

Neles™ ceramic ball valves

Series E2 and E6

Installation, maintenance and
operating instructions

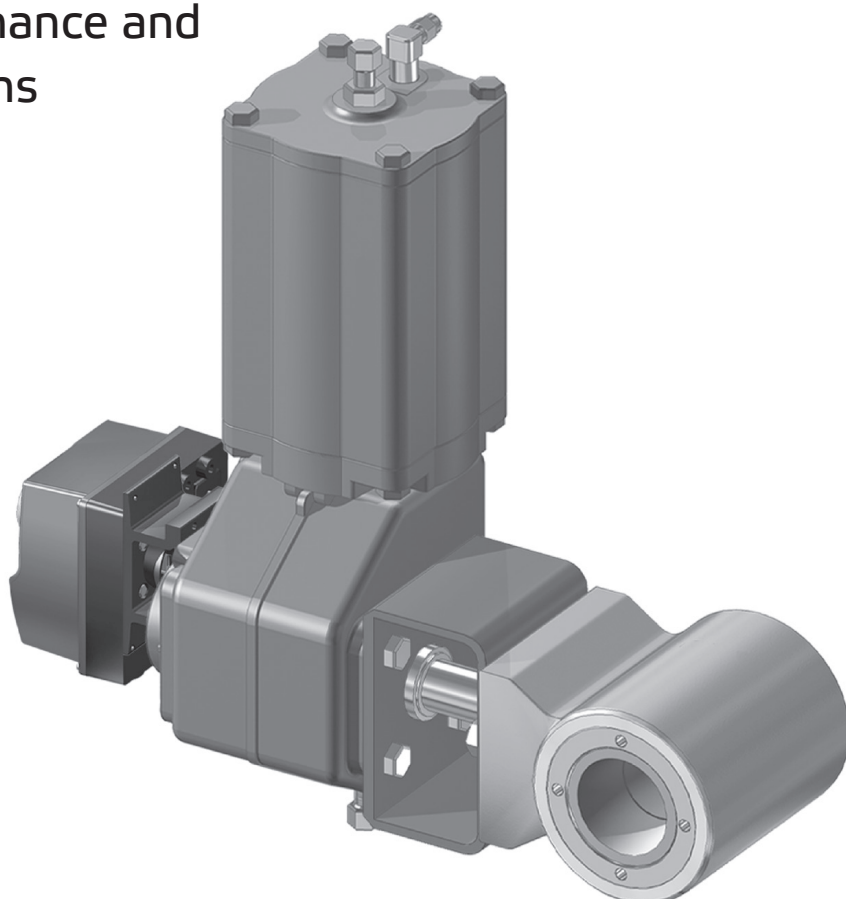


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This product meets the requirements set by the Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation.

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

Neles™ E2 ceramic ball valve is a flangeless (wafer type), and Neles™ E6 is a single flange (lug type) reduced-bore valve specially designed for control of erosive media.

The body and shaft are metal, while the trim is ceramic. There are no separate ball seats; instead, the seating surfaces are directly ground into the ceramic bushings. The insert retaining ceramic parts is attached to the body with threaded joint. The flow medium comes into contact with the metallic valve body. Note this when the valve is used for aggressive media.

Rotation transmission between shaft and ball takes place through a slot head. Axial bearings are located outside the valve, under the actuator mounting piece.

The valve is usually equipped with an actuator. (For details, see type-specific instructions.

1.2 Valve markings

The markings stamped on the body indicate the

- body material
- nominal size
- pressure rating

The valve also has an identification plate, the type of which depends upon the size of the valve. See Figure 1.



Fig. 1 Identification plate

The different sections of the identification plate give the following informations:

Identification plate marking:

1. Size
2. Pressure class
3. Type code
4. Body material
5. Seat material
6. Model number
7. Date
8. Trim material
9. Shaft material
10. Maximum shut-off pressure
11. Maximum temperature
12. Certification and approvals, eg. CE, Atex etc

The type designation is defined in the type code, see Section 10.

1.3 Technical data

Face-to-face length:	IEC 534-3-2 / ISA S75.04
Body pressure rating:	ASME Class 300
Max. diff. pressure/ temperature:	in control applications ASME Class 150 in shut-off applications ASME Class 300, For NPS 8/DN 200 the maximum differential pressure is limited to 20 bar.
Max. oper. temp.:	A-construction: +200 °C (+392 °F) H-construction: +450 °C (+842 °F)
Direction of flow:	insert on upstream side
Characteristic curve:	equal percentage
Tightness class:	10 x ISO 5208 Rate D
Media:	not for inflammable media
Dimensions:	see Section 9
Weights:	see Section 9

1.4 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.

1.5 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.

1.6 Safety precautions

CAUTION:

Due to the nature of ceramic material used in valve internals, the valve might cause an ignition of explosive gas mixtures. Valve internals, when operating against each other may cause sufficient heat to ignite the gaseous mixture inside the valve. Therefore the safe use of the valve must be assessed when used in potentially explosive and flammable applications. According to the Hazard Analysis the valve is not creating an ignition risk to its environment outside the valve. For further information, please contact Valmet business.

CAUTION:

Composite material (MMC) option in erosion proofing parts is electric conductive and offer ATEX compatible construction in E2/E6 series valve.

CAUTION:**Do not exceed the valve performance limitations!**

Exceeding the limitations marked on the valve body 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 if the valve is pressurized!**

Damage or personal injury may result. Dismantling a pressurized valve will cause uncontrolled pressure release. Always isolate the required part of the pipeline, release the pressure from the valve and remove the medium before dismantling the valve. Be aware of the medium type. Protect people and equipment in the area from any harmful or poisonous medium. If the valve is actuator operated, close and detach the actuator pressure supply pipeline.

