Flowrox™ Slurry Knife Gate valves SKW DN50–600 (Wafer) SKF DN80–600 (Flanged)

Installation, maintenance and operating instructions

These instructions must be read carefully and understood prior to the installation, use, and servicing of this product.

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Table of Contents

READ THESE INSTRUCTIONS FIRST!

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

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 EU Declaration of Conformity

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

VALMET FLOW CONTROL OY

Marssitie 1

53600 Lappeenranta

Finland

Tel. +358 (0)10 417 5000

Product model/type: **Knife Gate Valve (SKF, SKW)**

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

Machinery Directive 2006/42/EC: Annex IIB partly completed machinery

As the product may be used as parts or components in machinery, we declare that this product must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Follow the valve installation, operating and maintenance instructions in this manual.

Person authorised to compile the technical file is Technology Manager Jarmo Partanen.

On behalf of Valmet Flow Control Oy

In Lappeenranta, 13th May 2022

Riku Salojärvi

Head of Operations

1.1 General safety instructions

The symbols in Table 1 are used in this manual to highlight the parts requiring particular attention.

Hazard severity panels:

	**⚠ DANGER!**
	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	**⚠ WARNING!**
	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	**⚠ CAUTION!**
	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Table 1. Warning and safety signs.

Symbol	Description
	Risk to personal safety: Neglecting the safety measures can cause serious injury or death.
	Crushing hazard
	Read the operation and maintenance instructions: Read and understand the operation and maintenance instructions before using the product.
	Mandatory action symbol: Obey these instructions to prevent machine malfunctions.
	Forbidden action symbol.

Prevent accidents and ensure the valve's appropriate operation by complying with the installation, safety, and maintenance instructions in this manual. Installation and maintenance of the valve must be carried out by persons with appropriate training. Electrical installation work of the actuator must be performed by a qualified electrician.

Access to the IOM-manual must be guaranteed at all times at the place of operation of the valve. It is required to observe the IOM-manual in all work tasks for the valve.

Use personal protective equipment when performing any checks or maintenance operation for the valve (goggles, helmet, clothing and gloves). Always follow the factory safety regulations.

In case of any discrepancies between translations, the English version shall prevail.

See appendix C - General safety warnings.

2 Introduction

2.1 Applications and purpose of use

Flowrox Slurry Knife Gate valves (SKW) and (SKF) are intended for industry medium and slurry applications. They are bi-directional and are installed between flat flanges to shut-off or open flow within instructed temperature and pressure limits.

2.2 Restrictions on use for SKW and SKF valves

The valve must not be used to throttle the flow in any way, nor should the gate be left in partially opened or closed position as this will lead to premature failure.

The valve temperature and pressure range must not be exceeded. The temperature ranges are given in Table 2 for standard sleeve materials. Check the pressure class from the valve type plate. Do not use higher pipeline pressure than rated for the valve.

Table 2. Temperature ranges for SKW and SKF valves.

Ring sleeve material	NR	NBR	EPDM
Max valve operating temperature °C (°F)	0 to 75 (32 to 167 °F)	0 to 100 (32 to 212 °F)	0 to 100 (32 to 212 °F)

2.3 Using the valve in explosive conditions

This valve type is not designed for Ex-areas.

For use in explosive conditions the valve must have the required Ex-classification and the grounding cables must be connected to earth. For more information, contact Valmet Flow Control.

2.4 General description

2.5 Principle of operation

Flowrox SKW and SKF valves are built with a cast or welded body and feature a heavy-duty stainless steel gate as a standard structure. Removable ring sleeves on both sides of the gate provide a bi-directional bubble tight seal.

In the open position the two ring sleeves seal against each other in the centre of the valve, providing a full bore through which the medium can travel. Main components are shown in Figure 1. Valve main components.. Closing the valve forces the gate progressively down between the two mating ring sleeves, until it reaches the fully closed position. When the valve is fully closed, the ring sleeves push against both sides of the gate, effectively sealing and completely containing the line pressure. Any medium discharged between the ring sleeves during open/close strokes is collected to the valve body cavity and drained or flushed through the flushing ports.

The secondary seal is located in the upper part of the body. On every valve stroke, it wipes the gate and lubricates it with silicone grease. Easier actuation and minimum wear are achieved. There is no need to remove the valve from the line when replacing the secondary seal, but in tight or unsafe conditions it is unavoidable.

