

Neles™ top entry rotary valve

Series T2

Installation, maintenance and
operating instructions

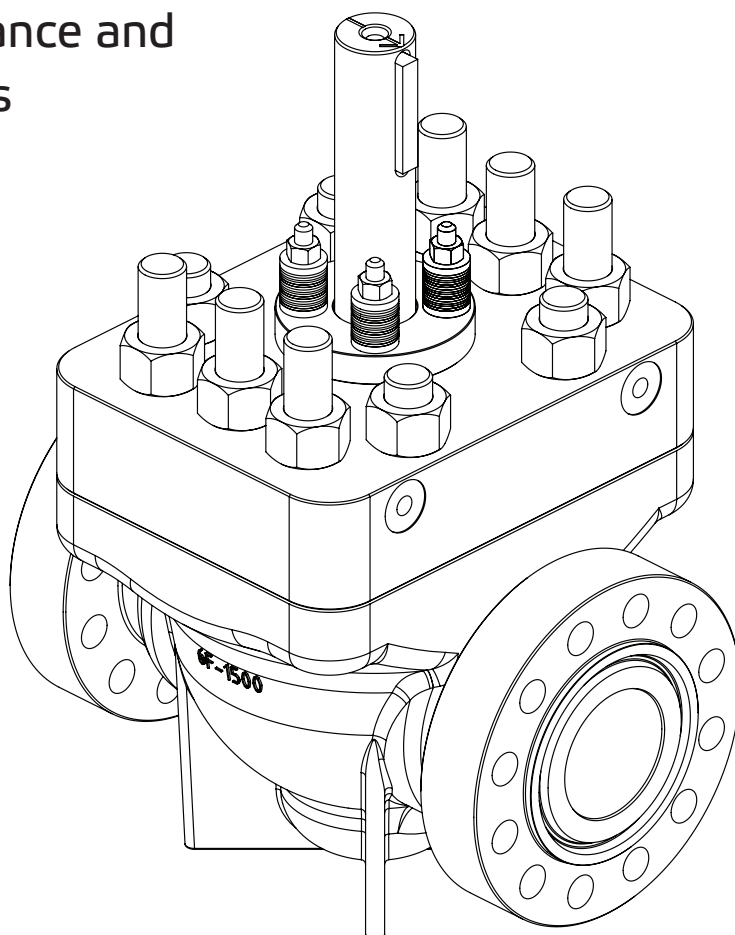


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This product meets the requirements set by the Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation.

READ THESE INSTRUCTIONS FIRST!

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

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

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 Scope of the manual

This manual provides the essential information on the T2 series top entry rotary 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 have any questions concerning the use or application of the valve, contact Valmet for more information.

1.2 Valve description

Neles™ T2 series top entry rotary valve has flanges or welding ends, Top entry body construction, one-piece body and one-piece ball and stem (stem ball) supported by the bearings.

The T2 valve series is intended for either control or shut-off applications.

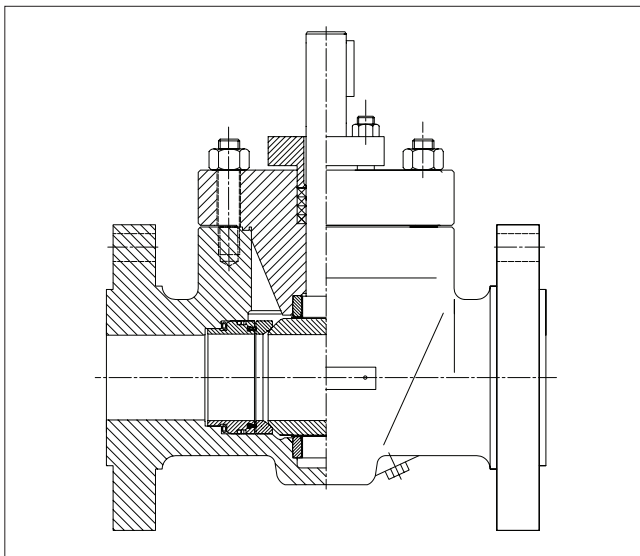


Fig. 1 Construction of T2 series valve

1.3 Valve markings

Body markings are cast or stamped on the body.

The identification plate (Fig. 2) is on the valve flange or in the valve body.

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.

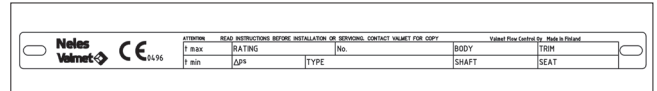


Fig. 2 Identification plate

1.4 Technical specifications

Product type

Trunnion mounted ball valve
Top entry design
Flanged or weld ends

Pressure ratings

ASME Class 900, 1500

Size range

NPS03 - 30 (Class 900)

NPS01 - 12 (Class 1500)

Standard temperature range

-50°C...+450°C, consult factory for higher temperature applications

Material and test certification

EN10204-3.1 material certificates for body and bonnet.

Valve testing

Each valve is tested for body integrity and seat tightness.

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

Design standard

| | |
|---------------------|-------------|
| Valve body | ASME B16.34 |
| Valve flanges | ASME B16.5 |
| Face-to-face length | ASME B16.10 |
| Actuator mounting | ISO 5211 |

Flow direction

Dependable on ball seat configuration

Standard tightness

Soft seated, ISO 5208 rate B or FCI Class VI

Metal seated, ISO 5208 Rate C or FCI Class V

Dimensions and weights

See Section 11

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.

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. Move the valve to its intended location just before installation. The valve is usually delivered in the open position.

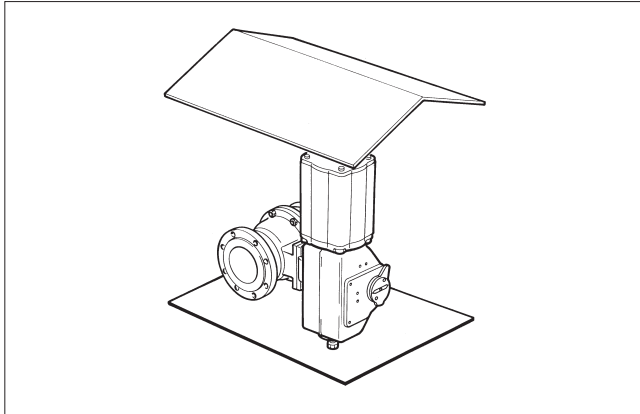


Fig. 3 Storing the valve

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!

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 or welding.

Flush or blow the pipes clean before mounting the valve. Impurities, sand and parts of welding electrodes may damage the ball and seats surfaces.

There are three marks to indicate the open-closed position of the valve.

- an indicator on the actuator's drive centre
- a groove at the end of the ball stem
- the keyway of the ball stem

If you feel uncertain about the indicator, check by the groove and the keyway.

The valve may be installed in any position and it offers the needed tightness. 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.