CAUTION:**Be aware of the ball cutting movement!**

When the valve is actuated, the ball functions as a cutting device.

Do not stick your hand or other body parts into the open flow port. Prevent foreign objects from being left inside the pipeline. If the valve is actuator operated, close and detach the actuator pressure supply pipeline.

CAUTION:**Be aware of noise emission!**

Depending on the application the valve may cause noise emission during use. The noise level can be measured with equipment designed for this purpose or by using the Neles Nelprof software. Pay attention to work environment legislation concerning noise emission.

CAUTION:**Be aware of extreme temperatures!**

During use the valve body may be very cold or very hot. If extreme temperatures occur, protect people from frost 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.

NOTE:**Do not drop, knock or hit the valve!**

Internal parts of the valve are made of ceramic material. Although the material is robust, it will not tolerate impact as metals do.

NOTE:

Media which may solidify should not be allowed to stand in the ball valve. Wash such media from the valve using a suitable arrangement. Cycle a valve few times when washing.

ATEX/Ex Safety

CAUTION!

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

CAUTION!

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

CAUTION!

Ensure the general process and worker protection from static electricity in the facilities.

Note! Within series there is possibility to Category 2, Category 3 and non-ATEX valve.

1.7 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 chocks 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

Valves are delivered in the usual Valmet packaging, unless otherwise agreed with the customer.

Make sure that the valve and any possible accessories have not been damaged during transport.

Do not remove the bore protectors before installation.

Store the valve with care, preferably indoors and in a dry environment.

Take the valve to the installation site only just before installation.

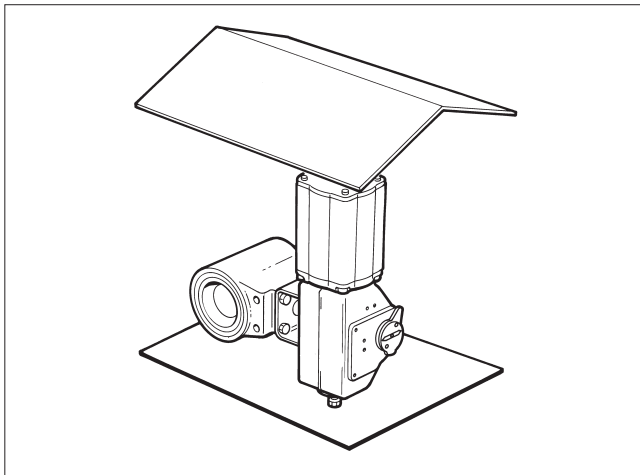


Fig. 2 Storage of the valve

NOTE:

Ceramic valves must be handled with particular care.

3. INSTALLATION AND USE

Remove the bore protectors and check that the valve is clean. Also ensure that the pipeline is clean.

The pipeline must be firmly supported so that the valve is not subjected to additional strain.

The valves can be installed between the following flanges:

- EN PN 10, 16, 25, 40
- ASME 150, 300
- ISO 7005 PN 20, PN 50
- JIS 10 K, 16 K, 20 K, 30 K

In some valve sizes the body of the valve has thread fillets for the two flange screws located closest to the shaft. Size NPS 8 / DN 200 has thread fillets for all flange screws. See Figure 3 and Tables 1 to 3. All other dimensions are shown in Section 9.

The valve is tight in both directions and may be installed in any position. It must not, however, be installed in such a way that the actuator is below the valve (see Figure 4).

The actuator must not come into contact with the pipeline, as vibrations in the pipeline might damage the actuator and its performance.

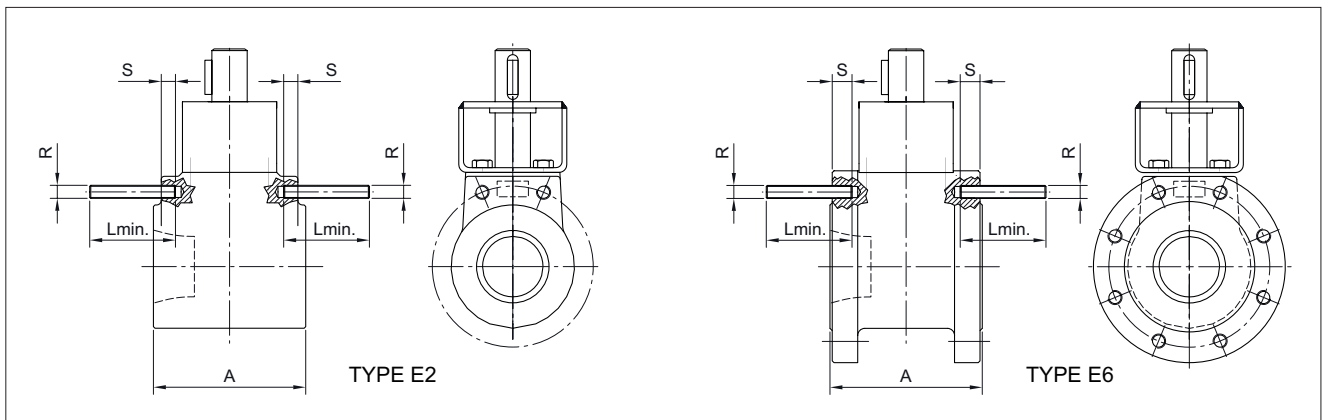


Fig. 3 Flange drilling / neck bolting

Table 1 Flange drilling / neck bolting, dimensions in mm. ASME 150 / ISO 7005 PN 20. ASME 300 / ISO 7005 PN 50