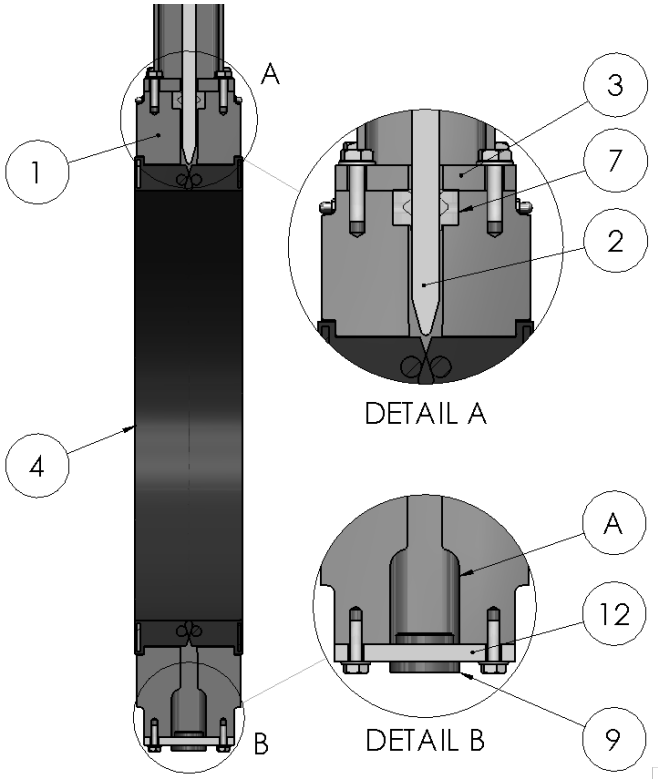


Figure 1. Valve main components.

No.	Description	No.	Description
1	Valve body	7	Secondary seal
2	Gate	9	Protective plug (on flushing port)
3	Tower	12	Bottom cover plate
4	Ring sleeve	A	Valve body cavity

The valve must not be used to throttle in any way, nor should the gate be left in partially opened or closed position as this will lead to premature failure.

This valve is intended for on-off operation only. Ring sleeves are easily replaced, and are available in a number of molded elastomer options to suit different conditions.

	The gate speed may not exceed 25mm/s.

2.6 Mechanical structure

SKW and SKF valves can be delivered with the actuator options shown in Figure 2. Alternative actuators. Manual actuator type depends on the valve size.

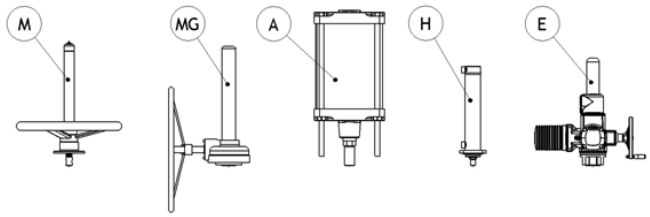


Figure 2. Alternative actuators

Type	Description
M	Manual actuator
MG	Manual actuator with gearbox
A	Pneumatic actuator
H	Hydraulic actuator
E	Electric actuator

SKW valve part list is shown in Table 3 and the exploded view in Figure 3. Part quantities are not displayed if they are valve size or actuator type dependent.