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

To facilitate servicing, it is preferable that the valve be supported by the body, using pipe clamps and supports. Do not fasten supports to the flange bolting or to the actuator, see Fig. 4.

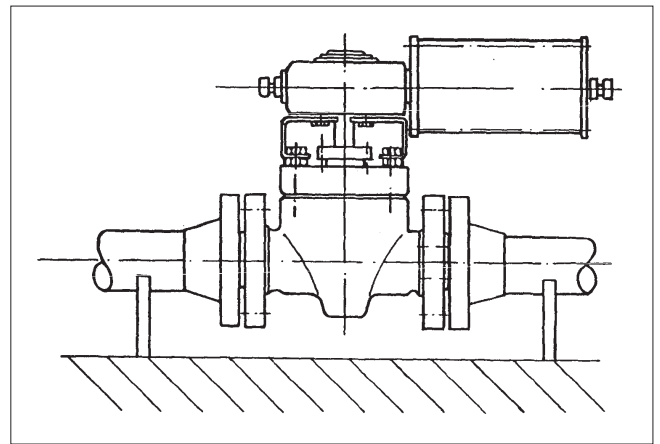


Fig. 4 Supporting the valve

Assembly of welding end valve

The valves are mounted in the pipeline by using standard welding methods.

When welding or annealing the joints, assure that the temperature of body in PTFE or the rubber sealings is not higher than that allowed for this type of sealing material, e.g. 120 °C. The increase of temperature can be prevented by winding wet protection cloth around the body during the welding. Fig. 5.

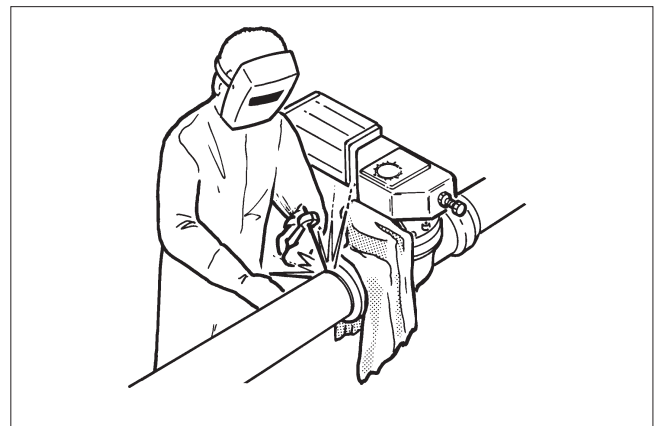


Fig. 5 Valve body covered with wet protection cloth during welding

Valves with welding ends are, if necessary, supported by flaky, arched supports on the machined part or preferably (Fig. 6) on the part of pipeline next to the valve.

After welding, the piping should be carefully cleaned and flushed before operating the valve.

After trial operation, the valve should be left in the 'Open' position until the process is started up.

If the valve is found to jam during test operation, open it and flush again with a powerful flow.

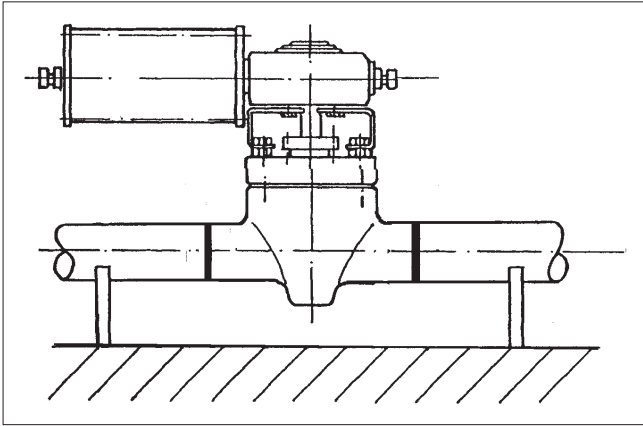


Fig. 6 Supporting the welding end valve

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Fig. 7.

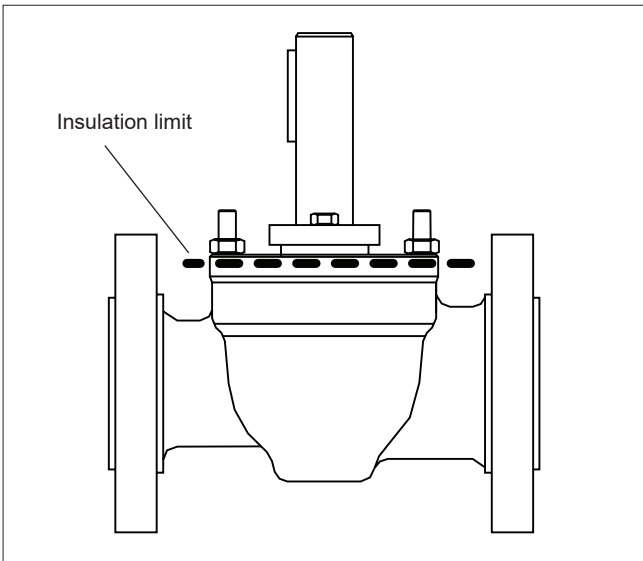


Fig. 7 Insulation of the valve

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 gland packing

CAUTION:

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

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

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

- Make sure that the valve is not pressurized.
- Detach the actuator and bracket according to the instructions in Section 4.4.
- Remove the key (10).
- Remove the nuts (18), the disc spring sets (150) 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 (3). The gland may be used for pushing the rings into the counterbore.

Do not damage packing rings in the shaft keyway. See Fig. 8 for proper orientation.

Packing without disc spring sets

- Compress the packing rings by tightening the gland nuts to the torque Tt, see value from table 1 or table 2 depending on valve pressure class. Lock the nuts with locking compound e.g. Loctite 221.
- Check leakage when the valve is pressurized.

Packing with disc spring sets:

- Pre-compress the packing rings by tightening the gland nuts without disc spring sets to the torque Tt, see value from table 1 or table 2 depending on valve pressure class.

- Remove the gland nuts 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 valve pressure class. Lock the nuts with locking compound e.g. Loctite 221.
- Check leakage when the valve is pressurized.

