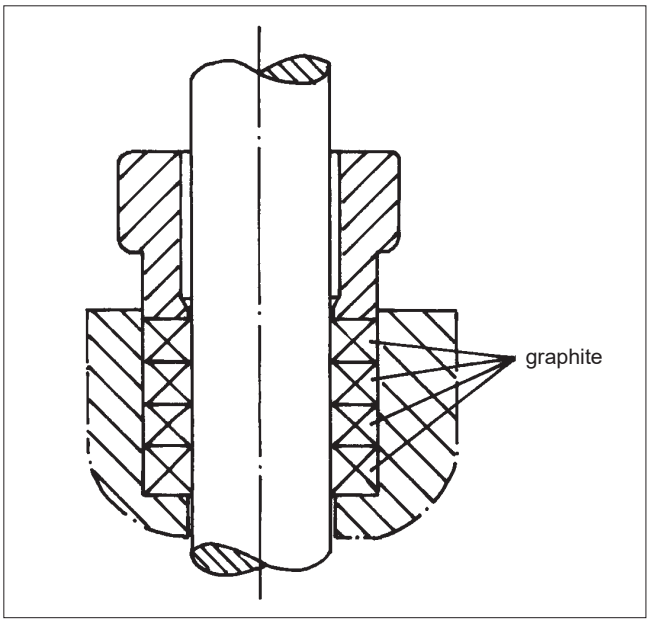


Fig. 7 Gland packing

Changing the gland packing

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

- Remove the actuator.
- Make sure the valve is not pressurized.
- Detach the gland (9).
- Remove the old packing rings (69).
- Clean the packing ring counterbore.
- Check that there are no burrs on the edges of the key slot.
- Install the new packing rings one by one using the gland as a tool. Cover the stem key slot with tape, a plastic bag or other similar material that protects the packing rings when you push the gland over the key slot.

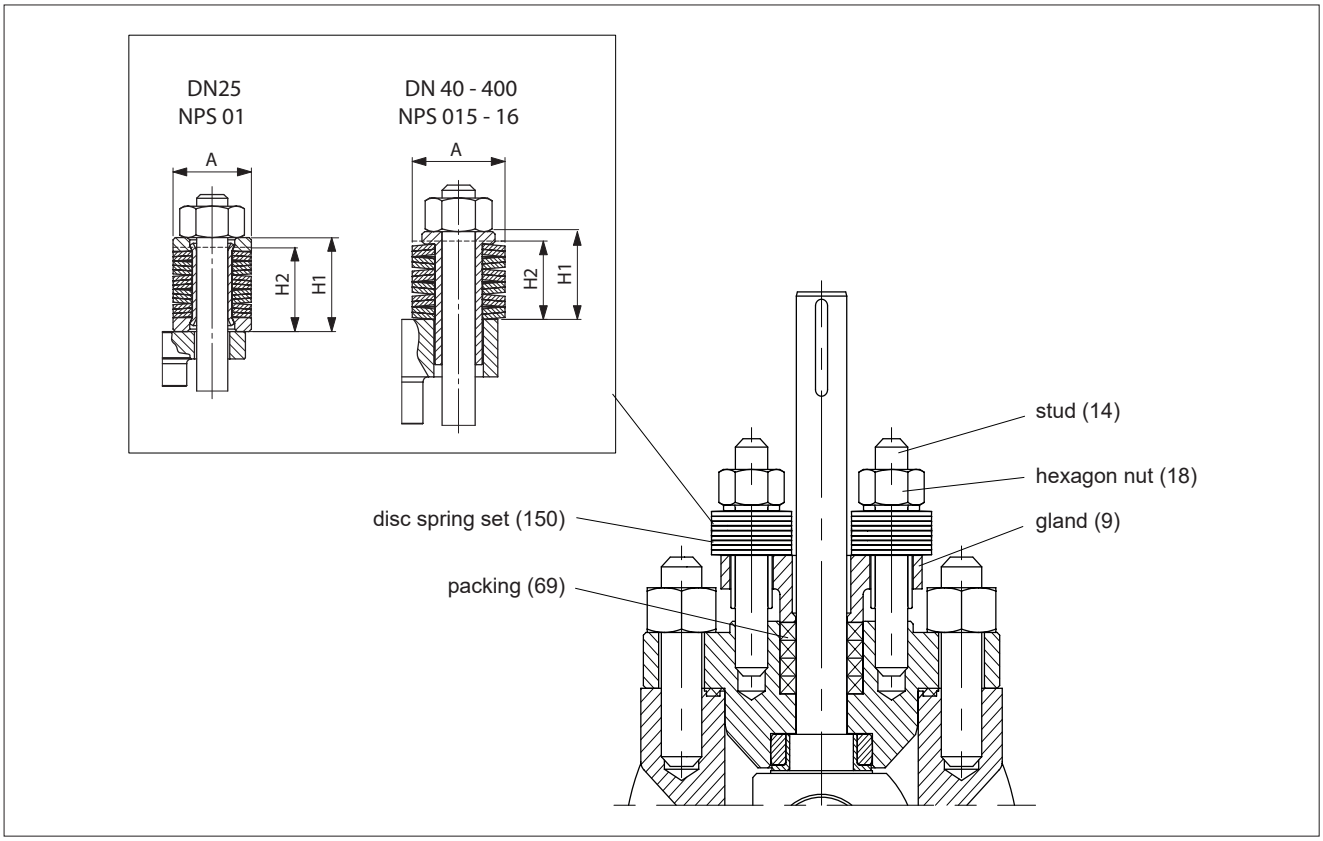


Fig. 8 Gland packing

Gland packing tightening

Gland packing without disc springs:

- Pre-compress the packing rings (69) first tightening the gland nuts (18) to the torque Tt. 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.
- Retighten the nuts (18) to the torque Tt, see table 2.
- Check leakage when the valve is pressurized. If the leakage still occurs when the valve is pressurized, re-tighten the nuts (18) but don't exceed the torque Tt value in the Table 2 by 50 %.

Gland packing with disc springs:

- Pre-compress the packing rings (69) first tightening the disc springs (150) to the height H2. See Fig. 8 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.
- Retighten the disc springs (150) to the height H2, see table 2.
- Check leakage when the valve is pressurized. If the leakage still occurs when the valve is pressurized, re-tighten the disc springs (150) but do not fully compress (totally flat) them.

Table 2 Tightening of gland packing

Valve size		Shaft dia	Spring dimensions (free)		Graphite	
					Disc spring	Nut
DN	NPS	mm	A, mm	H1, mm (1	H2, mm (1	Tt, Nm (2
25	01	15	20	24	23	4
40	015	20	31.5	27.2	24.5	20
50	02	20	31.5	27.2	24.5	20
80	03	25	35.5	33.6	30.9	25
100	04	35	40	35.5	31.5	50
150	06	45	50	51.3	46.3	110
200	08	55	50	45.6	40.7	120
250	10	60	50	45.6	40.7	130
300	12	70	63	53.5	47.6	170
350	14	85	63	53.5	47.2	200
400	16	85	63	53.5	47.2	200

(1 Use H1 and H2 dimensions (mm) when construction is with liveloaded packing.
(2 Use torque (Nm) values when construction is without liveloaded packing.