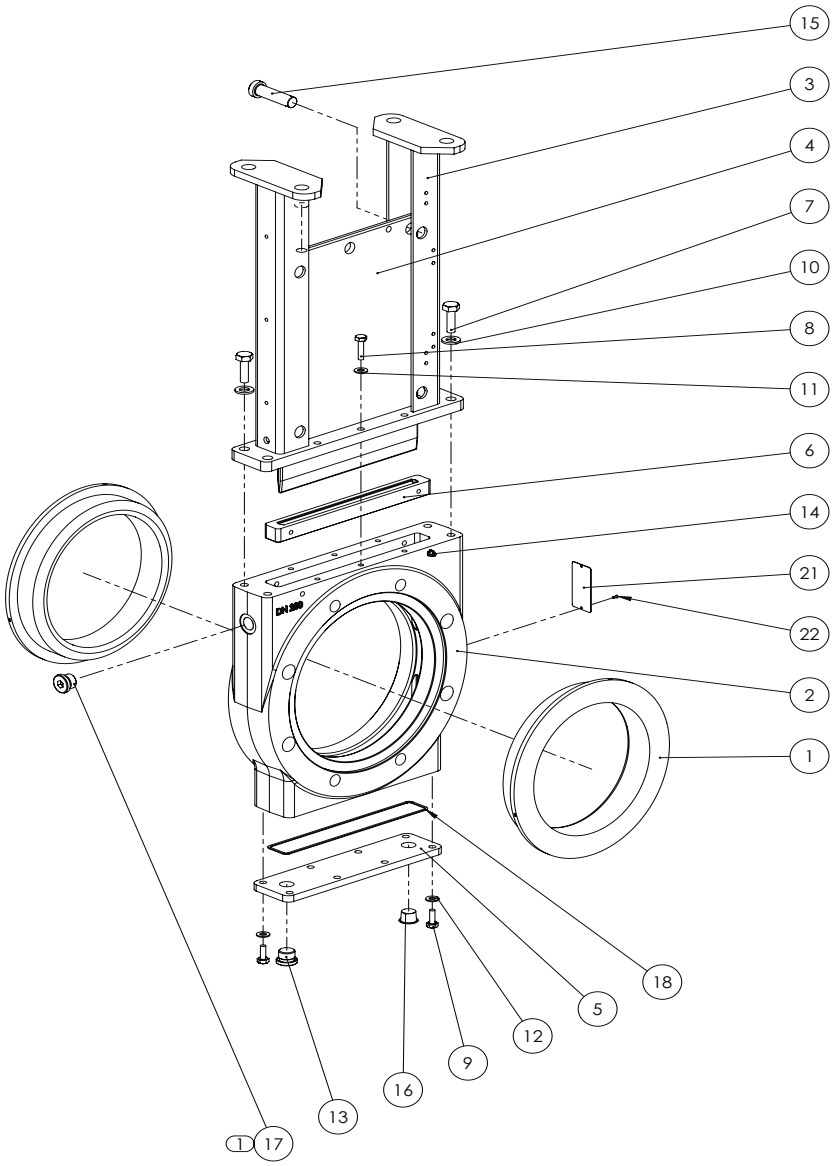
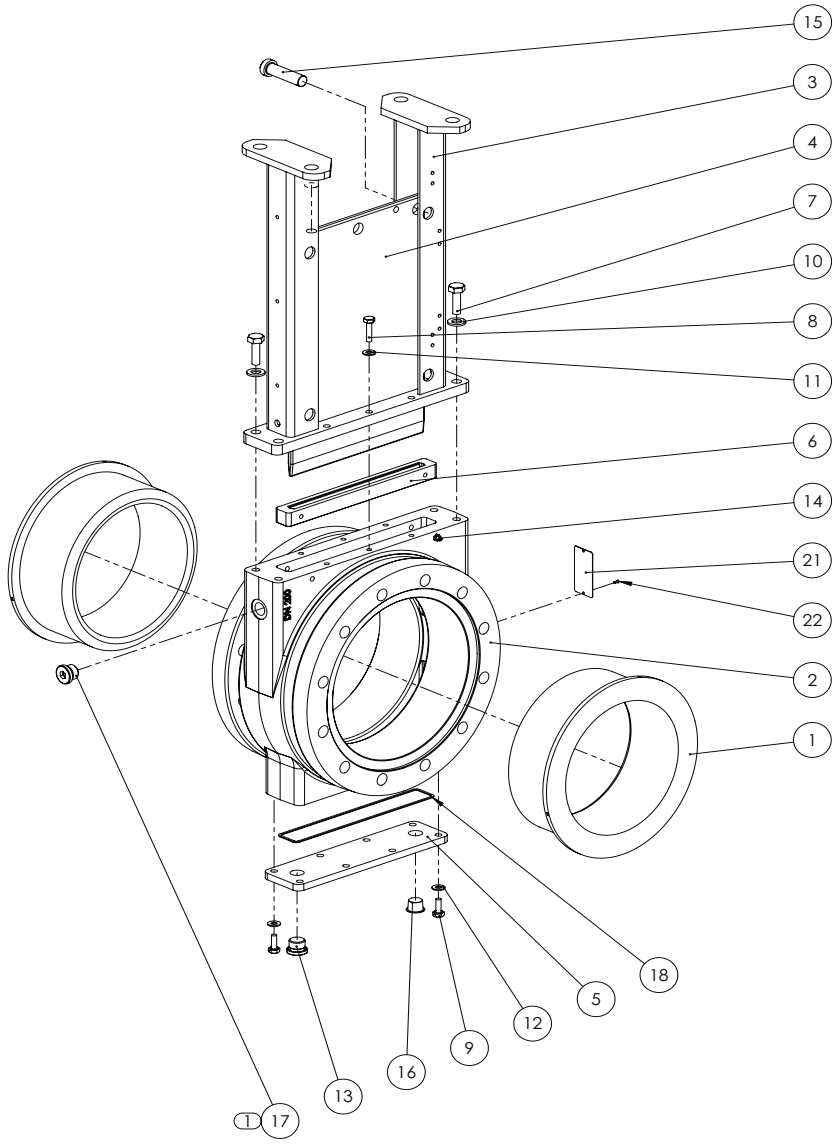


Figure 3. Exploled view of SKW valve

Table 3. SKW valve part list

Part	Description	Part	Description
1	Ring sleeve	**12**	Washer
2	Body SKW	**13**	Plug
3	Tower	**14**	Grease nipple
4	Gate	**15**	Locking pin
5	Bottom plate	**16**	Plug
6	Secondary seal	**17**	Plug
7	Hex screw	**18**	Sealing strip
8	Hex screw	**19**	Ferrule (not shown)
9	Hex screw	**20**	Steel wire rope (not shown)
10	Washer	**21**	Tag plate
11	Washer	**22**	Hammerdrive screw

SKF valve part list is shown in Table 4 and the exploded view in Figure 4. Part quantities are not displayed if they are valve size or actuator type dependent.



① NOT AVAILABLE ON ALL OPTIONS / SIZES

Figure 4. Exploled view of SKF valve

Table 4. SKF valve part list.

Part	Description	Part	Description
1	Ring sleeve	**12**	Washer
2	Body	**13**	Plug
3	Tower	**14**	Grease nipple
4	Gate	**15**	Locking pin
5	Bottom plate	**16**	Plug
6	Secondary seal	**17**	Plug
7	Hex screw	**18**	Sealing strip
8	Hex screw	**19**	Ferrule (not shown)
9	Hex screw	**20**	Steel wire rope (not shown)
10	Washer	**21**	Tag plate
11	Washer	**22**	Hammerdrive screw

2.7 Technical Specifications

Pressure range: 0-10 bar (0 -150 psi)

Max pressure differential: according to pressure rating.