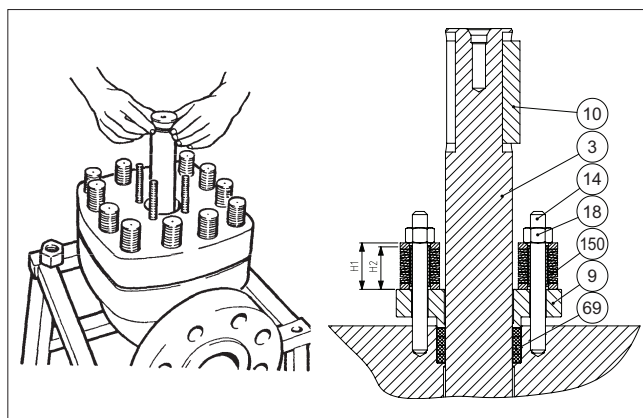


Fig. 8 Gland packing

- Install the actuator

Table 1 T2H ASME 1500 - Tightening of the gland packing

| Valve size | Shaft dia | Spring dimensions (mm) | | Tightening torque | ID code of disc spring set |
|------------|-----------|------------------------|---------|-------------------|----------------------------|
| | | H1 (mm) | H2 (mm) | | |
| NPS 1 | 20 | 24 | 22.3 | 10 | H148583 |
| 2 | 35 | 35.2 | 32 | 42 | H148588 |
| 3 | 45 | 48.5 | 44.4 | 65 | H161163 |
| 4 | 55 | 59 | 54 | 130 | H148587 |
| 6 | 85 | 59 | 54 | 150 | H148587 |
| 8 | 105 | 73 | 66 | 560 | H148589 |
| 10 | 150 | 60 | 54 | 310 | H148591 |
| 12 | 150 | 60 | 54 | 310 | H148591 |
| 16 | 175 | 60 | 54 | 380 | H148591 |

Table 2 T2G ASME 900 - Tightening of the gland packing

| Valve size | Shaft dia | Spring dimensions (mm) | | Tightening torque | ID code of disc spring set |
|------------|-----------|------------------------|---------|-------------------|----------------------------|
| | | H1 (mm) | H2 (mm) | | |
| NPS 3 | 45 | 48.5 | 45.5 | 45 | H161163 |
| 4 | 55 | 59 | 54.5 | 90 | H148587 |
| 6 | 85 | 59 | 54 | 135 | H148587 |
| 8 | 105 | 73 | 66 | 400 | H148589 |
| 10 | 120 | 60 | 54 | 360 | H148591 |
| 12 | 120 | 60 | 54 | 360 | H148591 |
| 16 | 165 | 73 | 66 | 600 | H148589 |
| 20 | 220 | 60 | 54 | 320 | H148591 |

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) 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 valve/actuator unit is small or not easily accessible, it is advised better to remove the whole unit at the same time.

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

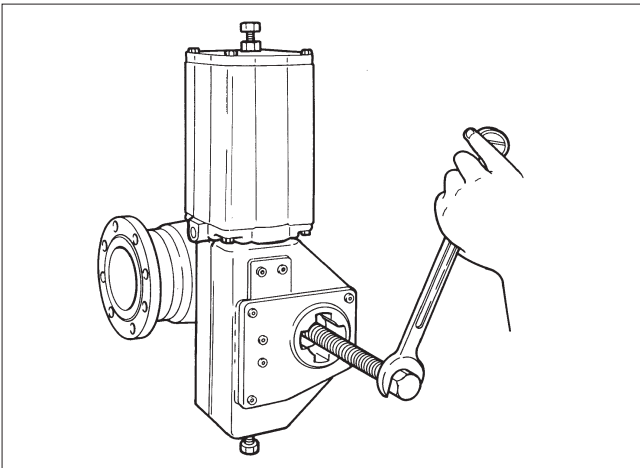


Fig. 9 Detaching a B series actuator with an extractor

- 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

- Remove the actuator as explained in 4.4.
- Loosen the gland nuts. Do not remove the gland.
- Remove the bonnet gland nuts and lift off the bonnet. If necessary use an extractor to grip the gland. See Fig. 10.

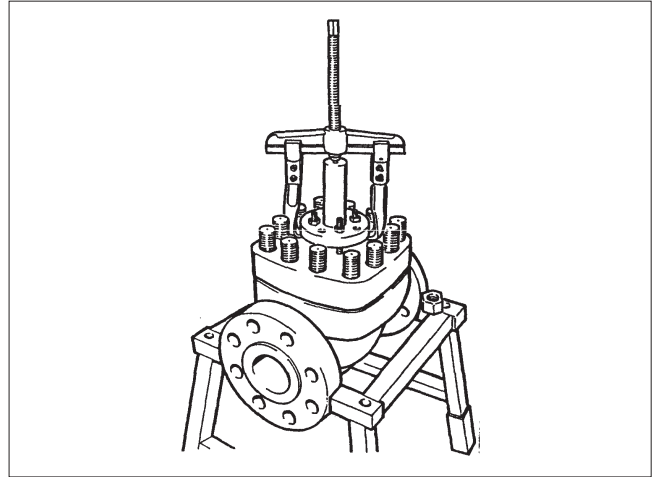


Fig. 10 Lifting the bonnet

- Install the locking tools (see Fig 11) to push support seat rings or bellows in to back position.

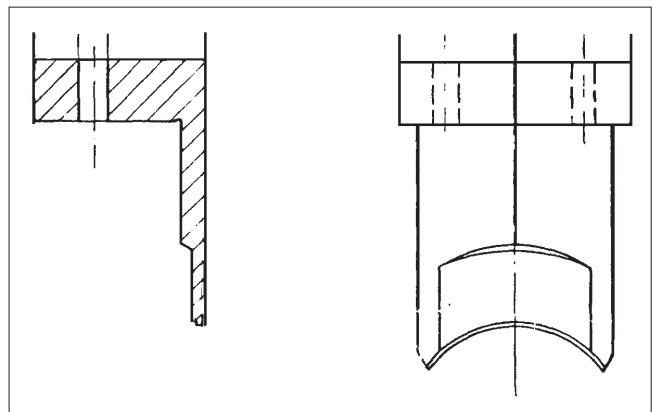


Fig. 11 Locking tool

- Pull out the ball and seats with the ball in the 'Open' position. See Fig. 12. Lower the ball on a soft surface.

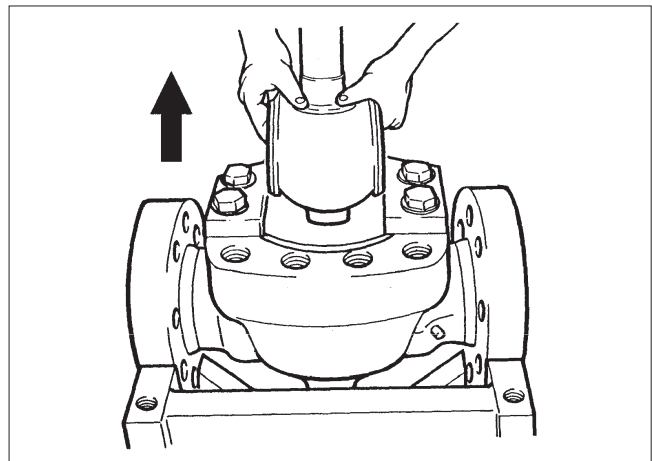


Fig. 12 Pulling out the ball

- To check the bearings, remove the circlips if any (27) and pull the bearing bushing (5) out off the shaft.
- Pull out the seat support rings or bellows.