TYPE	Face-to-face A	ASME 150 / ISO 7005 PN 20						ASME 300 / ISO 7005 PN 50					
		Number of flange bolts *)	Number of neck bolts **)	ASME150 Bolt size R	PN20 Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin	Number of flange bolts *)	Number of neck bolts **)	ASME300 Bolt size R	PN50 Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin
E2_025/E2_01	102	4	-	-	-	-	-	4	-	-	-	-	-
E2_040/E2_1H	114	4	-	-	-	-	-	4	-	-	-	-	-
E2_050/E2_02	124	4	-	-	-	-	-	8	2	5/8" UNC	M16	17.0	70
E2_080/E2_03	165	4	-	-	-	-	-	8	2	3/4" UNC	M20	20.0	85
E2_100/E2_04	194	8	2	5/8" UNC	M16	17.0	75	8	2	3/4" UNC	M20	20.0	90
E6_025/E6_01	102	4	-	1/2" UNC	M12	-	-	4	-	5/8" UNC	M16	-	-
E6_040/E6_1H	114	4	-	1/2" UNC	M12	-	-	4	-	3/4" UNC	M20	-	-
E6_050/E6_02	124	4	-	5/8" UNC	M16	-	-	8	2	5/8" UNC	M16	28.5	75
E6_080/E6_03	165	4	-	5/8" UNC	M16	-	-	8	2	3/4" UNC	M20	28.5	85
E6_100/E6_04	194	8	2	5/8" UNC	M16	29.5	80	8	2	3/4" UNC	M20	29.5	90
E6_150/E6_06	229	8	2	3/4" UNC	M20	28.5	80	12	2	3/4" UNC	M20	28.5	95
E6_200/E6_08	243	8	8	3/4" UNC	M20	28.5	80	12	12	7/8" UNC	M24	28.5	95

*) total number / flange

**) number of neck bolts / flange

Table 2 Flange drilling / neck bolting, dimensions in mm. EN PN 10, 16, 25, 40

TYPE	Face-to-face A	EN PN 10				EN PN 16				EN PN 25				EN PN 40							
		Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin	Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin	Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin					
E2_025/E2_01	102	4	-	-	-	4	-	-	-	-	4	-	-	-	4	-	-	-	-		
E2_040/E2_1H	114	4	-	-	-	4	-	-	-	-	4	-	-	-	4	-	-	-	-		
E2_050/E2_02	124	4	-	-	-	4	-	-	-	-	4	-	-	-	4	-	-	-	-		
E2_080/E2_03	165	8	2	M16	17.0	65	8	2	M16	17.0	65	8	2	M16	17.0	70	8	2	M16	17.0	70
E2_100/E2_04	194	8	2	M16	17.0	65	8	2	M16	17.0	65	8	2	M20	20.0	75	8	2	M20	20.0	75
E6_025/E6_01	102	4	-	M12	-	-	4	-	M12	-	-	4	-	M12	-	-	4	-	M12	-	-
E6_040/E6_1H	114	4	-	M16	-	-	4	-	M16	-	-	4	-	M16	-	-	4	-	M16	-	-
E6_050/E6_02	124	4	-	M16	-	-	4	-	M16	-	-	4	-	M16	-	-	4	-	M16	-	-
E6_080/E6_03	165	8	2	M16	28.5	70	8	2	M16	28.5	70	8	2	M16	28.5	75	8	2	M16	28.5	75
E6_100/E6_04	194	8	2	M16	29.5	70	8	2	M16	29.5	70	8	2	M20	29.5	80	8	2	M20	29.5	80
E6_150/E6_06	229	8	2	M20	28.5	75	8	2	M20	28.5	75	8	2	M24	28.5	85	8	2	M24	28.5	85
E6_200/E6_08	243	8	8	M20	28.5	75	12	12	M20	28.5	75	12	12	M24	28.5	85	12	12	M27	28.5	85

*) total number / flange

**) number of neck bolts / flange

Table 3 Flange drilling / neck bolting, dimensions in mm. JIS 16 K, 20 K, 30 K

TYPE	Face-to-face A	JIS 10 K					JIS 16 K - 20 K					JIS 30 K				
		Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin	Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin	Number of flange bolts *)	Number of neck bolts **)	Bolt size R	Depth of neck bolt drilling S	Length of neck bolts Lmin
E2_025/E2_01	102	4	-	-	-	-	4	-	-	-	-	4	-	-	-	-
E2_040/E2_1H	114	4	-	-	-	-	4	-	-	-	-	4	-	-	-	-
E2_050/E2_02	124	4	-	-	-	-	8	2	M16	17.0	65	8	2	M16	17.0	70
E2_080/E2_03	165	8	2	M16	17.0	65	8	2	M20	20.0	75	8	2	M20	20.0	80
E2_100/E2_04	194	8	2	M16	17.0	65	8	2	M20	20.0	75	8	2	M22	22.0	90
E6_025/E6_01	102	4	-	M16	-	-	4	-	M16	-	-	4	-	M16	-	-
E6_040/E6_1H	114	4	-	M16	-	-	4	-	M16	-	-	4	-	M20	-	-
E6_050/E6_02	124	4	-	M16	-	-	8	2	M16	28.5	70	8	2	M16	28.5	70
E6_080/E6_03	165	8	2	M16	28.5	70	8	2	M20	28.5	75	8	2	M20	28.5	80
E6_100/E6_04	194	8	2	M16	29.5	70	8	2	M20	29.5	80	8	2	M22	29.5	90
E6_150/E6_06	229	8	2	M20	28.5	75	12	2	M22	28.5	85	12	2	M24	28.5	95
E6_200/E6_08	243	12	12	M20	28.5	75	12	12	M22	28.5	85	12	12	M24	28.5	95