Temperature range: See section 2.2.

Flow direction: Bidirectional

2.8 Product identification

Flowrox valve name plates or identification plates are shown on Figure 5.

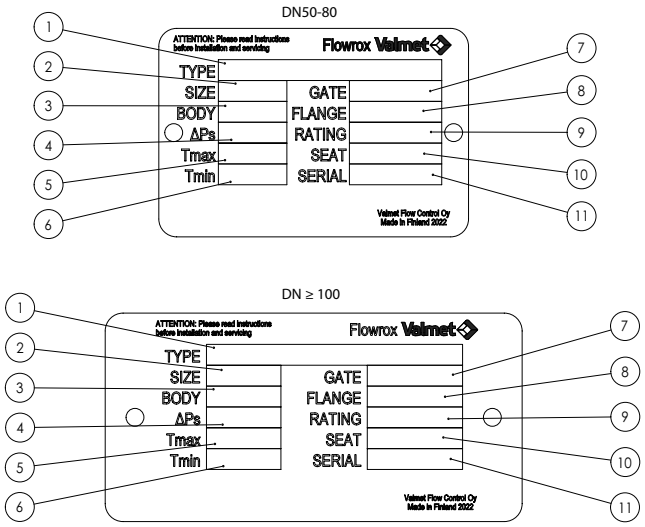


Figure 5. Valve type plate example.

1. Type designation
2. Size
3. Body material
4. Maximum shut-off pressure differential
5. Max. temperature
6. Min. temperature
7. Gate material
8. Flange drilling
9. Pressure rating
10. Seat material
11. Serial number

2.9 Actuators

Standard actuators:

- Handwheel / handwheel with gearbox
- Pneumatic
- Hydraulic
- Electric

Manual actuator operation revolutions are shown in Table 5. Valves are closed by turning clockwise. Do not use additional levers or long wrenches for valve operation.

Pneumatic actuators are with a fixed stroke and do not require external controls to position the gate. The nominal supply pressure for pneumatically operated valves is 6 bar (90 psi).

The air must be clean, dry, lubricated and properly filtered. An air quality of minimum requirement to ISO 8573-1:2010 [7:4:4] is recommended. If any component used on the valve has a stricter requirement (pressure, air quality), the stringent shall prevail.

Use correct sized pneumatic hoses to ensure sufficient air flow. Pneumatic actuator noise level may exceed 85 dB and it is recommended to use ear protectors when working near the valve.

Hydraulic actuators have a nominal supply pressure of 150 bar (2250 psi).

Electric actuators have open/close limit switches preset at the factory. A separate instruction from the actuator manufacturer is always included in the shipment.

Make sure that the 3-phase electrical connection is done correctly. If the connection is done wrong, the limit or torque switches will not trigger as designed. This will allow the actuator to move beyond limits and cause damage to the valve.

Consult the manufacturer's instructions on actuator requirements or/and limitations. If actuator is changed or valve needs adjustment, follow the *Maintenance* instructions.

	The gate speed may not exceed 25mm/s.

Table 5. Manually actuated valve operating revolutions.

Valve nominal size	DN 50 (2")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 200 (8")	DN 250 (10")
Handwheel revs. to stroke valve	18	25	28	40	50	60
Bevel gear revs. to stroke valve	-	-	-	-	-	-

Valve nominal size	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
Handwheel revs. to stroke valve	-	-	-	-	-	-

Bevel gear revs. to stroke valve	120	137	313	350	380	340

3 Transportation, Storage and lifting

Check and document any damage in packages or valves. Contact the transportation company in case of damage. When new or unused valves are sitting idle for long periods, execute the following procedures:

1. Prior to storage, thoroughly drain valves of any liquid.
2. Indoor storage is required. For unfavorable environment, cover the equipment with protective tarpaulin that will allow proper air circulation.
3. Protect the equipment from temperature and humidity extremes and exposure to excessive dust, moisture, vibration and sunlight.
4. It is preferred to store valves with the gate locked in open position.
5. Ensure pneumatic and hydraulic cylinder actuators have appropriate plugs installed in the respective supply ports to prevent contamination of the cylinders.
6. Protect valve ring sleeves from heat, light and exposure to ozone.
7. Cover the flange openings.
8. Do not store any objects on the rubber ring sleeves.
9. Follow actuator instructions for storage.
10. Before start-up, clean the gate and lubricate the valve.

When storing used valves, wash the valve and also the body cavities with fresh water and follow the steps above. For storage periods greater than 36 months, please contact Valmet Flow Control Oy as the rubber parts need to be changed before use.

	Lifting equipment must be used for valves weighing over 25kg (55 lbs).

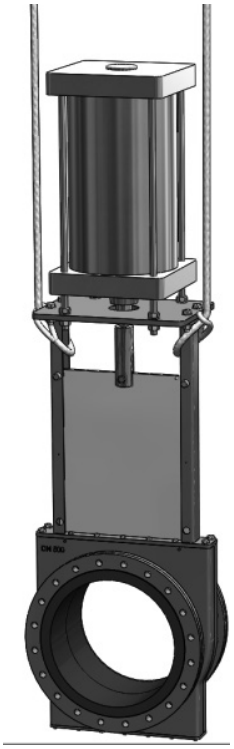


Figure 6. Valve lifting example.