4.7 Checking the parts of a dismantled valve

Seats

Seat T

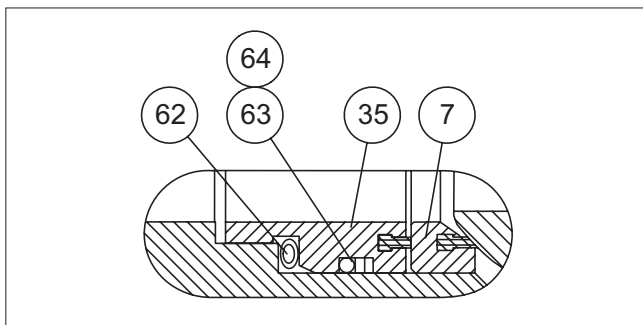


Fig. 13 Seat T

- Check the sealing and back surfaces of the seat ring (7), the support ring (35) and the o-ring (63). Sealing surfaces may require lapping.
- If damage is extensive, the parts should be replaced. Check the spring groove for any impurities which may jam the support ring (35).

Seat S

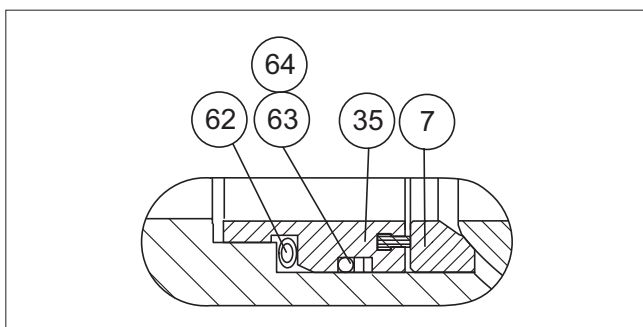


Fig. 14 Seat S

- Check the sealing and back surfaces of the seat ring (7), the support ring (35) and the o-ring (63). Sealing surfaces may require lapping. The sealing surface of the seat (7) is lapped against ball surface.
- If damage is extensive, the parts should be replaced. Check the spring groove for any impurities which may jam the support ring (35).

Seat H

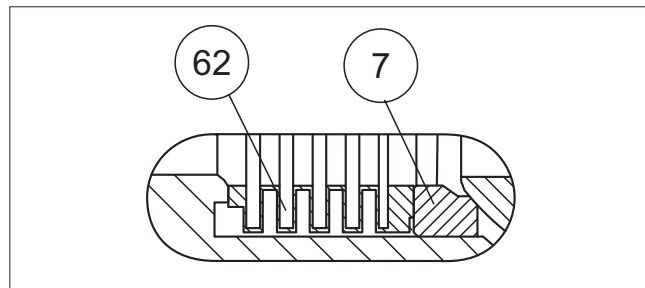


Fig. 15 Seat H

- Check the sealing surfaces of seat (7) and bellows (62). The sealing surfaces may require lapping. Parts with extensive damage must be replaced.
- Check the bellows for any impurities which may effect operation.
- If necessary, the sealing surface of the seat (7) may be lapped against ball surface. The back surface of the seat (7) and straight edges of the bellows (62) may be lapped on. Also the body may be lapped if the sealing surface is damaged.

Ball

- Lift the ball with ball seats from the body onto a soft surface for cleaning. Check the sealing and bearing surfaces of the ball stem. Remove smaller scratches and impurities with emery cloth. The ball may require lapping. See also Section 4.6. File off any burrs from the stem keyway.
- If there are deep scratches on the ball it shall be replaced.

Bearings

Standard construction

Bearings are of PTFE with stainless steel net.

- Check that the bearing strips and replace if necessary.

Hi-temp construction

- Bearings are of stainless steel with hard coating or solid cobalt based alloy.
- Replace if necessary.

4.8 Reassembling the valve

- Clean all the inside parts. If there is any rust inside, the surfaces can be sprayed with an antirust agent after cleaning. Check the reactions of the agent to flowing medium.
- Install first the spring, into the support ring.

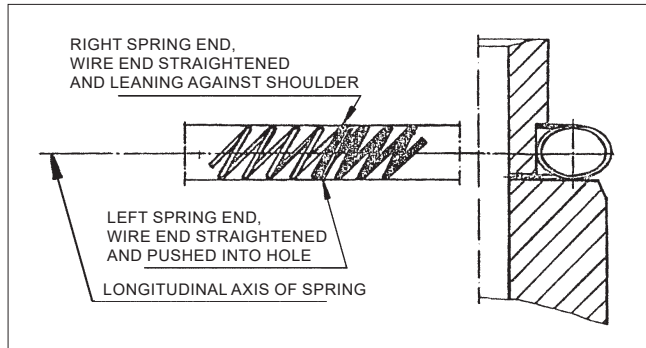


Fig. 16 Mounting the spring

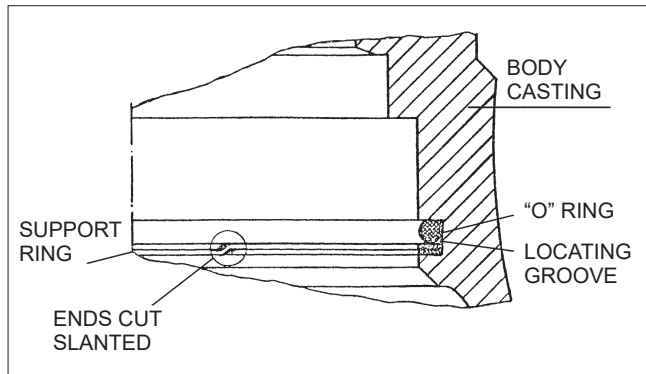


Fig. 17 O-ring as backseal

- Lubricate the O-rings, for example with silicone. Locate them into their grooves.
- Place the support ring, made of two rounds of PTFE strip, into the O-ring groove. The strip must be one-piece with the ends cutted as shown in Fig. 17.
- Install the support rings or bellows (C and H constructions) in both flow ports and press them into the back position by using extractor tool.

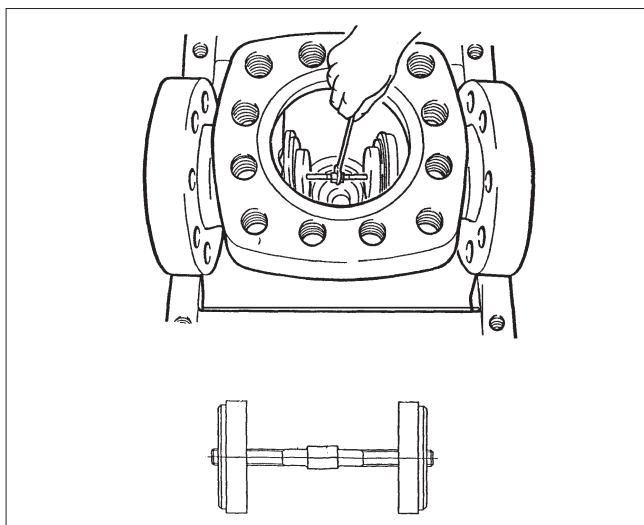


Fig. 18 Using extractor tool

- Hold the tool in place until the locking tools are installed.
- Place the locking tools in position and tighten as shown in Fig. 18. Remove the extractor tool.
- Lower the ball with bearings and seats into the body, in the 'Open position'. Check that the back face of the seat does not damage the support ring seat when lowering the ball into the ball body. See Fig. 19.