*) total number / flange
 **) number of neck bolts / flange

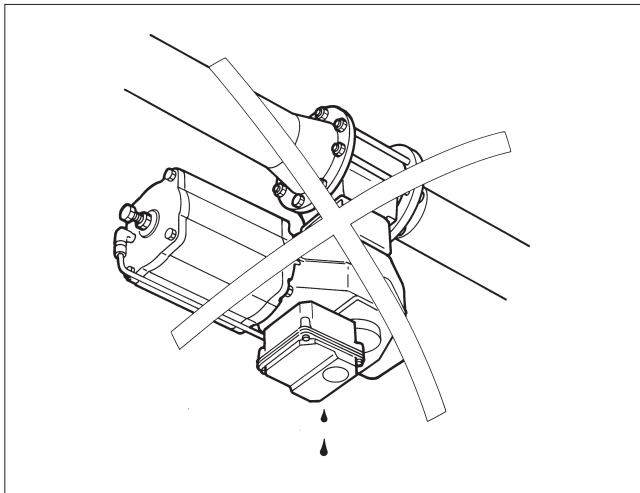


Fig. 4 Avoid this mounting position

To facilitate easy maintenance, the actuator should be installed in such a way that there is plenty of room for removing it.

The screws, nuts and washers used should be equivalent to the fastenings used elsewhere in the pipeline.

Pay particular attention when centring the flange gasket. The inside diameter of the gasket should be acc. to the nominal size of the valve, i.e. the gasket covers the insert (6) and the rim of the ceramic bushing (3).

NOTE:

An eccentric flange gasket may cause premature body wear, particularly with media containing particles.

The pipeline should be flushed carefully before use. The valve should be kept entirely open during flushing.

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 5.

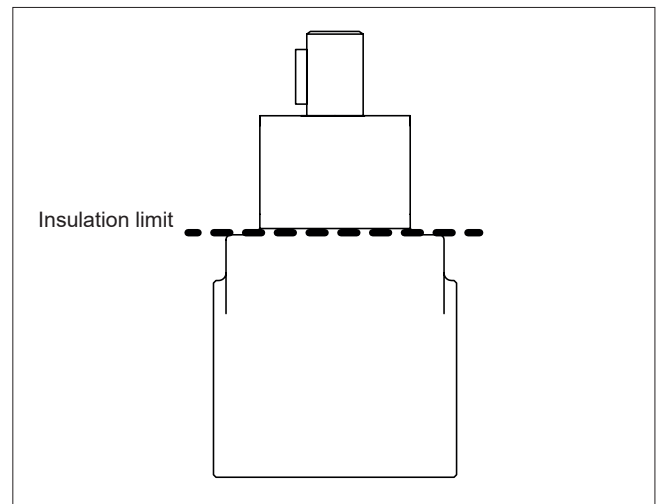


Fig. 5 Insulation of the valve

4. MAINTENANCE

CAUTION:

Observe the safety precautions mentioned in Section 1.6 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 Changing the gland packing, A-construction

The component numbers given in brackets refer to the diagram and component list given in Section 8.1. See also Figure 6.

Disassembly

CAUTION:

Do not detach or disassemble a pressurized valve! This warning also applies to individual components (13).

1. Detach the air supply conduit from the actuator. Also detach any cables preventing the removal of the actuator.

2. Remove the actuator from the bracket (5) by unscrewing the fixing screws. Pull the actuator from the shaft (4). Detaching the actuator is described in more detail in Section 4.7.
3. Detach the key (20) from the shaft.
4. Detach the bracket (5) from the body (1) by opening the screws (13) M12 or M16.
5. Detach the bearing (8), the axial bearing (7) and the lock ring (19).
6. Loosen the strain ring (9) with a special opener tool - see correct opener tool ID code from table 4.
7. Pull the shaft (4), and lift it and gland bushing (10) and parts (11, 12, 17) out of the valve body.
8. Pull the gland bushing off the shaft while rotating. Now the gland packing may be disassembled.
9. Remove the gasket (16) between the gland bushing and the body from the valve body.

Replacing parts

The gland packing set includes the V-ring set (11) and the spring (12). Replace both parts at the same time.

NOTE:

Replace the gasket (16) between the gland bushing (10) and the body (1) whenever the strain ring has been loosened. Leakage of the V-ring set (11) and leakage of the gasket (16) may cause similar symptoms.

The O-ring (17) should be replaced if it is damaged. The main purpose of the O-ring is to protect the shaft from erosive media, such as sludge, and it therefore does not need to be changed regularly.

Assembly

1. Apply silicon grease to the O-ring (17) and install it into the gland bushing (10) cavity.

NOTE:

Make sure you do not damage the O-ring with the shaft keyway and the shaft shoulder.

2. Slip the gland bushing (10) onto the shaft (4).
3. Install the spring (12) into the bottom of the gland bushing (10). Before installation, the spiral should be completely compressed once, for example in a vice. This will make installation of the strain ring easier, since the working height of the spiral is roughly 0.6 x the free height of the spring.
4. Once the spiral is in place, slip the sheet ring (15) into position. After this, install the V-ring (11) onto the shaft, one by one.

NOTE:

Make sure you do not damage the gland packing rings with the shaft keyway or shaft shoulder.

The order from bottom to top of the different rings is as follows:

- base ring
 - angle rings
 - saddle ring
5. Place the gasket (16) into the valve body.
 6. Insert the shaft together with the gland bushing back into the valve body.