Lift the valves securely from the tower (part 3 in *Mechanical structure*). Bigger valves may have pre-installed lifting eyes which should be used when available. When pre-installed lifting eyes are not available, use soft straps to lift valve as shown in Figure 6.

Do not attach lifting equipment to the valve bore, handwheel, actuator, locking pin holes or gate guards, as they can be damaged.

For valve dimensions and weight, refer to *Appendix A*.

4 Installation

	⚠ WARNING!
	Crushing and cutting hazard. Do not put your hands or fingers into the tower or port areas when the valve cycles. Do not energize the actuator before the valve is properly attached to the pipeline. Disconnect and de-energize the actuator before installation and maintenance work.
	High pressure injection hazard. Do not use higher pressure than rated for the valve. Higher pressures can cause serious damage to the valve or harm to operating personnel.

	⚠ CAUTION!
	Harmful substance hazard. If the process medium has to be fully contained, is corrosive or harmful, make sure the flushing ports are piped to a safe location.

	Never use the valve with all flushing ports plugged. Accumulated solids can cause the valve to jam.

4.1 General

Flowrox gate valves are normally delivered fully assembled and ready for use. Only personnel with appropriate training are allowed to install the valves. If the valve is delivered without an actuator or accessories, they must be installed in accordance with the manufacturer's instructions.

Flowrox gate valves have connections with DIN or ANSI bolt drillings as standard design, but other drillings are also available, such as BS, AS, JIS.

Reserve enough space for safe installation and maintenance. See *Appendix A* for valve dimensions. Notice that during opening and closing cycles, a small amount of medium is discharged in the valve body cavity; therefore do not install gate valves above walkways or critical components. Flushing and drainage connection must be installed if medium is harmful or corrosive.

If the valve has been stored in the warehouse, lubricate the valve as instructed in the *Lubrication* chapter.

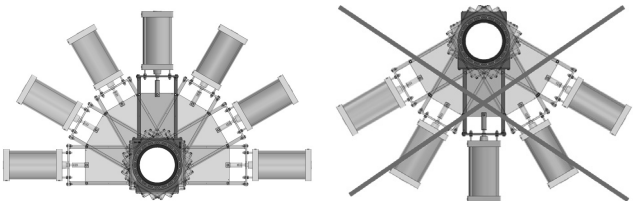
4.2 Flow direction, support, and valve position

	Do not install DN250 or larger valves in other than vertical position without support.
	Do not step on a valve installed in horizontal or angled position.

The valve does not have an intended flow direction; therefore it can be installed either way in the pipeline.

Proper pipe support must be placed on either side of the valve to support the weight of the pipe. The valve must never be used to support the pipes.

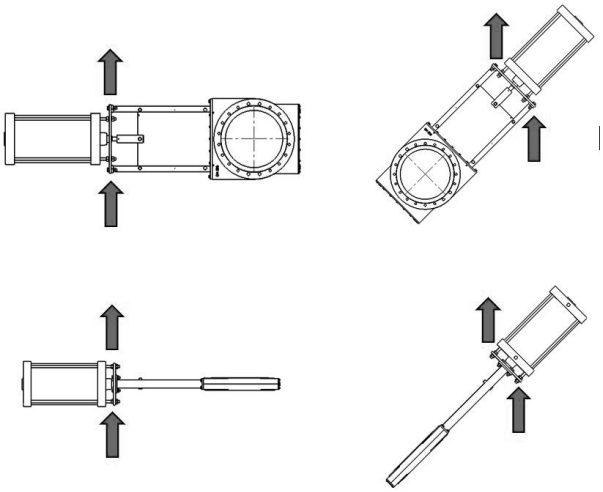
The valve can be installed in any position other than below horizontal. Flushing will not work in installations below horizontal level and it will lead to leaking and nonfunctional valve. See the following Figure 7.



Recommended installation positions

Forbidden installation positions

Figure 7. Installation alternatives for SKW and SKF valves.



Horizontal installation. Support is required as shown or otherwise.

Angled installation. Support is required as shown or otherwise.

Figure 8. Support for automatically actuated valves.

4.3 Valve installation

At least the following must be ensured before valve installation:

- The pipeline is isolated from the process and there is no pressure in it.
- The pipeline is empty, clean, and cooled down.
- The pipeline flanges are parallel, concentric and with correct distance.
- The flange connection bolts size is correct. See Table 6.
- The valve is in OPEN position.

Follow these Installation steps:

1. Disconnect automatic actuator from power supply if connected.
2. Install the safety guards and required accessories to the valve
3. Lift the valve on place with appropriate lifting equipment.
4. Tighten the flange connection bolts evenly in a crosswise sequence shown in Figure 9. Recommended tightening torque is shown in Table 6.
5. Other than mentioned flange drillings are also available.

Always support DN250 (10") and larger automatically actuated valves (Support for automatically actuated valves.).