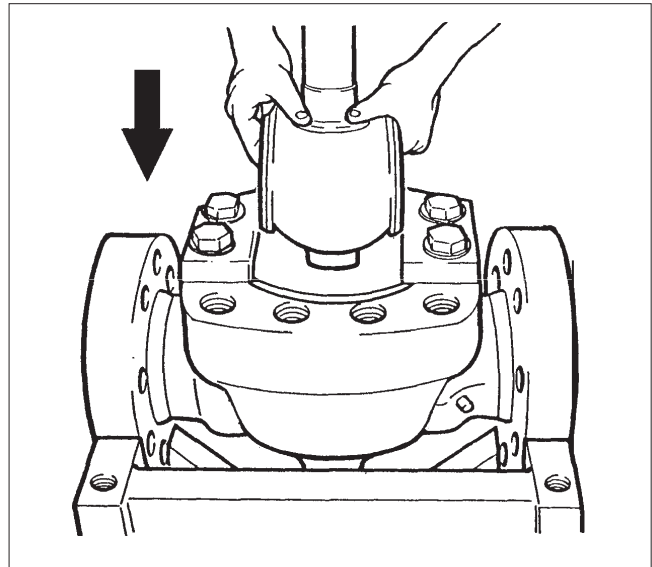


Fig. 19 Lowering the ball into the body

- Remove the locking tools.
- Install the bonnet gasket. This graphite gasket should always be replaced.

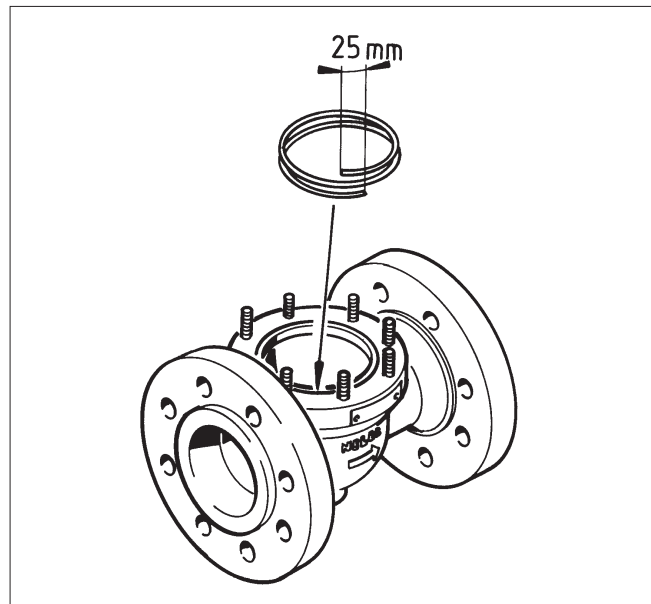


Fig. 20 Bonnet gasket

- Place the bonnet in position. If the gland packings are in place and in good condition, lower the bonnet carefully, ensuring that the shaft key groove does not damage them. If necessary replace the gland packings as explained in 4.2.
- Tighten the bonnet nuts by using the torques given in Table 3. Tighten in the order shown in Fig. 21.

Table 3 Recommended tightening torques of the body stud nuts

| Material | ASTM A320 gr. L7M | ASTM A193 gr. B8M cl. 1 |
|-----------|------------------------|-------------------------|
| Bolt size | Tightening torque (Nm) | Tightening torque (Nm) |
| 5/16UNC | 23 | 10 |
| 1/2UNC | 99 | 44 |
| 5/8UNC | 200 | 88 |
| 3/4UNC | 350 | 160 |
| 1-8UNC | 840 | 380 |
| 1 1/8-8UN | 1200 | 560 |
| 1 1/4-8UN | 1800 | 790 |
| 1 1/2-8UN | 3200 | 1400 |
| 2-8UN | 7900 | 3500 |
| 2 1/2-8UN | 16000 | 7100 |
| 2 3/4-8UN | 21000 | 9500 |
| 3-8UN | 28000 | 12000 |

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

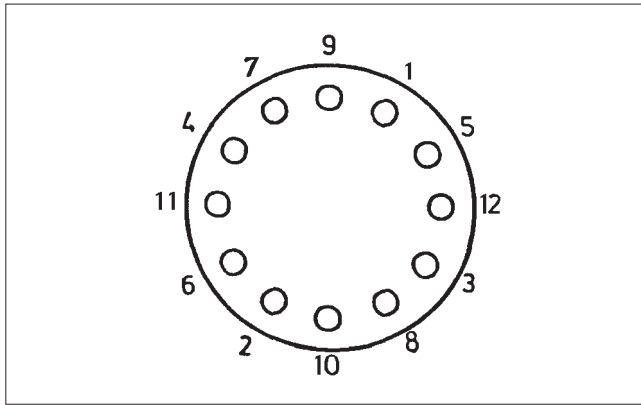


Fig. 21 Nut tightening order

- Assemble the gland packing as described in 4.2.

5. TESTING THE VALVE

CAUTION:

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

- The hydraulic body test shall be carried out after the reassembly.
- Test pressure shall be 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.

6. INSTALLING THE ACTUATOR

6.1 General

Use suitable mounting parts and couplings when you install the actuators.

CAUTION:

Beware of ball cutting movement!

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 key groove of the actuator and the couplings. Install the coupling on the shaft and lock it. Install the bracket(s) on the valve. A plate should be installed between the valve flange mounting face or bracket and the actuator mounting face, see actuator's instructions for details.
- Lubricate the actuator screws. Install and tighten all screws.
- Adjust the ball fully open and fully closed positions with the hexagon screws located on both sides of the housing (see Fig. 22). 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 indicator on the top of actuator shows the direction of the ball flow bore.

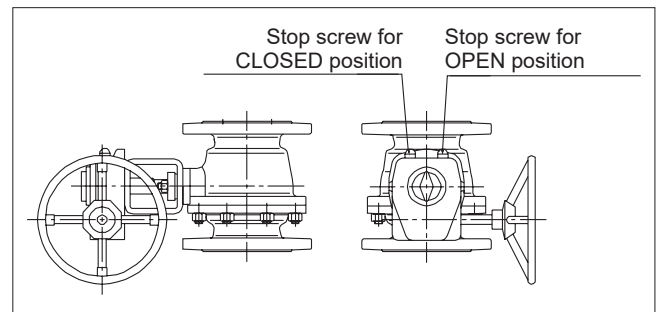


Fig. 22 Open and closed positions of the M actuator

6.3 Installing the B1C-series actuator

- Operate the actuator to the same position as the valve (fully open or fully closed).
- 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 Fig. 23). 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.