5.3 Dismantling the valve

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

- Remove the actuator and the actuator mounting shelf.
- Remove the key (10). Check that there are no burrs on the edges of the key slot.
- Loosen the gland packing by unscrewing the nuts (18).
- Remove the hexagon nuts (16) on the bonnet.
- Lift the bonnet. You may use an extractor as help, see Fig. 9.

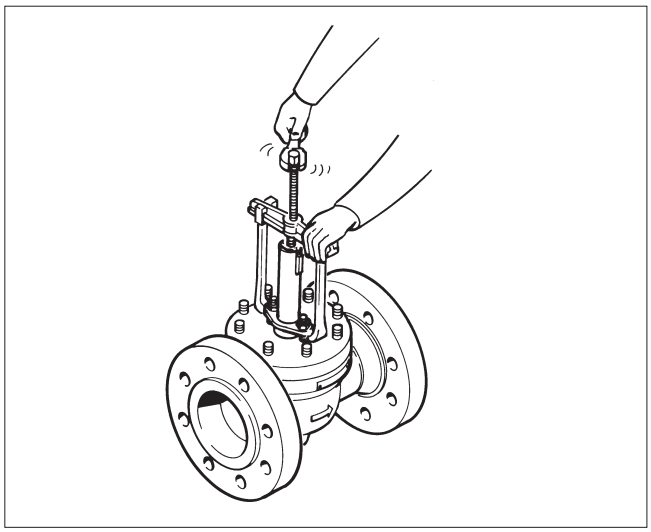


Fig. 9 Detaching the bonnet

- Turn the valve ball 180 degrees from the CLOSED position, see Fig. 10.

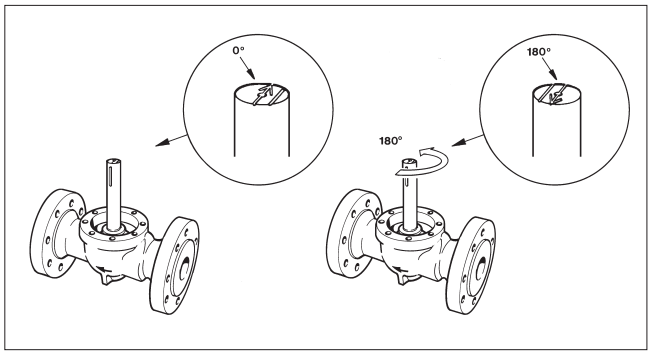


Fig. 10 Turning the ball

- Lift the ball. Check that the unbroken side of the ball does not rest on the seat, see Fig. 11.

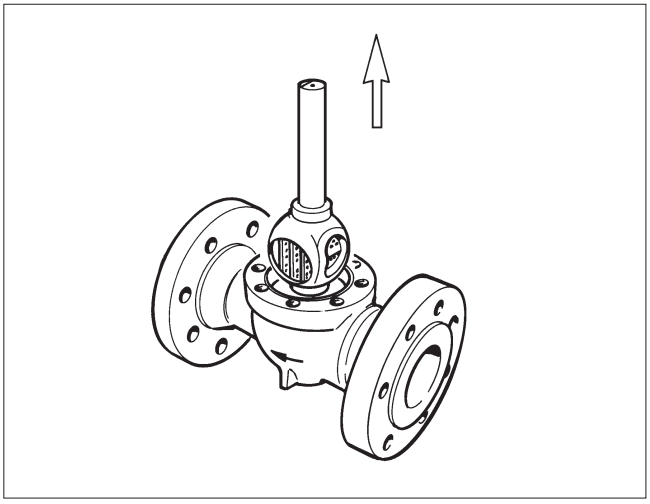


Fig. 11 Lifting the ball from the body

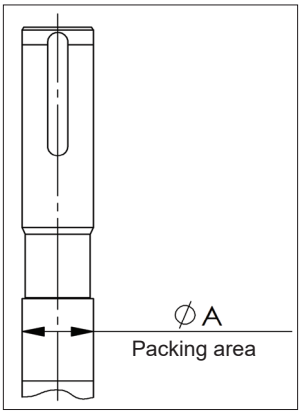
- Remove the seat (7).

5.4 Checking the parts of a dismantled valve

- Clean the removed parts.
- Check the ball and shaft (3) and thrust bearings (4, 5). 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

- Check the ball (3) and the ball seat (7).
- Check the body gasket surfaces.
- Replace any damaged parts.



5.5 Assembly

Check all sealing surfaces with care. If necessary, lap the sealing surfaces with diamond powder and thereafter with water sanding paper no. 1200. Clean all parts carefully.

Spray the sealing surfaces of the ball and the seat thinly with e.g. Molykote 321R dry lubricant. Wipe the surfaces with a soft cloth after the lubricant has dried. Check the gland packing. If it shows any signs of damage, remove it and clean the packing ring counterbore. Do not install a new gland packing until you have put the bonnet back.

Installing a seat

The same seat selection is available for all Top5 series valves. The dimensions of seat recesses have been standardized to be of equal sizes since June, 1990.

Push the seat into the body by hand (see Fig. 12).

Final installation can be done using a plastic hammer if needed.

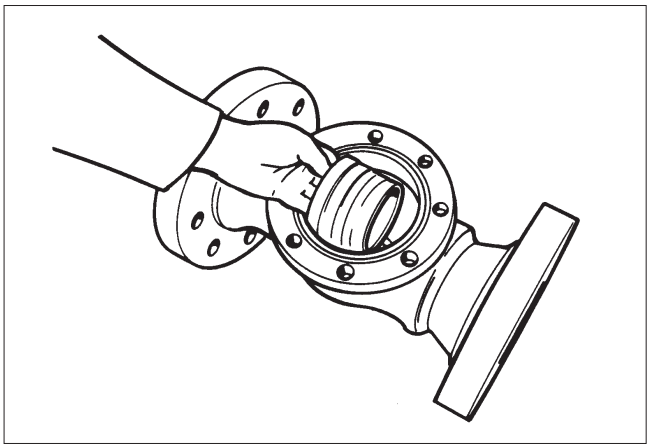


Fig. 12 Installing the seat

- Place the spring (62) into the groove in the seat (7).
  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.

A-seat (A, A1, A3),

Metal seat

See Fig. 13.

- Check the sealing surfaces.
- Install the back seal (130) on the seat (7).
- Install the ring (129).
- Install the spring (62) into the seat body.
- Install the support ring (35).
- Spread some anticorrosive agent, e.g. Cortec VCI-369, in the seat recess of a carbon steel body.
- Push the seat into its place.

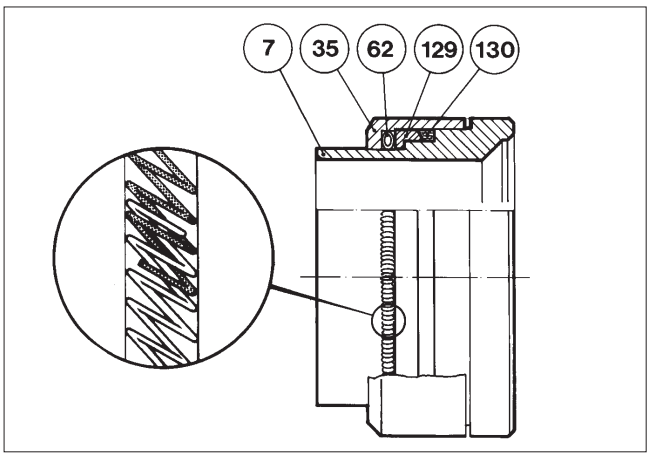


Fig. 13 A seat

F-seat (F, F1, F3, F7, F8)

Bellows seat, (SS steel, Monel 400, Inconel 626)

See Fig. 14.