7. The shaft joint on the ball has been shaped in such a way that the shaft only fits seat when it is in the correct position. Check the direction of the bore by observing the indicator line at the top of the shaft, and take the position of the keyway into account when you install the actuator.
8. Lubricate the thread of the strain ring with, for example, Molykote. Then fasten the strain ring (9). When correctly fastened, the ring shoulder must be at least on a level with the body, or 0.1 mm below it. The tightening torques are given in Table 4. The shoulder of the strain ring must not remain above the surface level of the body.

Table 4 Tightening torques of strain ring

Nominal size DN	Thread	Torque N m	Tool DIN 1810A	Opener tool's codes
25/20	M39 x 1.5	190	34-36	H099326
40/32	M45 x 1.5	250	40-42	H099327
50/40	M50 x 2	320	45-50	H099328
80/65	M64 x 2	340	58-62	H099329
100/80	M75 x 2	560	68-75	H099330
150/100	M95 x 2	1330	80-90	H099331
200	M95 x 2	1330	80-90	H099331

9. Make sure that the bracket (5) is not carrying the weight of the valve because this would have an immediate effect on the bearing clearance.
10. Install the lock ring (19), the axial bearing (7) and the bearing (8) onto the shaft.
11. Attach the bracket to the valve body. While fastening the screws, make sure that the hole in the bracket is properly centered in relation to the shaft. For the correct tightening torques, see Table 5.
12. Install the actuator. See Section 4.7.

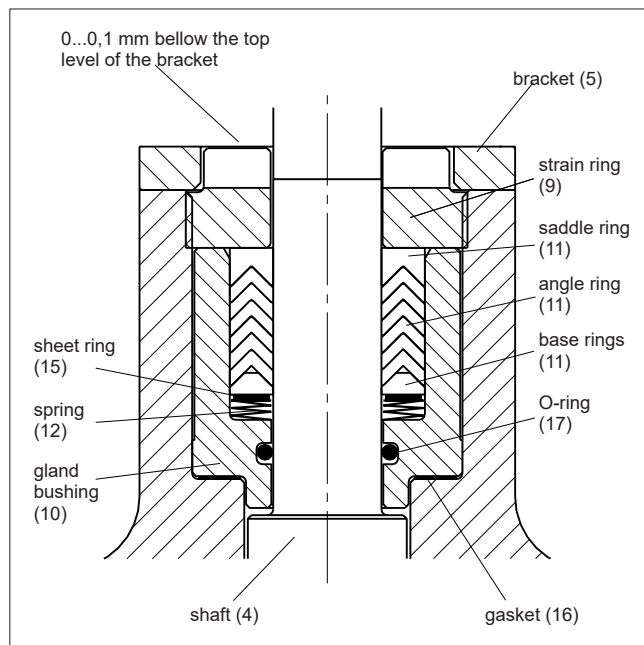


Fig. 6 Sealing of the shaft, A-construction

Table 5 Tightening torques of bracket screws

Nominal size DN	Thread	Torque N m	Tool size
25/20, 40/32, 50/40	M12	80	19
80/65, 100/80, 150/100, 200	M16	190	24

4.3 Changing the gland packing, H-construction

CAUTION:

Do not detach or disassemble a pressurized valve! This warning also applies to individual components (13).

The part numbers in this section refer to the diagram and part list in Section 8.

1. Unfasten the nuts (24) of the gland (22) and lift up the gland.
2. Remove the old packing rings (11) by using, for example, a sharp pricker.
3. Install the new packing rings.
4. Place the nuts on the studs and tighten the gland packings while the valve is not pressurized, see Table 6.
5. Retighten if necessary.

Table 6 Tightening torques of gland nuts material A2/A4-70

Nominal size DN	Thread	Torque N m	Tool size
25	M12	16	19
40	M12	20	19
50	M12	31	19
80	M16	53	24
100	M16	85	24
150, 200	M16	100	24

4.4 Changing the gasket of the gland packing

In an H-construction valve, changing the gland packing does not require unfastening the strain ring, and this does not entail changing the gasket (16).

When the gasket (16) needs to be changed, this can be done by following the same instructions that were given for the A-construction. Note that there is no O-ring in the H-construction.

4.5 Changing the bearing, A-construction and H-construction

1. Detach the actuator from the bracket, see Section 4.7.
2. Detach the bracket (5) from the valve body (1) by unscrewing fixing screws (13) M12 or M16 and detach the key from the shaft.
3. Detach and change the bearing (8).
4. Attach the bracket to the valve, see Table 5.
5. Install the actuator, see Section 4.7.

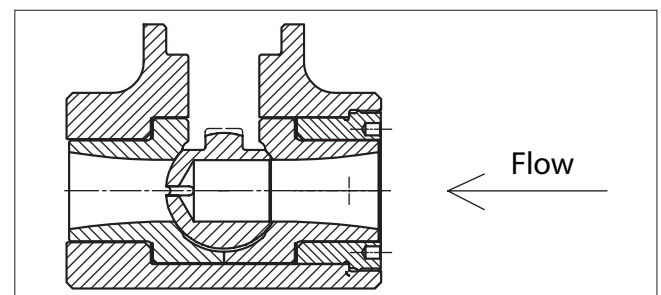


Fig. 7

4.6 Changing the ceramic parts

Changing the ceramic parts, ball (2) and bushings (3) requires special tools. It is highly recommended that this work is done by the Valmet service organisation.

Disassembly

1. Detach the actuator from the valve, see Section 4.7.
2. Detach the key (20), fixing screws (13), bracket (5), axial bearing (7), bearing (8) and lock ring (19).
3. Fasten the valve firmly into a vice the insert (6) pointing upwards.
4. Fasten the special tool, Table 7, to the insert and turn it open without removing it.
5. Remove the strain ring (9) with a special tool, Table 4. See also Sections 4.2, 4.3 and 4.4.
6. Pull the shaft (4) with gland bushing (10) out of the body.
7. Remove the insert (6) and detach the ceramic parts, bushing (3), ball (2) and bushing (3), from the body.
8. Remove the gasket (25) between the insert and body (8"/DN 200 only).