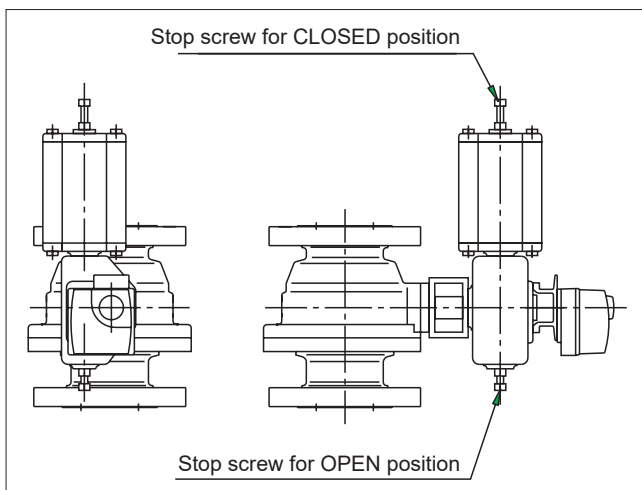


Fig. 23 Open and closed positions of the B1C/B1J actuator

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 B1 C-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 and taking account the stem and keyway dimensions.

7. MALFUNCTIONS

The following Table 4 lists malfunctions that might occur after prolonged use.

Table 4 Malfunctions

| Malfunction | Possible cause | Action |
|--------------------------------|---|---|
| Leakage through a closed valve | Wrong stop screw adjustment of the actuator | Adjust the stop screw for closed position |
| | Damaged ball surface | Replace the ball |
| | Damaged seat(s) | Replace seat(s) |
| | Ball cannot move freely | Clean the inside of the valve |
| Stick valve movement | Impurities between the ball and seats | Flush the valve from the inside |
| | | Clean the sealing surfaces and seats mechanically |
| | Damaged bearings | Replace bearings |
| | Damaged seat | Replace seat(s) |
| Leakage through gland packing | Over-tightened gland packing | Untighten the nuts |
| | Loose packing | Tighten the nuts |
| Leakage through gland packing | Worn-out or damaged packing | Replace the gland packing |
| | Loose bonnet nuts | Re-tighten the bonnet nuts |
| Leakage through bonnet sealing | Damaged body gasket | Replace the body gasket |

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).