- Check the sealing surfaces.
- Check the sealing surfaces at the ends of the spring (62).
- Check the spring countersurface in the body.
- Spray both ends of the spring and their countersurfaces thinly with dry lubricant.
- Install the spring on the seat (7).
- Spread some anticorrosive agent, e.g. Cortec VCI-369, on the countersurface of the spring in a carbon steel body.
- Push the seat into its place.

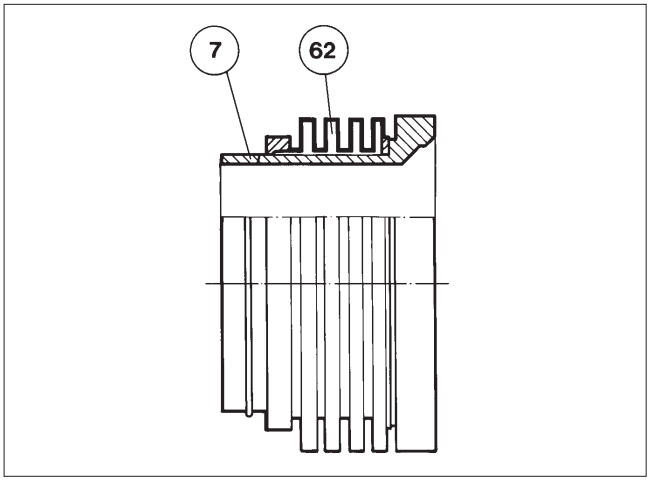


Fig. 14 F seat

R-seat (R63)

Soft seat, Fire safe -design

See Figs. 15 and 16.

- Check the sealing surfaces.
- Lubricate the O-ring (63) with silicone grease before installation.
- Install the O-ring (63).
- Install the support ring (64) into its groove. Cut the ribbon ends diagonally to make a flexible seam.
- Only in the Fire Safe version:
- Install the back seal (130) and the ring (129). See Fig. 16.
- Install the spring (62) into the seat body (7).

- Install the spring support ring (131).

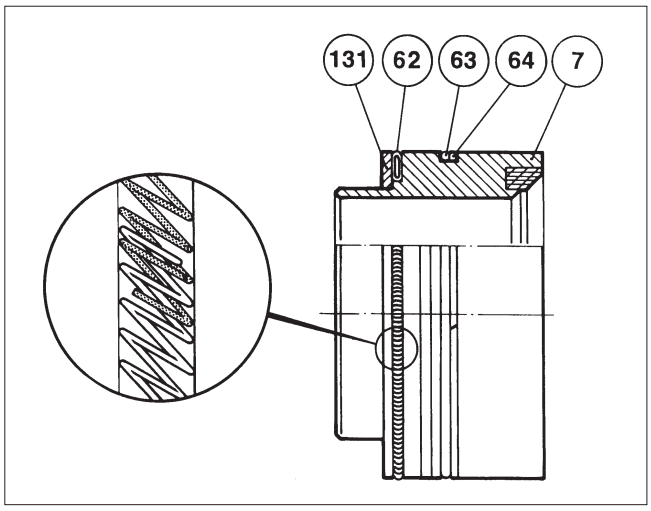


Fig. 15 R-seat. Delivered after 4/95 only as a spare part.

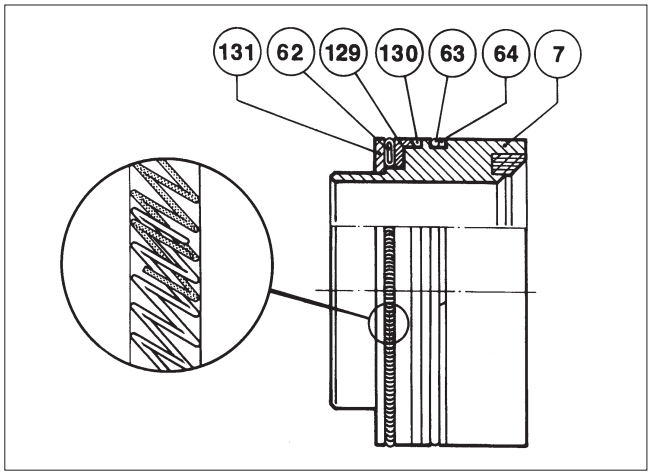


Fig. 16 R-seat (Fire Safe)

E1-seat (E1, E2, E4)

Metal seat for control service.

See Fig. 17.

- Check the sealing surfaces.
- Install the back seal (130) on the seat (7).
- Install the ring (129).
- Install the spring (62) into the seat body.
- Install the ring (133).
- Install the seal (135).
- Install the support ring (35).
- Spread some anticorrosive agent, e.g. Cortec VCI-369, in the seat recess of a carbon steel body.
- Push the seat into its place.

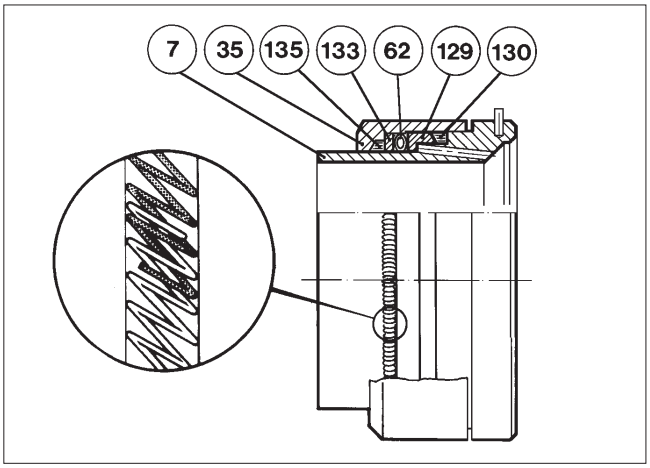


Fig. 17 E1-seat

Installation of bearings

Check the bearings and the bearing surfaces. If necessary, grind the bearing surfaces with an abrasive cloth and replace worn bearings. Spray the bearing surfaces lightly with dry lubricant.

Standard bearings

The bearing material is PTFE reinforced with an acid-resistant steel net. If the bearings are so worn that the net is visible on the wear surface, you should replace the bearings (60, 61, 89, 94). See Fig. 18.

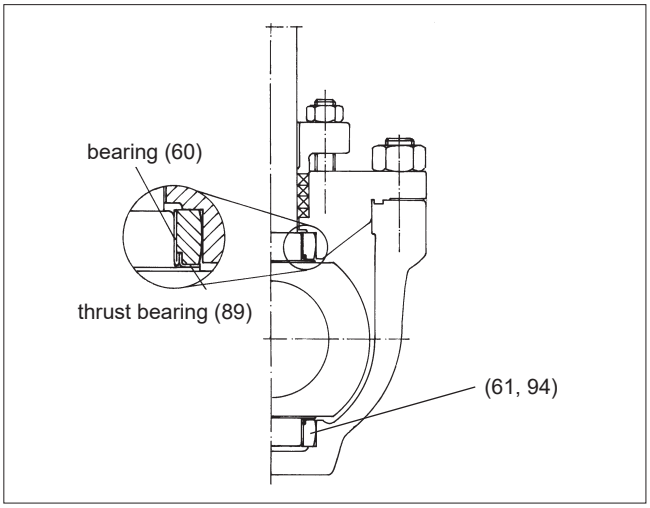


Fig. 18 Standard bearings

Heat-resistant bearings

The position of the ball in the direction of the stem is determined by means of the bearings (4, 60). Pipeline pressure causes a pressure force towards the cross section of the ball stem; this force removes the clearances against the bearings (4, 60) supported on the bonnet.