6. Connect automatic actuator to power supply.
7. Connect flushing connection (if applicable).
8. Check that all connections have been fastened and the actuator is installed correctly.
9. Run a few open/close cycles without pressure in the pipeline.

For an electric actuator, close the valve manually halfway then operate electrically to ensure that the wiring is done properly.

10. Refer to *Troubleshooting* if the valve does not operate smoothly or without extra force.

Table 6. Valve connection maximum tightening torque and bolt nominal diameter for steel flanges.

Valve size (DN)	Recommended tightening torque for flange bolt Nm (ft-lbs)	Tapped hole depth in body (mm)	DIN Bolt nominal diameter	ANSI150 Bolt nominal diameter
50 (2”)	43 (32)	12	M16	5/8”-11 UNC
80 (3”)	43 (32)	14	M16	5/8”-11 UNC
100 (4”)	43 (32)	14	M16	5/8”-11 UNC
150 (6”)	75 (55)	16	M20	3/4”-10 UNC
200 (8”)	75 (55)	23	M20	3/4”-10 UNC
250 (10”)	120 (90)	23	M20	7/8”-9 UNC
300 (12”)	120 (90)	24	M20	7/8”-9 UNC
350 (14”)	185 (135)	24	M20	1”-8 UNC
400 (16”)	185 (135)	30	M24	1”-8 UNC
450 (18”)	260 (190)	28	M24	1-1/8”-7 UNC
500 (20”)	260 (190)	42	M24	1-1/8”-7 UNC
600 (24”)	260 (190)	42	M27	1-1/4”-7 UNC

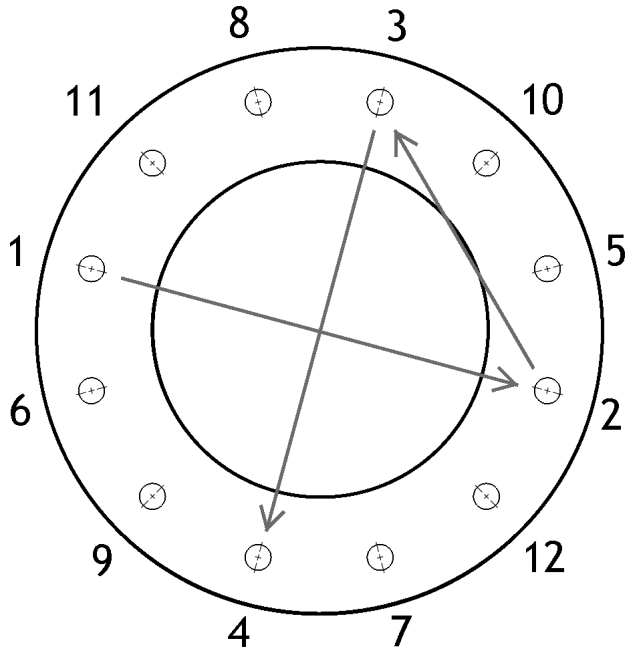


Figure 9. Flange bolt tightening example.

4.4 Flushing installation guidelines

	⚠ CAUTION!
	Harmful substance hazard. If the process medium has to be fully contained, is corrosive or harmful, make sure the flushing ports are piped to a safe location.

	Never use the valve with all flushing ports plugged. Accumulated solids can cause the valve to jam.

When valve flushing is required, customers need to provide the plumbing. The valves are shipped with plugs installed in the flushing holes. Contact Valmet Flow Control Oy office for process specific instructions.

The concept of flushing is to ensure the valve does not jam due to accumulation of medium solids in the valve body. Flushing line or drain line is also required if the medium is harmful to people, environment or other components nearby. In other cases, the flushing connections can be opened to prevent valve body from clogging up.

Reclaim service water is usually clean enough to accomplish the water flush, if clean water is not readily available.

Larger diameter valves can have additional flushing connection to ensure proper flushing. Flushing connection are on the sides, bottom or on the face of the valve. Hole sizes are shown in *Appendix A*. One or more flushing connections are used, depending on the process.

A flow indicator can be installed to the flushing line for easier function check-out.

In flushing example 1 the valve protective plugs (9) are removed or bottom cover plate (12) is removed. The process medium slipping between the gate and ring sleeves during valve operation flows freely out of the valve. If the medium is harmful in any way, the flushing port must be piped to a safe location.

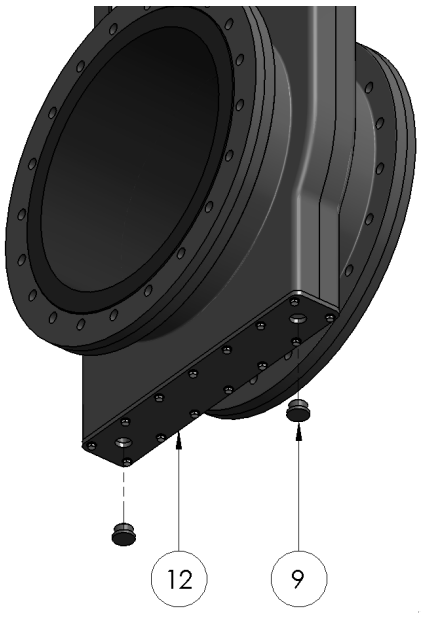


Figure 10. Flushing example 1.