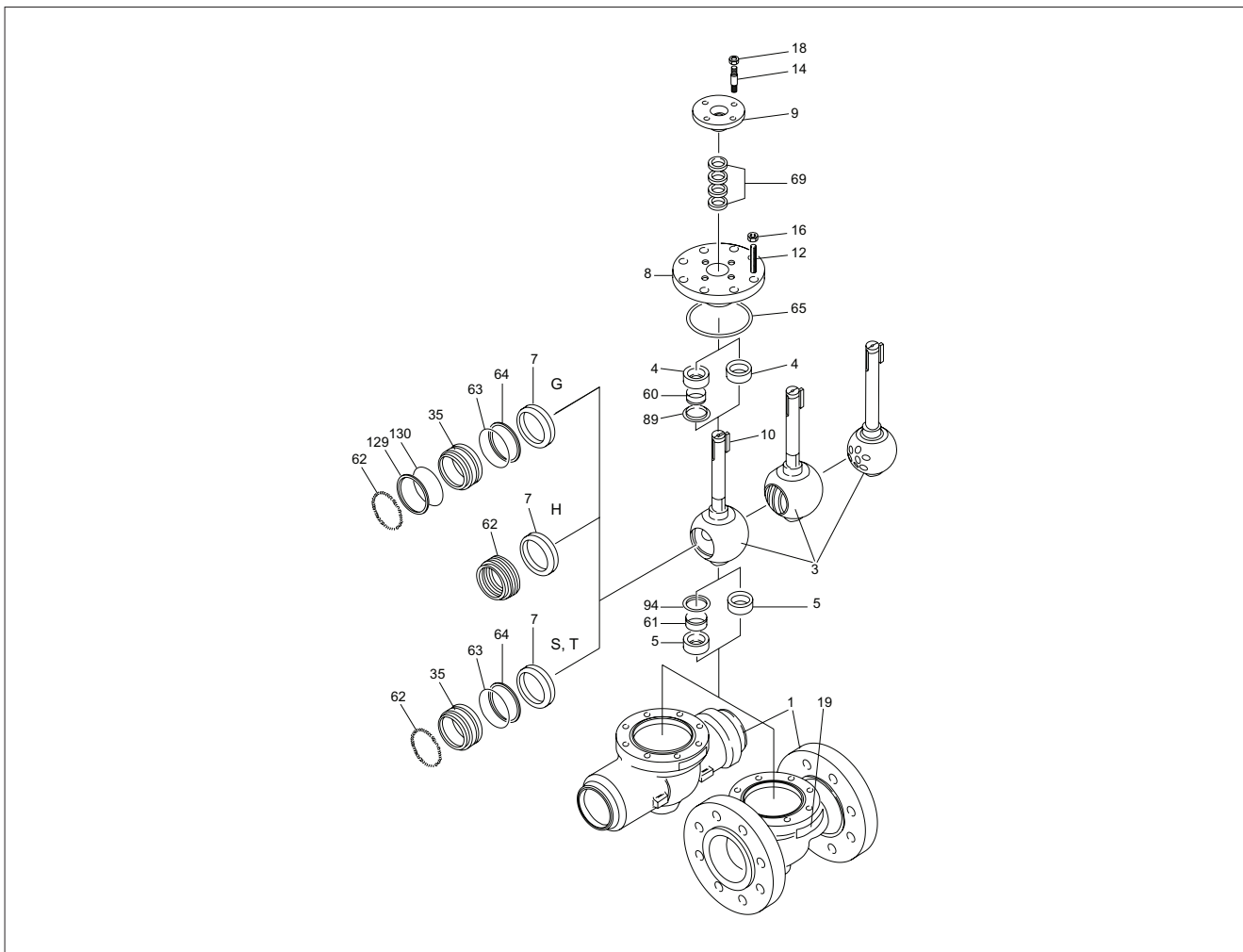
9. ORDERING SPARE PARTS

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

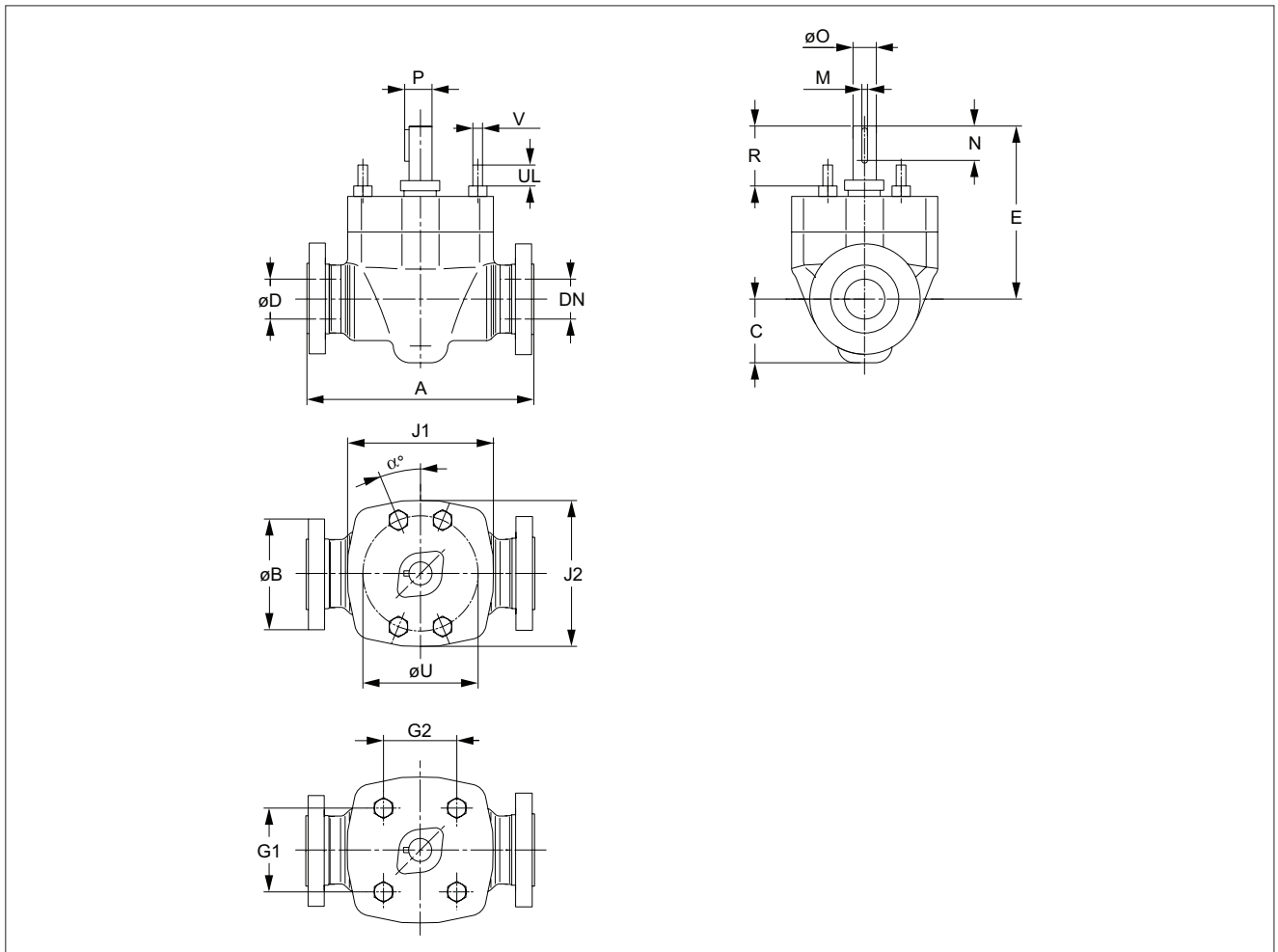
This information can be found from the identification plate or documents.

10. EXPLODED VIEW AND PARTS LIST



| Item | Qty | Description | Recommended spare |
|------|-----|--------------------------|-------------------|
| 1 | 1 | Body | |
| 3 | 1 | Ball | |
| 4 | 1 | Trunnion bearing | |
| 5 | 1 | Trunnion bearing | |
| 7 | 1 | Ball seat | |
| 8 | 1 | Bonnet | |
| 9 | 1 | Gland | |
| 10 | 1 | Key | |
| 12 | | Stud | |
| 14 | | Stud | |
| 16 | | Hexagon nut | |
| 18 | | Hexagon nut | |
| 19 | 1 | ID plate | |
| 35 | 2 | Secondary seat (S, T, G) | |
| 60 | 1 | Bearing strip | |
| 61 | 1 | Bearing strip | |
| 62 | 2 | Bellows spring (H) | |
| | 2 | Spring (S, T, G) | |
| 63 | 2 | O-ring (S, T, G) | |
| 64 | 4 | Back-up ring (S, T, G) | |
| 65 | 1 | Seal strip | |
| 69 | 5 | Packing ring | |
| 77 | 1 | Plug | |
| 89 | 1 | Thrust bearing | |
| 94 | 1 | Thrust bearing | |
| 129 | 2 | Support ring (G) | |
| 130 | 2 | Back seal (G) | |

11. DIMENSIONS AND WEIGHTS



Valve T2H, ASME 1500

| | DIMENSIONS IN mm | | | | | | | | | | | | | | | | α° | V 8 UN | KG | |
|--------|------------------|------|-----|-----|-------|------|-------|-----|-----|-------|-----|-----|-----|-----|-----|------|----------------|-----------|-------|------|
| | DN | A | øB | C | øD | E | M | N | øO | P | R | UL | G1 | G2 | øU | J1 | | | | J2 |
| T2H 01 | 25 | 254 | 150 | 60 | 25.5 | 226 | 4.76 | 35 | 20 | 22.16 | 100 | 36 | - | - | 110 | ø142 | 22.5 | 3/4UNC | 29 | |
| T2H 02 | 50 | 368 | 215 | 89 | 50.8 | 348 | 9.52 | 58 | 35 | 39.1 | 163 | 60 | - | - | 167 | ø224 | 22.5 | 1 1/8 | 95 | |
| T2H 03 | 80 | 470 | 265 | 125 | 76.2 | 447 | 12.7 | 80 | 45 | 50.4 | 201 | 70 | - | - | 225 | ø300 | 22.5 | 1 1/2 | 205 | |
| T2H 04 | 100 | 546 | 310 | 150 | 101.6 | 507 | 12.7 | 90 | 55 | 60.6 | 218 | 80 | - | - | 280 | 348 | 348 | 16.6 | 1 1/2 | 335 |
| T2H 06 | 150 | 705 | 395 | 240 | 146.1 | 730 | 22.22 | 146 | 85 | 94.6 | 328 | 80 | 415 | 216 | - | 440 | 575 | - | 2 | 800 |
| T2H 08 | 200 | 832 | 485 | 305 | 193.7 | 850 | 25.4 | 180 | 105 | 116.1 | 358 | 95 | 480 | 128 | - | 545 | 625 | - | 2 | 1500 |
| T2H 10 | 250 | 991 | 585 | 340 | 241.3 | 1000 | 38.1 | 250 | 150 | 166 | 440 | 110 | 762 | 204 | - | 654 | 890 | - | 2 1/2 | 2000 |
| T2H 12 | 300 | 1130 | 675 | 440 | 288.9 | 1120 | 38.1 | 250 | 150 | 166 | 440 | 125 | 834 | 208 | 860 | 730 | 1200 | 42 | 2 1/2 | 4200 |