NOTE:

Replace the gasket (25) between the insert (6) and the body (1) whenever the insert has been loosened.

Assembly

1. Apply Molykote 312R lubricant to the threads of the insert (6).
2. Turn the insert into metal-to-metal contact with the body (without ceramic parts) and draw a mark with a felt tip pen to the body and insert seam.
3. Remove the insert.
4. Install the sheet rings (14) on the bushings (3).
5. Place the ball (2) between the bushings (3). Mounting a LowCv valve, when ball is open the groove must be on the valve's exhaust side. Fig. 7.
6. Push the ceramic parts as a package into the body. Please note the position of the shaft slot.
7. Install the gasket (25) on the body (1) (8"/DN 200 only).
8. Turn the insert (6) lightly into the body.
9. Push a assembly guide tool, Table 7, through the gland bore into the slot of the ball. Make sure that the tool is properly engaged with the ball. The tool will keep the bushings (3) in place during the tightening of the insert (6).

Table 7 Assembly guide tool

Nominal size	Tool
1" / DN 25	280139
1.5" / DN 40	280140
2" / DN 50	280141
3" / DN 80	280142
4" / DN 100	280143
6" / DN 150	280529
8" / DN 200	H136723

10. Fasten the valve firmly into a vice the insert (6) pointing upwards and tighten the insert evenly using a special tool 1...2 mm past the mark made earlier. See Table 8.

Table 8 Tightening torques of insert

Nominal size DN	Thread	Max. torque N m *	Insert removing tool
25/20	M52 x 1,5	60	279922
40/32	M70 x 2	120	279921
50/40	M85 x 2	240	279921
80/65	M115 x 2	440	279920
100/80	M140 x 2	770	279920
150/100	M200 x 3	1450	H136725
200	M250 x 3	2000	H136724

*) Graphite lubricant applied to the threads

11. Remove the assembly guide tool from the gland bore and mount the shaft (4). See Sections 4.2, 4.3 and 4.4 for details of gland packing assembly. Tighten the strain ring (9) according to Table 4.

4.7 Detaching and installing the actuator

Detaching from the valve

1. Detach the air supply tube from the actuator. Also detach any cables preventing the removal of the actuator.
2. Detach the actuator from the bracket (5) by unscrewing the fixing screws.
3. Pull the actuator off the shaft by using a special extraction tool, Figure 8. Prevent the shaft from pressing the ceramic ball when removing, e.g. by gripping the shaft with self-locking pliers (don't damage the shaft) .

NOTE:

Make a note of the mutual position of the valve and the actuator. This will enable you to keep the operating direction unchanged during reassembly. Also make a note of the position of the actuator (valve open/closed).

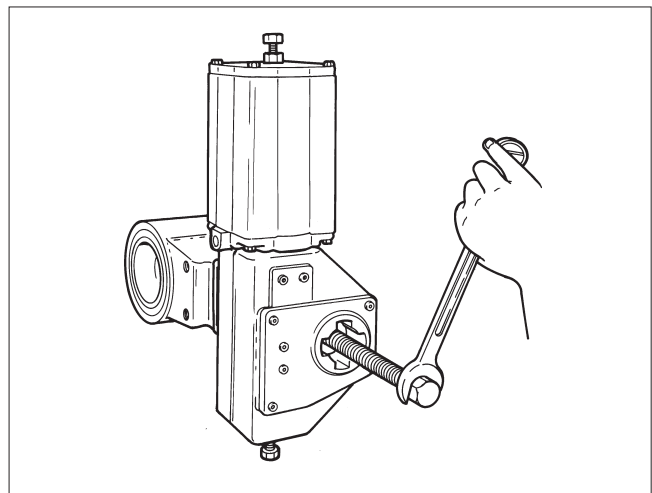


Fig. 8 Removal of the actuator with an extractor

Installation onto the valve

Clean the shaft boring of the actuator. Lubricate the shaft boring and the valve shaft with, for example, Cortec® VCI 369 anticorrosive agent.

The installation position of the actuator is determined as follows:

- The B1C-actuator is installed in such a way that the piston is in the extreme outward position when the valve is closed.
- The B1J/B1JA-actuator is installed in one of two positions, depending on the function required (spring opens/spring closes).
- The actuator mounted the valve before is installed in the same position.
- Carefully insert the actuator over the valve shaft and make sure the shaft does not press the ceramic ball, use e.g. self-locking pliers (don't damage the shaft).

NOTE:

Do not strike at the actuator during installation because this might damage the ceramic parts.

- Make sure that the actuator is straight in relation to the valve.
- Insert and tighten the fixing screws.
- Check to see that the limiter screws of the open and closed position are properly adjusted.

NOTE:

The actuator has an arrow indicating the flow direction. Make sure that this arrow is in the correct position in relation to the bore.

NOTE:

The position of the ball is indicated by means of a groove at the top of the shaft, which shows the direction of the bore.

More information concerning the actuator is available in the installation, operation and maintenance instructions given for the model in question.

5. TROUBLE SHOOTING TABLE

The following Table 9 lists malfunctions that might occur after prolonged use.

Table 9

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

6. TOOLS

In addition to the usual standard tools, the following special tools might be needed:

- Unfastening/tightening the strain ring:
 - special tool, see Table 4
- Removing the actuator:
 - extractor tool 303821 (BC/BJ 6)
 - extractor tool 8546-1 (BC/BJ 8-11)
 - extractor tool 8546-2 (BC/BJ 12-17)
- Unfastening/tightening the insert:
 - special tool, see Table 7
- Assembling the ceramic parts:
 - assembly guide, see Table 8

The special tools are available from the manufacturer.