9. Protective plug
12. Bottom cover plate

In flushing example 2 (Figure 11), the water is supplied to one side and drained from the other side of the valve. It is necessary to have a shut-off valve (B) on the upstream or supply side of the flush water line to prevent water running constantly. This can be located anywhere, but is usually near to the valve.

12. Bottom cover plate
A. Flush water supply
B. Shut-off valve
C. Drain line

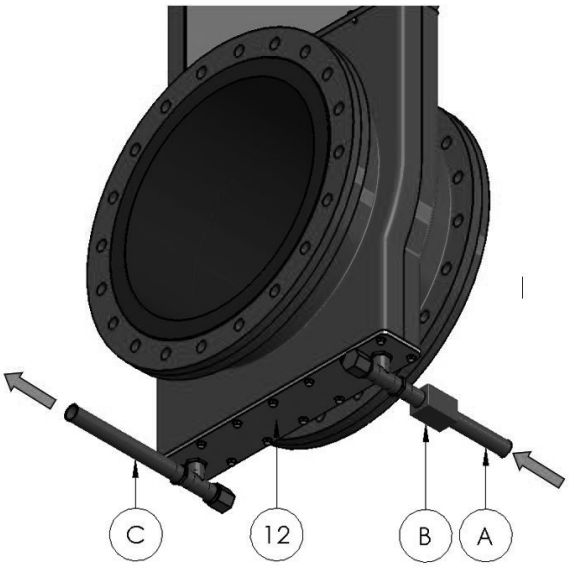


Figure 11. Flushing example 2.

5 Operation

5.1 Commissioning and decommissioning

Before the valve is operated within the pipeline, ensure that it has been installed in accordance with this manual and applicable safety regulations.

The following must also be ensured:

- Parameters on the type plate are suitable for the process and environment
- The valve is used for the purpose specified at the time of sales
- Required gate guards and other accessories are installed
- Possible explosive conditions have been taken into account

When a valve is decommissioned, dispose the valve parts and electric/pneumatic/hydraulic devices (actuators) according to the local regulations and the instructions given by the part or device manufacturer. Collect and dispose dangerous process media, so that people and environment are not endangered. Follow the local regulations.

5.2 Recycling and disposal

Most valve parts can be recycled. Separate recycling and disposal instructions are available from the manufacturer. A valve can also be returned to the manufacturer for recycling and disposal for a fee.

5.3 Flushing

Follow these operation instructions, when valve flushing is installed.

Flush Fowrox gate valves at least after every 20 cycles to keep the body clear of solids, depending on application and process. If slurry solids are present in the process, the flushing sequence needs to be initiated each time the valve is operated.

It is important to open the water supply valve a moment before the valve is operated. The flushing water is then left on for the entire cycle and for a minimum of 10 seconds after the cycle. To improve flushing, the water should be left on until clean flushing water is exhausting through the drain line.

The flushing water pressure must not exceed the maximum allowable operating pressure of the valve.

6 Maintenance

6.1 General maintenance and checks

	**⚠ WARNING!**
	Unexpected start-up hazard. De-energize actuators before maintenance. Especially pneumatic actuators equipped with a mechanical spring can cause injury to people and equipment if cylinder actuates unintentionally.
	Crushing hazard. Keep your hands and feet clear of moving parts. De-energize actuators before maintenance.

	**⚠ CAUTION!**
	Depressurize, empty and cool down the valve before any maintenance work. Valve surface can be hot. Isolate the valve completely from the process and follow the factory safety regulations.

	Lifting equipment must be used for valves weighing over 25 kg (55 lbs).
	Do not step on a valve installed in horizontal or angled position.

Only personnel with appropriate training are allowed to service the valves. For actuator service instructions consult the manufacturer's documentation supplied with the valve.

Check the condition of the valve regularly. When the valve is tight and it actuates flawlessly, lubricating is the only mandatory maintenance task. Periodic inspections should be done as valves may wear over time depending on conditions and process.

6.2 Scheduled maintenance

Include the valves in your factory maintenance program. Maintenance tasks and service intervals are offered as a guideline in Maintenance schedule.7. Schedules will vary with applications.

Table 7. Maintenance schedule.

Maintenance task	Frequency & advice
Do a leakage inspection	Regularly. Refer to Troubleshooting.
Lubricate valve	After every 50 cycles. More often if valve is operated rarely. Refer to chapter 6.1.3.
Lubricate the actuator stem	Every six months. Read the manufacturer's instructions.
Run an open/close cycle	Suggested once a month for smooth and reliable operation.
Examine the flushing and drainage	Every two months
Clean the gate	Every two months. Reduces the ring sleeve and gland packing wear.
Examine the gate for erosion	Every two months.
Examine the valve for erosion and wear	Every six months.

6.3 Spare parts

To ensure correct and quick delivery of spare parts, the order must contain at least the following information:

- Serial number
- Valve type code
- Spare part name and quantity (example: Ring sleeve, 2 pieces)

You can order the spare parts from Valmet Flow Control, distributors or agents. Contact information is available at www.valmet.com/flowcontrol.