The bearings (4, 5) are precision-machined cobalt based alloy sleeves.

The bearing countersurface is a sleeve (60, 61) of special steel, which has been installed against the ball using a press-on fit. See Fig. 19.

If the surfaces are badly damaged and cannot be ‘restored’ using an abrasive cloth, the bearings and the ball must be replaced.

When installing new bearings (4, 5), lock them securely to the bonnet and the body using a nail punch.

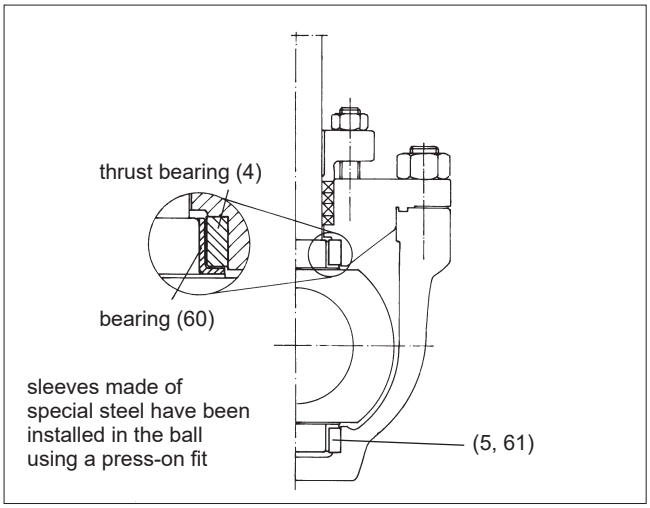


Fig. 19 Heat-resistant bearings

Installing the ball

If the ball surface has deep scratches that cannot be removed using an abrasive cloth or if it is not completely round, you should send the ball to the manufacturer for repair.

Adjust the seat to the ball by lapping them together with diamond powder before you install the ball (and the seat) into the body.

Install the ball into the body with the ‘cut’ side against the seat. Take care not to damage the bearing and the seat with the ball. In valves that have PTFE bearings and have a size of 6” or more, the bearings (94, 61, 5) are ready-fitted on the ball and locked using a lock ring (27).

When the ball is in its place, turn the ball against the seat and check visually that the ball has enough room to complete the operating circle and that it turns easily against the seat.

Installing the bonnet

The bonnet is installed in the reverse order compared to the disassembly, see section 5.3. Spray the bolts lightly with Molykote 321R dry lubricant.

Twist the bonnet gasket (graphite ribbon) around two times so that the ends overlap for about 25 mm, see Fig. 20.

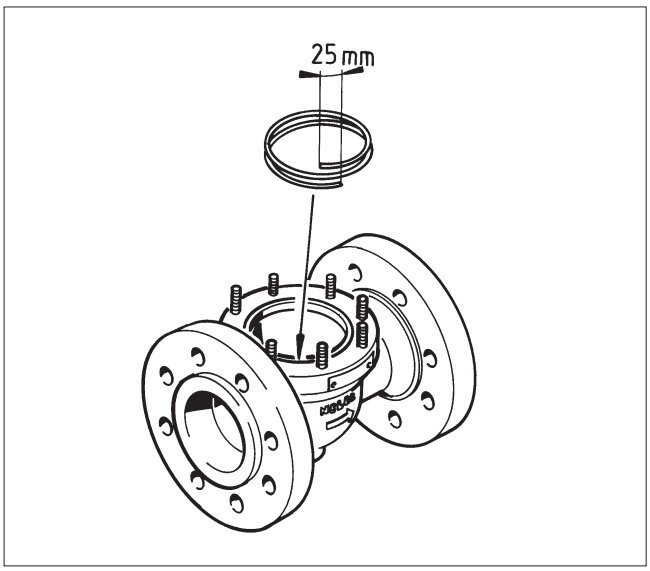


Fig. 20 Installing a gasket for the bonnet

Pull at the stem to make the ball perpendicular. The bonnet settles in the correct position, and the necessary pre-compression between the ball and the seat is achieved, see Fig. 21.

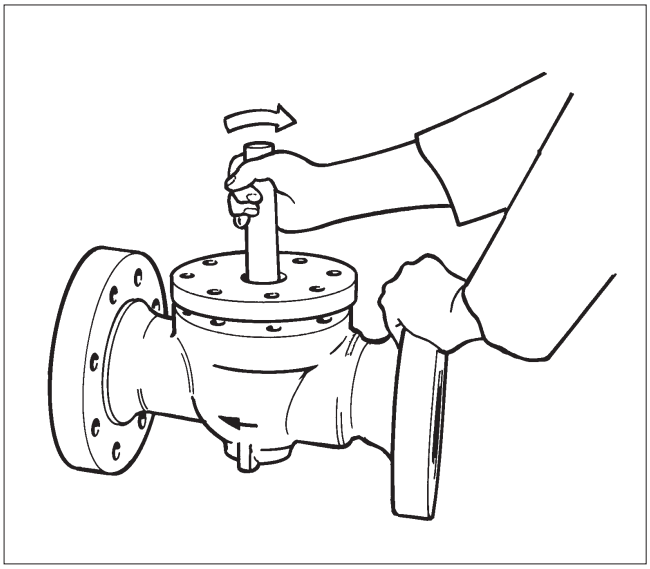


Fig. 21 Adjusting the bonnet by pulling at the ball stem

Tighten the bonnet nuts crosswise as shown in Table 3.

Stages 1 to 4: all bolts are tightened crosswise.

Stage 5: the bolts are tightened in succession along the circumference.

Install the gland packing as explained in section 5.2.

Table 3 Torques for the bonnet nuts

		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Material	Size UNC	0,2xM_final (Nm)	0,5xM_final (Nm)	0,8xM_final (Nm)	M_final (Nm)	M_final (Nm)
B8M/8M	3/8	3.6	9	14.4	18	18
B8M/8M	5/8	17.6	44	70.4	88	88
B8M/8M	3/4	32	80	128	160	160
B8M/8M	1	76	190	304	380	380
B8M/8M	1 1/4	158	395	632	790	790
L7M/2HM	3/8	8.2	20.5	32.8	41	41
L7M/2HM	5/8	40	100	160	200	200
L7M/2HM	3/4	70	175	280	350	350
L7M/2HM	1	168	420	672	840	840
L7M/2HM	1 1/4	360	900	1440	1800	1800

Note! Torque values shown on table 3 apply only for standard bolt materials B8M/8M and L7M/2HM. In case of non-standard bolt material, please consult manufacturer.

6. 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 bore of the valve. The valve must be in an open position during the test.

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

7. INSTALLING THE ACTUATOR

CAUTION:
Beware of the cutting movement of the ball!

Installation of the actuator must not cause bearing loads on the valve. The valve has two bearings, and the actuator serves as the third bearing. They must all be aligned.