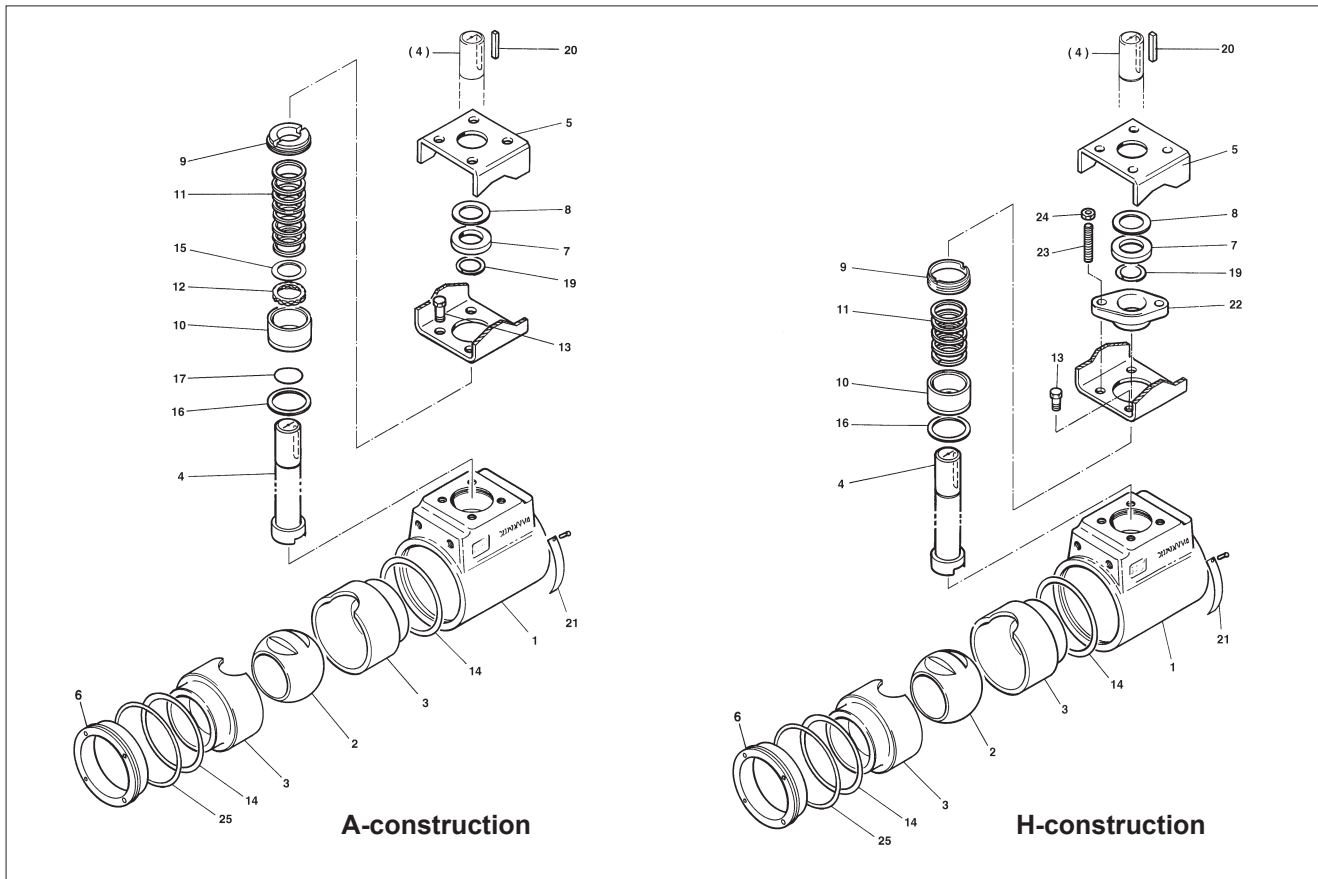
7. ORDERING SPARE PARTS

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.

8. EXPLODED VIEWS AND PARTS LIST



Item	Qty	Description	Spare part category
1	1	Body	
2	1	Ball	3
3	2	Bushing	2
4	1	Shaft	3
5	1	Bracket	
6	1	Insert	
7	1	Axial bearing	3
8	1	Bearing	1
9	1	Strain ring	
10	1	Gland bushing	
11	1	V-ring set	1
12	1	Spring (A-construction only)	
13	4	Hexagon screw	
14	2	Sheet ring	1
15	1	Sheet ring (A-construction only)	3
16	2	Gasket	1
17	1	O-ring (A-construction only)	1
19	1	Lock ring	
20	1	Key	
21	1	Identification plate	
22	1	Gland (H-construction only)	
23	2	Stud (H-construction only)	
24	2	Hexagon nut (H-construction only)	
25	1	Plate ring (8" / DN 200 only)	1