Valve T2G, ASME 900

| | DIMENSIONS IN mm | | | | | | | | | | | | | | | | α° | V 8 UN | KG | |
|--------|------------------|------|-----|-----|-------|------|-------|-----|-----|-------|-----|-----|-----|-----|------|------|----------------|-----------|-------|------|
| | DN | A | øB | C | øD | E | M | N | øO | P | R | UL | G1 | G2 | øU | J1 | | | | J2 |
| T2G 03 | 80 | 470 | 241 | 125 | 76.2 | 447 | 12.7 | 80 | 45 | 50.4 | 201 | 70 | - | - | 225 | ø300 | 22.5 | 1 1/2 | 190 | |
| T2G 04 | 100 | 546 | 292 | 152 | 101.6 | 507 | 12.7 | 90 | 55 | 60.6 | 218 | 80 | - | - | 280 | 348 | 348 | 16.6 | 1 1/2 | 320 |
| T2G 06 | 150 | 610 | 381 | 255 | 152 | 730 | 22.22 | 146 | 85 | 94.6 | 328 | 80 | 415 | 216 | - | 575 | 440 | - | 2 | 760 |
| T2G 08 | 200 | 832 | 470 | 310 | 203 | 850 | 25.4 | 180 | 105 | 116.1 | 358 | 95 | 480 | 28 | - | 624 | 546 | - | 2 | 1430 |
| T2G 10 | 250 | 838 | 546 | 330 | 254 | 795 | 31.75 | 205 | 120 | 133.8 | 387 | 73 | - | - | 546 | 630 | 600 | 8.18 | 1 1/2 | 1350 |
| T2G 12 | 300 | 965 | 610 | 372 | 304.8 | 865 | 31.75 | 205 | 120 | 133.8 | 404 | 119 | - | - | 615 | 745 | 715 | 10 | 2 | 2200 |
| T2G 16 | 400 | 1250 | 705 | 485 | 374.7 | 1095 | 38.1 | 280 | 165 | 181.8 | 532 | 111 | - | - | 800 | ø940 | 20 | 2 1/2 | 3500 | |
| T2G 20 | 500 | 1600 | 857 | 615 | 473.1 | 1150 | 50.8 | 340 | 220 | 242.1 | 440 | 440 | - | - | 1040 | 1170 | 1170 | 7.5 | 2 3/4 | 6300 |

12. TYPE CODING

| Neles™ top entry rotary valve, series T2 | | | | | | | | | | |
|--|----|----|----|----|----|----|----|----|----|-----|
| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| Q- | T2 | G | H | 20 | D | H | H | 03 | 01 | /Y |

| Q-CODE | PRODUCT DESIGN |
|--------|---|
| QX- | Standard. Multichannel Q-ball for gas and liquid applications, single seat construction, only ≤ 12" |

| 1. sign | SERIES / DESIGN |
|-------------------------------|---|
| T2 SERIES STANDARD | |
| T2 | Top entry body, trunnion mounted, gland packing (except subsea). Full bore, flanged. ASME cl.900 or ASME cl.1500. |
| T2 SERIES NON-STANDARD | |
| T3 | Full bore, weld ends |
| T4 | Reduced bore, weld ends |
| T5 | Reduced bore, flanged (available only in ASME cl.900, T5G_). |

| 2. sign | PRESSURE RATING |
|---------|-----------------------------|
| G | ASME Class 900, all sizes |
| H | ASME Class 1500, only ≤ 12" |

| 3. sign | CONSTRUCTION |
|---------|---|
| A | General, PTFE bearings, double-seated, temp range: -50° to +230 °C. |
| B | Single-seated, metal bearings, one-way tight, temp range: -50° to +450/600 °C. |
| E | Single-seated, PTFE bearings, one-way tight, temp range: -50° to +230 °C. |
| H | High temperature, metal bearings, double-seated, temp range: -50° to +450/600 °C. |
| S | Subsea construction |
| Y | Special |

| 4. sign | SIZE CODE |
|---------|--|
| | 01, 02, 03, 04, 06, 08, 10, 12, 16, 20 |
| | NPS (inches) full bore |
| T2G | 3, 4, 6, 8, 10, 12, 16, 20 |
| T2H | 1, 2, 3, 4, 6, 8, 10 and 12 |
| | NPS (inches) reduce bore |
| T5G | 3/2, 4/3, 6/4, 8/6, 10/8 and 12/10 |

| 5. sign | BODY | BOLTING |
|-------------------------------|---------|---------|
| STANDARD MATERIALS | | |
| A | CF8M | B8M |
| D | WCB | L7M |
| NON-STANDARD MATERIALS | | |
| F | LCC | L7M |
| G | WCC | L7M |
| J | LC2 | L7M |
| Y | Special | |

| 6. sign | BALL |
|-------------------------------|--|
| STANDARD MATERIALS | |
| A | CF8M / AISI 316 + Chrome *) |
| D | CF8M / AISI 316 + NiBo, only size £18" |
| NON-STANDARD MATERIALS | |
| B | CF8M / AISI 316 + Cobalt based hard facing |
| G | Type AISI 329 (SS 2324) + Chrome *) |
| H | CA-6NM (or F6NM) + Chrome *) |
| Y | Special |

*) Ball without Chrome with soft seats

| 7. sign | SEAT |
|---------|---------------------|
| H, S | Standard metal seat |
| T | Standard soft seat |
| G | Metal seat |
| C | Bellows metal seat |

| 8. sign | Seat seal | Bonnet gasket | Gland packing | Back seal of support ring | Spring / Bellows |
|-------------------------------|-------------|---------------|---------------|---------------------------|----------------------------|
| STANDARD MATERIALS | | | | | |
| 02 | (Polyamide) | Graphite | Graphite | Viton GF | Inconel X-750 |
| 03 | (Polyamide) | Graphite | Graphite | | Wno. 1.4418 (Avesta 248SV) |
| 18 | | Graphite | Graphite | | GR660 / F6NM |
| NON-STANDARD MATERIALS | | | | | |
| 05* | | Viton GF | V-rings, PTFE | Viton GF | AISI 329 (SS 2324) |

* subsea

| 9. sign | Construction code |
|---------|-------------------|
| | |

| 10. sign | |
|----------|-----------------|
| Y | Special flanges |

13. 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.
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.

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 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.
40. The valve should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the valve between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.
41. Repairs on valves for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
 - Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
 - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
 - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test medium during the test.
 - Lubrication shall be used only if specifically required in the instructions. Where lubrication is required, the lubricant must be approved for the service by the end user.

Valmet Flow Control Oy

Vanha Porvoontie 229, 01380 Vantaa, Finland.

Tel. +358 10 417 5000.

www.valmet.com/flowcontrol

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