If the actuator causes extra torsion on the stem, it is seen as increased need for torque and impaired control properties.

More detailed information on actuators can be obtained from the installation, operation and maintenance instructions for each actuator type.

1. The above represents common actuator mounting positions. For the code of other positions, consult your local Valmet representative.
2. If the desired position is not specified, the factory will mount the actuator in position: B-HR when the valve size is ≤ DN 100, and in B-HU when the valve size is ≥ DN 150.
3. Recommended mounting positions are B-HR, B-HU and A-VU.

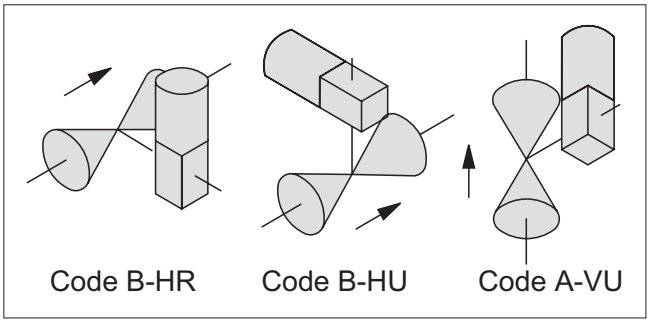


Fig. 22 Mounting positions

7.1 Installing the BC/B1C-series actuator

- Drive the actuator piston to the extreme outward end and turn the valve into the closed position.
- Clean the stem bore and file off any burrs.
- If a coupling is needed between the actuator and the valve stem, install it into the stem bore. Lubricate the coupling and stem bore. Note the correct position. The line at the end of the stem indicates the direction of the ball flow bore.
- Fasten the bracket loosely to the valve.
- Push the actuator carefully onto the valve stem. Avoid forcing it, since this may damage the ball and seats. We recommend mounting the actuator so that the cylinder is pointing upwards.
- Align the actuator as accurately as possible using the valve as help. Lubricate the mounting screws. Install the washers and tighten all screws. Final tightening may not change the position of the fixture.
- Adjust the ball open and closed positions (limits to piston movement) by means of the actuator stop screws (see Fig. 23). An accurate open position can be seen in the body flow bore. Check that the yellow arrow indicates the direction of the ball flow bore. **Keep your fingers out of the flow bore!**

There is no need to adjust the stop screw if the actuator is re-installed in the same valve. Drive the actuator piston to the housing end (open position). Turn the actuator by hand until the valve is in the open position (unless it is already open). Fasten the actuator in this position.

- Check the tightness of the stop screw at the end of the cylinder during cylinder operation. An O-ring is used for sealing.
- Check that the actuator is functioning correctly. Check the ball flow bore position and the actuator movement relative to the valve (clockwise: close, counterclockwise: open) after installing the actuator. The valve should be closed when the piston is in the extreme outward position.
- Check that the yellow arrow indicates the direction of the flow bore. If necessary, change the position of the arrow.

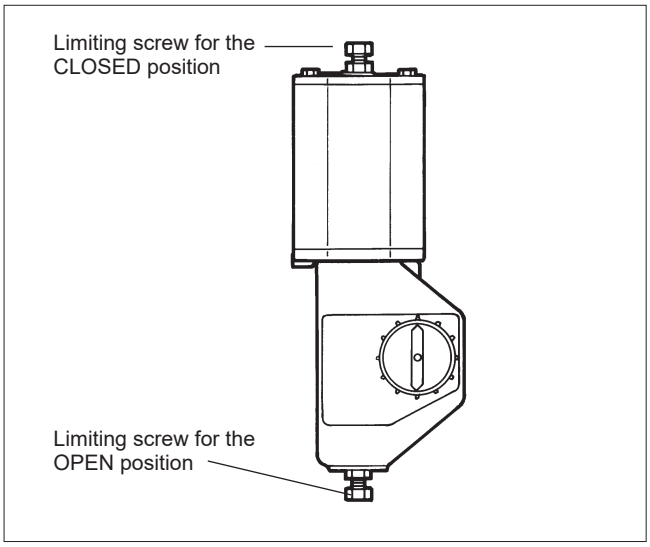


Fig. 23 Open and closed position in a B1 actuator

7.2 Installing the BJ/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 BJ/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 BJA/B1JA type is used for spring-to-open operation; the spring is between the piston and the cylinder end and pushes the piston towards the housing.

Spring-return actuators are installed in a manner similar to BC/B1C-series actuators, taking into account the following.

BJ/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.

BJA/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 the air supply connection must be open. The valve must be in the open position.

The rest of the installation procedure is the same as for the BC/B1C actuator.

8. TROUBLE SHOOTING TABLE

Table 4 lists malfunctions that might occur after prolonged use.

Table 4 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

9. TOOLS

To remove the actuator:

- Extractor tool (ID-code table in actuator's IMO)