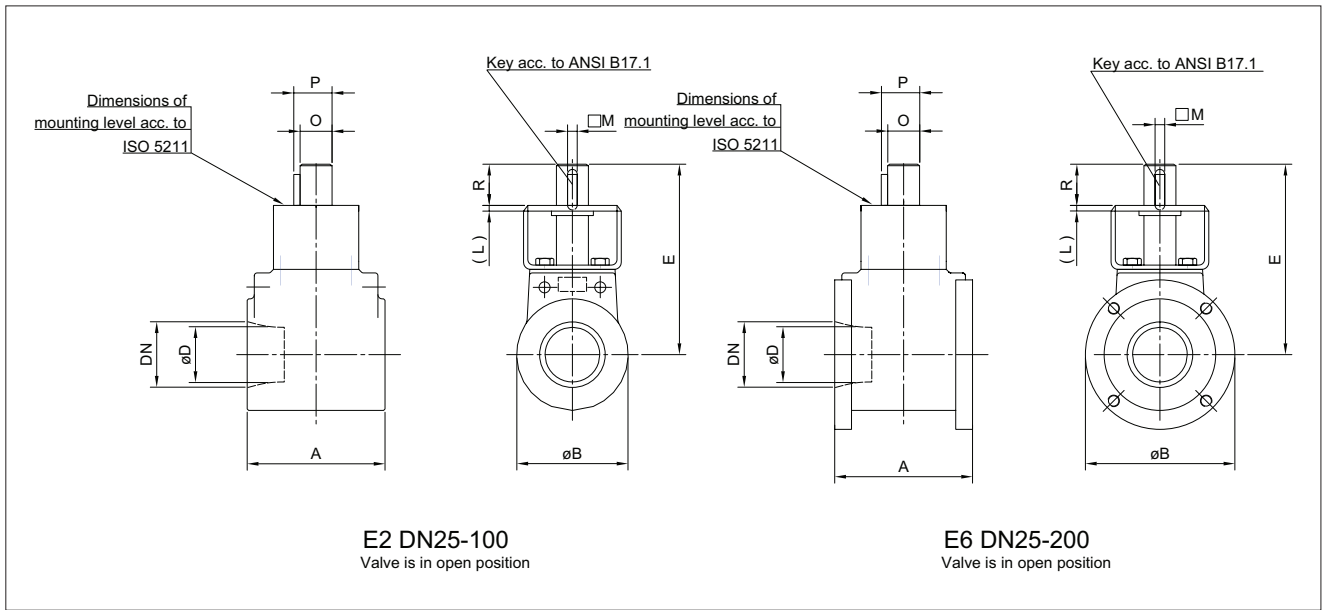
Spare part (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

Spare part category 2: Parts for replacing of the seat. Available also as a set.

Spare part category 3: Parts for replacing of the closing element.

Spares for the full overhaul: All parts from the categories 1, 2 and 3.

9. DIMENSIONS AND WEIGHTS



Dimensions, mm													
DN	A	E2	E6	E	ø D	L	O	P	R	M	Mounting face	Weight, kg	
		ø B	ø B									E2	E6
25	102	63.5	130	181	20	8	15	16.9	25	4.76	F07	5	7
40	114	82	160	186	32	8	20	22	35	4.76	F07	7	11
50	124	100	165	202	40	8	25	27.7	46	6.35	F07/F10	10	14
80	165	132	210	256	65	10	35	39	58	9.53	F12	19	27
100	194	157	254	282	80	10	40	44.5	68	9.53	F12/F14	30	45
150	229	-	325	363	100	12	55	60.5	90	12.7	F14	-	105
200	243	-	380	391	135	12	55	60.5	90	12.7	F16	-	330

Dimensions, inch													
NPS	A	E2	E6	E	ø D	L	O	P	R	M	Mounting face	Weight, lb	
		ø B	ø B									E2	E6
1	4.02	2.50	5.12	7.13	0.79	0.31	0.59	0.67	0.98	3/16	F07	11	15
1 1/2	4.49	3.23	6.30	7.32	1.26	0.31	0.79	0.87	1.38	3/16	F07	15	24
2	4.88	3.94	6.50	7.95	1.57	0.31	0.98	1.09	1.81	1/4	F07/F10	22	31
3	6.50	5.20	8.27	10.08	2.56	0.39	1.38	1.54	2.28	3/8	F12	42	60
4	7.64	6.18	10.00	11.10	3.15	0.39	1.57	1.75	2.68	3/8	F12/F14	66	99
6	9.02	-	12.80	14.29	3.94	0.47	2.17	2.38	3.54	1/2	F14	-	231
8	9.57	-	14.96	15.39	5.31	0.47	2.17	2.38	3.54	1/2	F16	-	728

10. TYPE CODE

Neles™ ceramic ball valve, series E2						
1.	2.	3.	4.	5.	6.	7.
	E2	L	A	100	X	Z

1.	CV-VALUE OF THE VALVE DN 25
-	Standard, without sign
C05-	Maximum C _v 5
C15-	Maximum C _v 15

2.	SERIES / CHARACTERISTICS
E2	End entry, wafer type, reduced bore, seat supported
E6	End entry, lug type, reduced bore, seat supported

3.	PRESSURE RATING
C	ASME Class 150
D	ASME Class 300
J	PN 10
K	PN 16
L	PN 25
M	PN 40
R	JIS 10K
S	JIS 16K
T	JIS 20K
X	ISO PN 20
Z	ISO PN 50

4.	CONSTRUCTION
A	Standard, V-ring gland packing
H	High temperature (over +200 °C / +392 °F). Graphite gland packing (max. +450 °C / +842 °F)

5.	SIZE		5.
	ASME	EN and JIS	
01	1"	25 mm	025
1H	1 1/2"	40 mm	040
02	2"	50 mm	050
03	3"	80 mm	080
04	4"	100 mm	100
06*	6"	150 mm	150*
08*	8"	200 mm	200*

*) Series E6 only.

6.	METAL PARTS			
	Body	Shaft	Screws	Other
X	CF8M	XM-19	A2-70	316SS

7.	Erosion proof material (ball and bushings)
Z	Zirconiumoxide, Mg-PSZ ceramic (Not Atex compatible)
M1	MMC = Composite material for erosion (Atex compatible)
M2	MMC2 = Composite material for erosion -corrosion (Atex compatible)

11. 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.

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