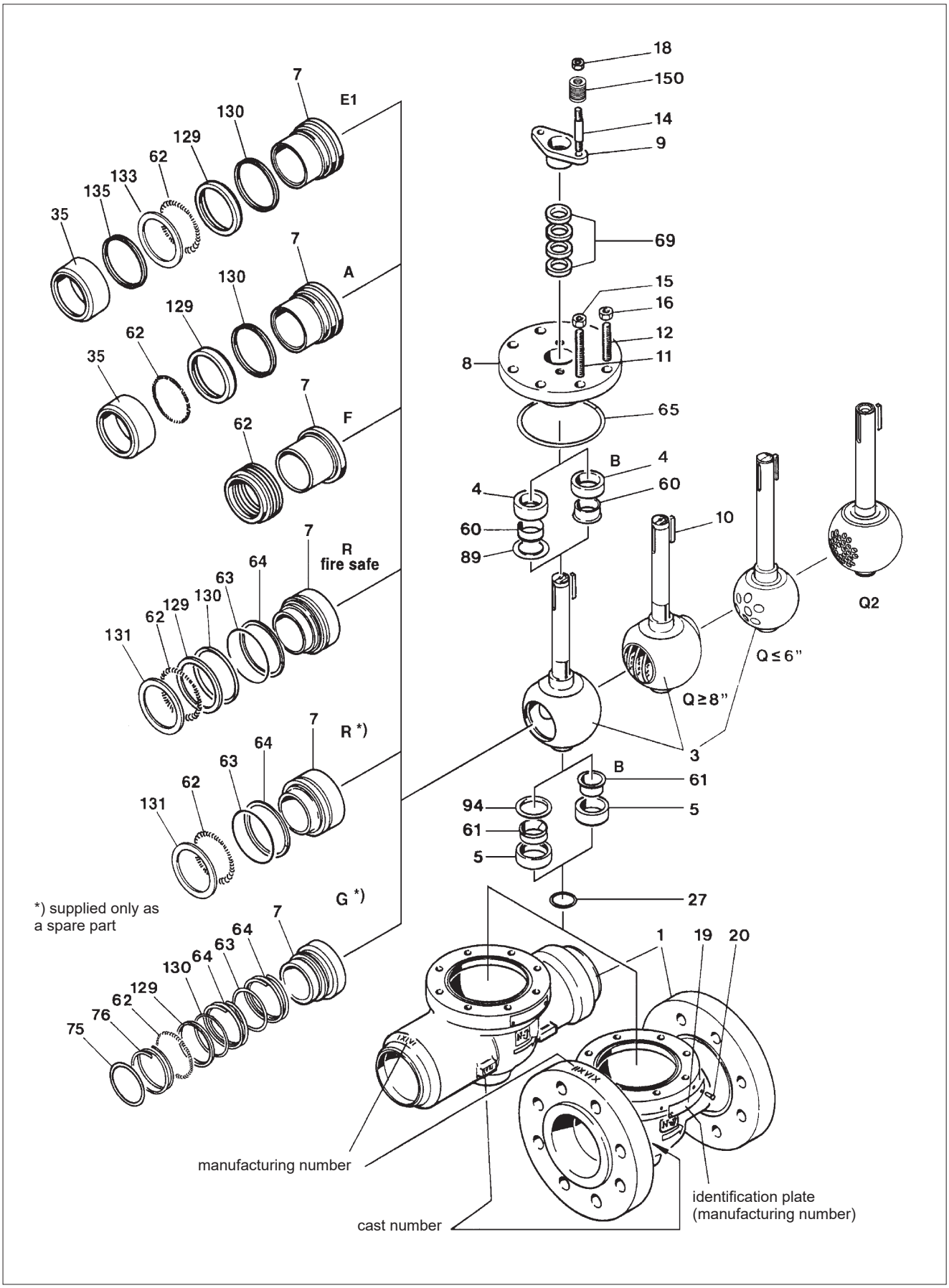
10. ORDERING SPARE PARTS

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.

11. EXPLODED VIEW

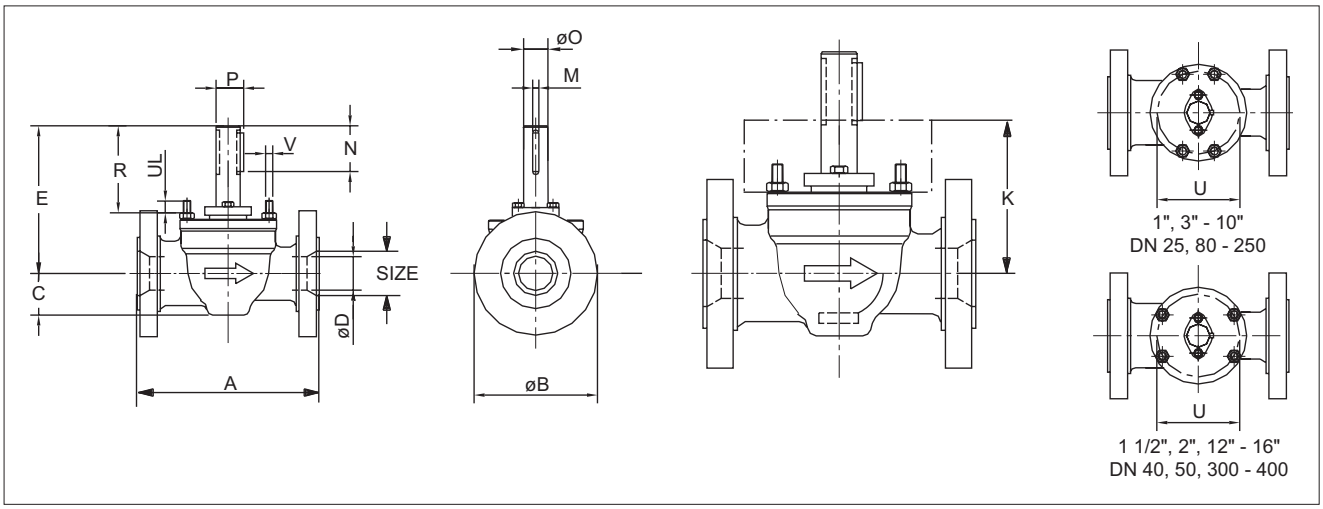


12. PARTS LIST

Item	Qty.	Description	Spare part category
1	1	Body	
3	1	Ball	3
4	1	Thrust bearing	3
5	1	Trunnion bearing	3
7	1	Seat	2
8	1	Bonnet	
9	1	Gland	
10	1	Key	3
11		Stud	
12		Stud	
14		Stud	
15		Hexagon nut	
16		Hexagon nut	
18		Hexagon nut	
19	1	Identification plate	
20	2	Screw	
27	1	Lock ring	
35	1	Supportr ing	2
60	1	Bearing	3
61	1	Bearing	3
62	1	Spring	2
63	1	O-ring	
64	1 (G-seat: 2)	Support ring	
65	1	Gasket	1
69		Gland packing	1
75	1	O-ring	
76	1 (4")	Support ring	
89	1	Thrust bearing	1***
94	1	Thrust bearing	1***
125	1	O-ring sleeve	
129	1	Ring	2
130	1	Back seal	2
131	1	Spring retainer	
133	1	Ring	
135	1	Seal	

Spare part set category 1: Recommended soft parts, always needed for the repair. Delivered as a set.
***) Bearing 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

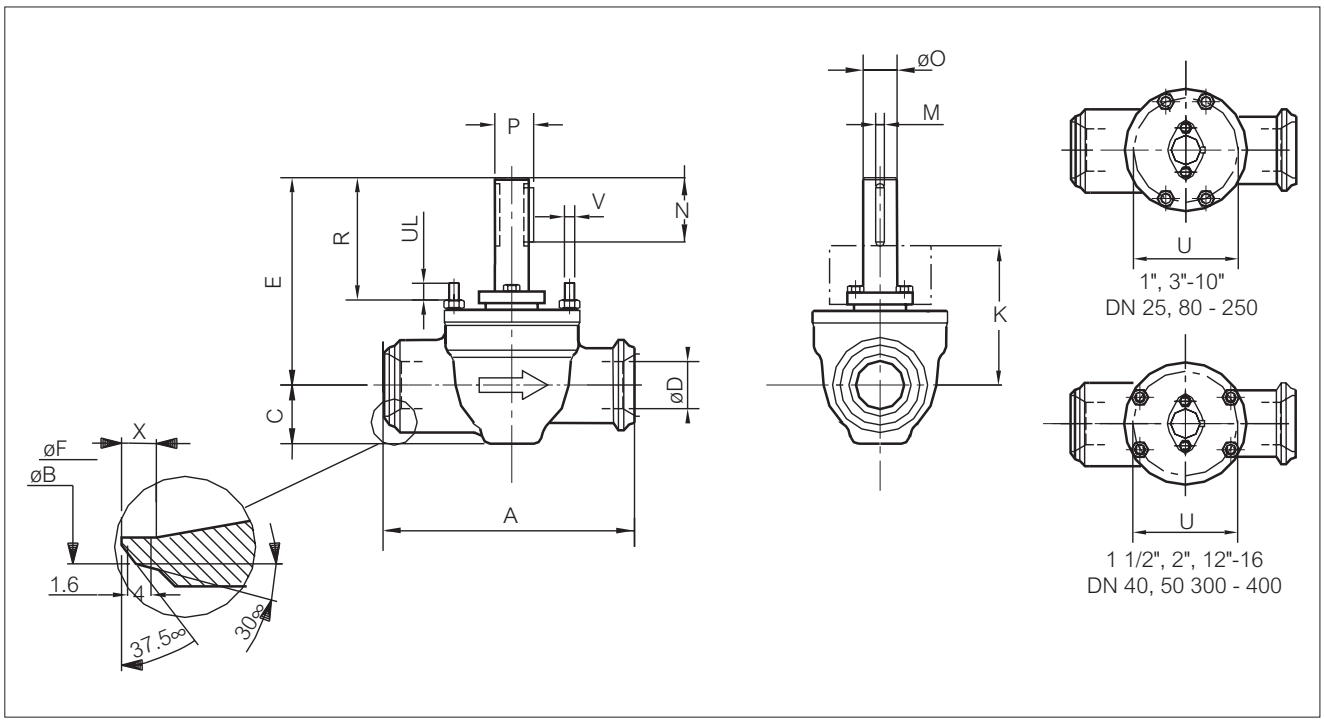
13. DIMENSIONS AND WEIGHTS



T5

Type	DN	T5D/T5M			T5F/T5N/T5P				DIMENSIONS, mm												T5D/T5M	T5F/T5N/T5P
		A	B		A	B															ASME 300 / PN 40	ASME 600 / PN 63, 100
			ASME 300	PN40		ASME 600	PN63	PN100	C	ø D	E	K	M	N	ø O	P	R	U	UL	V	kg	kg
T5_01	25	197	124	115	210	124	140	140	38	25	158	133	4.76	25	15	16.96	89	84	22	3/8 UNC	10	11
T5_015	40	235	155	150	251	155	170	170	60	38	200	165	4.76	35	20	22.22	105	110	30	5/8 UNC	15	17
T5_02	50	267	165	165	286	165	180	195	60	38	200	165	4.76	35	20	22.22	105	110	30	5/8 UNC	19	21
T5_03	80	317	210	200	337	210	215	230	71	50	230	184	6.35	46	25	27.8	124	128	28	5/8 UNC	32	36
T5_04	100	368	254	235	394	273	250	265	90	76	280	222	9.52	58	35	39.1	138	173	43	3/4 UNC	56	69
T5_06	150	473	318	300	508	356	345	355	122	102	362	280	12.7	80	45	50.4	185	220	44	1 UNC	115	147
T5_08	200	568	381	375	610	419	415	430	140	125	415	325	12.7	90	55	60.6	208	272	44	1 UNC	239	287
T5_10	250	708	445	450	752	508	470	505	170	152	420	330	12.7	90	55	60.6	195	319	40	1 UNC	315	403
T5_12	300	775	521	515	819	559	530	585	210	202	520	401	19.05	119	70	78.2	235	400	56	1 1/4 UNC	530	613
T5_14	350	927	584	580	972	603	600	655	275	254	730	584	22.225	146	85	94.6	389	480	60	1 1/4 UNC	1050	1123
T5_16	400	1057	648	660	1108	686	670	-	275	254	730	584	22.225	146	85	94.6	389	480	60	1 1/4 UNC	1100	1228

Type	DN	T5D/T5M			T5F/T5N/T5P				DIMENSIONS, inch												T5D	T5F
		A	B		A	B															ASME 300	ASME 600
			ASME 300	PN40		ASME 600	PN63	PN100	C	ø D	E	K	M	N	ø O	P	R	U	UL	V	lbs	lbs
T5_01	1	7.76	4.88	4.53	8.27	4.88	5.51	5.51	1.50	0.98	6.22	5.24	0.19	0.98	0.59	0.67	3.50	3.31	0.87	3/8 UNC	22	24
T5_015	1.5	9.25	6.10	5.91	9.88	6.10	6.69	6.69	2.36	1.50	7.87	6.50	0.19	1.38	0.79	0.87	4.13	4.33	1.18	5/8 UNC	33	37
T5_02	2	10.51	6.50	6.50	11.26	6.50	7.09	7.68	2.36	1.50	7.87	6.50	0.19	1.38	0.79	0.87	4.13	4.33	1.18	5/8 UNC	42	46
T5_03	3	12.48	8.27	7.87	13.27	8.27	8.46	9.06	2.80	1.97	9.06	7.24	0.25	1.81	0.98	1.09	4.88	5.04	1.10	5/8 UNC	70	79
T5_04	4	14.49	10.00	9.25	15.51	10.75	9.84	10.43	3.54	2.99	11.02	8.74	0.37	2.28	1.38	1.54	5.43	6.81	1.69	3/4 UNC	123	152
T5_06	6	18.62	12.52	11.81	20.00	14.02	13.58	13.98	4.80	4.02	14.25	11.02	0.50	3.15	1.77	1.98	7.28	8.66	1.73	1 UNC	253	323
T5_08	8	22.36	15.00	14.76	24.02	16.50	16.34	16.93	5.51	4.92	16.34	12.80	0.50	3.54	2.17	2.39	8.19	10.71	1.73	1 UNC	526	631
T5_10	10	27.87	17.52	17.72	29.61	20.00	18.50	19.88	6.69	5.98	16.54	12.99	0.50	3.54	2.17	2.39	7.68	12.56	1.57	1 UNC	693	887
T5_12	12	30.51	20.51	20.28	32.24	22.01	20.87	23.03	8.27	7.95	20.47	15.79	0.75	4.69	2.76	3.08	9.25	15.75	2.20	1 1/4 UNC	1166	1349
T5_14	14	36.50	22.99	22.83	38.27	23.74	23.62	25.79	10.83	10.00	28.74	22.99	0.88	5.75	3.35	3.72	15.31	18.90	2.36	1 1/4 UNC	2310	2471
T5_16	16	41.61	25.51	25.98	43.62	27.01	26.38	-	10.83	10.00	28.74	22.99	0.88	5.75	3.35	3.72	15.31	18.90	2.36	1 1/4 UNC	2420	2702



T4D/T4F

DIMENSIONS, mm																				
Type	DN	A	ø B	C	ø D	E	T4D ø F	T4F ø F	K	M	N	ø O	P	R	U	V	UL	T4D Xmin	T4F Xmin	kg
T4_01	25	210	36	38	25	158	26.6	24.4	133	4.76	25	15	16.95	89	84	3/8 UNC	22	-	-	10
T4_015	40	251	52	60	38	200	40.6	37.8	165	4.76	35	20	22.22	105	110	5/8 UNC	30	-	-	15
T4_02	50	292	62	60	38	200	52.5	49.3	165	4.76	35	20	22.22	105	110	5/8 UNC	30	7	9.5	18
T4_03	80	356	91	71	50	230	77.9	73.7	184	6.35	46	25	27.8	124	128	5/8 UNC	28	10	13	32
T4_04	100	432	117	90	76	280	102.3	97.1	222	9.52	58	35	39.1	138	173	3/4 UNC	43	11	15	65
T4_06	150	559	172	122	102	362	154.1	146.3	280	12.7	80	45	50.4	185	220	1 UNC	44	13	20	125
T4_08	200	660	223	140	125	415	202.7	188.9	325	12.7	90	55	60.6	208	272	1 UNC	44	15.2	25.5	210
T4_10	250	787	278	170	152	420	254.4	242.8	330	12.7	90	55	60.6	195	319	1 UNC	40	17.7	26.5	275
T4_12	300	838	329	210	202	520	303.2	288.8	401	19.05	119	70	78.2	235	400	1 1/4-8 UN	56	19.3	30	475
T4_14	350	889	362	275	254	730	333.4	317.6	584	22.225	146	85	94.6	389	480	1 1/4-8 UN	60	30	30	930
T4_16	400	991	413	275	254	730	381	363.6	584	22.225	146	85	94.6	389	480	1 1/4-8 UN	60	35	30	960

DIMENSIONS, inch																				
Type	DN	A	ø B	C	ø D	E	T4D ø F	T4F ø F	K	M	N	ø O	P	R	U	V	UL	T4D Xmin	T4F Xmin	lbs
T4_01	1	8.27	1.42	1.50	0.98	6.22	1.05	0.96	5.24	0.19	0.98	0.59	0.67	3.50	3.31	3/8 UNC	0.87	-	-	22
T4_015	1.5	9.88	2.05	2.36	1.50	7.87	1.60	1.49	6.50	0.19	1.38	0.79	0.87	4.13	4.33	5/8 UNC	1.18	-	-	33
T4_02	2	11.50	2.44	2.36	1.50	7.87	2.07	1.94	6.50	0.19	1.38	0.79	0.87	4.13	4.33	5/8 UNC	1.18	0.28	0.37	39.6
T4_03	3	14.02	3.58	2.80	1.97	9.06	3.07	2.90	7.24	0.25	1.81	0.98	1.09	4.88	5.04	5/8 UNC	1.10	0.39	0.51	70.4
T4_04	4	17.01	4.61	3.54	2.99	11.02	4.03	3.82	8.74	0.37	2.28	1.38	1.54	5.43	6.81	3/4 UNC	1.69	0.43	0.59	143
T4_06	6	22.01	6.77	4.80	4.02	14.25	6.07	5.76	11.02	0.50	3.15	1.77	1.98	7.28	8.66	1 UNC	1.73	0.51	0.79	275
T4_08	8	25.98	8.78	5.51	4.92	16.34	7.98	7.44	12.80	0.50	3.54	2.17	2.39	8.19	10.71	1 UNC	1.73	0.60	1.00	462
T4_10	10	30.98	10.94	6.69	5.98	16.54	10.02	9.56	12.99	0.50	3.54	2.17	2.39	7.68	12.56	1 UNC	1.57	0.70	1.04	605
T4_12	12	32.99	12.95	8.27	7.95	20.47	11.94	11.37	15.79	0.75	4.69	2.76	3.08	9.25	15.75	1 1/4-8 UN	2.20	0.76	1.18	1045
T4_14	14	35.00	14.25	10.83	10.00	28.74	13.13	12.50	22.99	0.88	5.75	3.35	3.72	15.31	18.90	1 1/4-8 UN	2.36	1.18	1.18	2046
T4_16	16	39.02	16.26	10.83	10.00	28.74	15.00	14.31	22.99	0.88	5.75	3.35	3.72	15.31	18.90	1 1/4-8 UN	2.36	1.38	1.18	2112

14. 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

15. TYPE CODING

Neles™ top entry rotary valve, Top5™ series T5											
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.		11.
	T5	F	B	04	A	A	F	03		/	-

1.	PRODUCT DESIGN Q- TRIM and V-PORT OPTIONS
Q	Low noise trim for gas and liquid applications (in sizes NPS 08" and larger).
QX	Multichannel Q-ball for gas and liquid applications. (in sizes NPS 06" and smaller)
Q2G	Q2-trim for gas applications
Q2GH	Q2-trim for gas applications, high capacity version
QA	Low noise trim + attenuator plate in downstream flow port of body for gas applications. (in sizes NPS 08" and larger).
QXA	Multichannel Q-ball + attenuator plate in downstream flow port of body for gas applications. (in sizes NPS 06" and smaller).
A	Attenuator plate in downstream flow port of body for gas application *
QXR	Reduced capacity multichannel Q-ball for gas and liquid applications. (in sizes NPS 06" and smaller)
QRA	Reduced capacity multichannel Q-ball + attenuator plate in downstream flow port of body for gas applications. (in sizes NPS 06" and smaller).
V_ _	V-port (only for T5/T4 1", 1 1/2", 2"/DN 25, 40, 50).

*) For liquid applications customized baffle plates are used. Code "A" must be replaced with "Y" and explanation must be given.

2.	SERIES / DESIGN
	T5 SERIES **Top entry body, trunnion mounted**
T5	Reduced bore, flanged, single seated, face-to-face lenght acc. to IEC 534-3 and ANSI/ISA S75.03-1985.
T4	Reduced bore 2" - 16", full bore 1" & 11/2", weld-ends.

3.	PRESSURE RATING
C	ASME Class 150, face-to-face is according to Class 300
D	ASME Class 300
F	ASME Class 600
L	PN 25, DIN 2544, size 08" and bigger (sizes 01" - 06", use PN40)
M	PN 40, DIN 2545, size 01" and bigger
N	PN 63, DIN 2546, size 02" and bigger (sizes 01" and 1H", use PN100)
P	PN 100, DIN 2547, size 01" and bigger
U	JIS 30K
W	JIS 40K
Z	JIS 63K

4.	CONSTRUCTION
E	General, PTFE bearings. Temperature range -50 °C ... +230 °C.
B	High and low temperature, metal bearings. Temperature range -50 °C...+450 °C.
C	Cryogenic, metal or PTFE bearings F-seat only. Temperature ranges: PTFE bearings -200 to +230 °C and metal bearings -200 to +400 °C.
Z	OXYGEN CONSTRUCTION BAM tested non-metallic materials - T = -50 °C… +200 °C - Max pressure based on body rating - Metal bearings, cobalt based alloy - seat type F, WC-Co coated ball and seats - Oxygen cleaning acc. to Neles internal procedure

5.	SIZE
	inch(es) 1, 1.5, 2, 3, 4, 6, 8, 10, 12, 14, 16 code 01, 015, 02, 03, 04, 06, 08, 10, 12, 14, 16,

6.	BODY	BOLTING
A	CF8M	B8M / 8M
D	WCB	L7M / 2HM

7.	BALL
A	CF8M + hard chrome with metal seats
D	CF8M + NiBo
R1	CF8M / AISI 316 + WC-Co, Dry gas, high pressure, T < 400 °C
R3	CF8M / AISI 316 + CrC, High temperature, T > 400 °C

8.	SEAT
A	Metal seat, T= -50 ... +450 °C. General service and fire safe applications.
E	Metal seat for control service. T= -50...+450 °C. Ejector style seat, lower torque in modulating control.
F	Bellows seat, T= -200 ... +400 °C (600 °C). Shut-off applications at low and high temperatures.
R	Standard soft seat, T= -30 ... +100 °C. Control and shut-off applications for high pressure gas.

9.	Seat seal	Bonnet gasket	Gland packing	Spring / Bellows	Bearings
02	Graphite, (seat A or E)	Graphite	Graphite	Inconel X-750 / W.no. 1.4418	PTFE
03	Graphite, (seat A or E)	Graphite	Graphite	Inconel X-750 / W.no. 1.4418	Metal
63	Viton G O-ring and Graphite (seat R)	Graphite	Graphite	Inconel X-750	PTFE or metal

10.	GLAND PACKING OPTION
G	Standard, Live loaded graphite packing,
G1	Live loaded graphite packing, ISO 15848-1 certified construction.
-	Without sign, Graphite packing

11.	FLANGE FACING
-	ASME B16.5 Raised Face (Ra 3.2-6.3) EN 1092-1 Type B1 (Ra 3.2 - 12.5) without sign
05	ASME B16.5 Ring Joint

12.	CONSTRUCTION CODE
+D	Drain plug

16. 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.

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