It is recommended to keep the spare parts of Spare part list.8 available at your factory warehouse. Part numbers refer to *Mechanical structure*.

Table 8. Spare part list.

Part	Part number	Quantity/valve
Ring sleeve (set)	4	1
Secondary seal	7	1
Sealing kit for hydraulic or pneumatic actuator	-	1

Lubrication

Use only silicone based lubricants such as DOW# 111, DOW 4, DOW 44, GENERAL ELECTRIC COMPOUND G661, AND RHONE - POULENE RHODORSIL III.

Flowrox gate valves have grease nipples on both sides of the valve body (Figure 12). Valves are lubricated when assembled - therefore first lubrication should not be required unless the valves have been in stock for a longer time. For dry material handling, lubrication might be limited or forbidden.

Hydrocarbon based greases cannot be used to lubricate these valves as the elastomer ring sleeves will swell and disintegrate.

Lubricate both sides of the valve approximately every 50 cycles, or after long periods of infrequent cycling. Grease volume requirement is shown in Table 10. Please notice that even when the lubricant is inert it may disturb a sensitive process. Acceptable lubricants include: DOW# 111, DOW 4, DOW 44, GENERAL ELECTRIC COMPOUND G661 AND RHONE - POULENE RHODORSIL III.

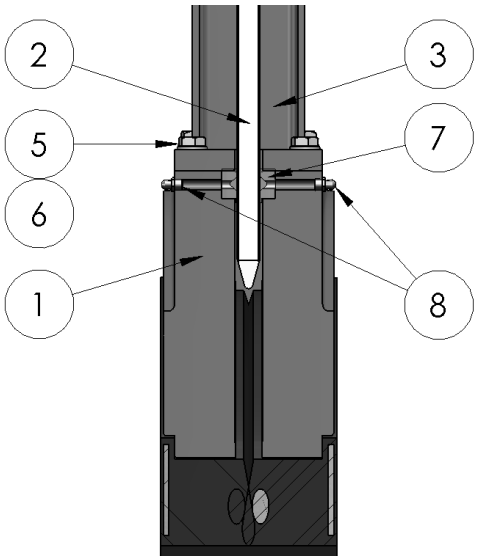


Figure 12. Grease nipples on valve body.

1. Valve body
2. Gate
3. Tower
5. Tower mounting bolt
6. Tower mounting washer
7. Secondary seal
8. Grease nipple

Table 9. Volume of grease required per unit.

Valve nominal size	DN 50 (2")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 200 (8")	DN 250 (10")
Lubricant per valve (cm^3)	35 (1.18 fl. oz.)	40 (1.35 fl. oz.)	60 (2.02 fl. oz.)	65 (2.19 fl. oz.)	105 (3.55 fl. oz.)	240 (8.11 fl. oz.)

Valve nominal size	DN 300 (12 ")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
Lubricant per valve (cm^3)	480 (16.23 fl. oz.)	490 (16.56 fl. oz.)	550 (18.59 fl. oz.)	620 (20.96 fl. oz.)	1090 (36.85 fl. oz.)	1470 (49.70 fl. oz.)

6.4 Changing the secondary seal

Follow these instructions if you are to change the secondary seal while the valve is installed to a pipeline. The actuator, tower, and gate are removed as one package to get more work space. Refer to *Changing the ring sleeves* or *Valve dismantling* if further service is required as well.

Part numbers refer to *Mechanical structure*.

⚠ WARNING!

Crushing hazard.

Keep your hands and feet clear of moving parts. De-energize actuators before maintenance.

1. Depressurize and drain the pipeline.
2. Stroke the valve to fully OPEN position and put the locking pins (13) on place.
3. Disconnect automatic (electric, pneumatic or hydraulic) actuator from power supply to prevent injuries.
4. Remove the bolts (5) that attach the tower (3) to the body (1). Lift the actuator, tower (3) and gate (2) off as one package. The secondary seal (7) might come up with the gate (2).
5. Remove the secondary seal (7).
6. Clean the space for the secondary seal (7).
7. Apply recommended silicon lubricant to any inner contours and outside of the new secondary seal (7) and push it in the sealing slot. If the secondary seal has a sealing lip, place it towards valve bore.

Use only silicone based lubricants such as DOW# 111, DOW 4, DOW 44, GENERAL ELECTRIC COMPOUND G661, AND RHONE - POULENE RHODORSIL III.

8. Apply recommended silicon lubricant on the chamfered edge of the gate (2).
9. Lower the actuator, tower and gate package on the body and fasten with bolts (5).
10. Lubricate valve grease nipples (8) as instructed in *Lubrication*.
11. Reconnect automatic actuator to power supply and remove locking pins (13).
12. Run a few test strokes before the pipeline is pressurized.

6.5 Changing the ring sleeves

To change the ring sleeves, the valve needs to be removed from the pipeline. Refer to *Valve dismantling* if further service is required as well. Part numbers refer to *Mechanical structure*.

⚠ WARNING!

Multiple hazards.

Pressurized medium in the pipeline can cause high pressure injection, scalding, corrosion and irritation.

Do not disconnect a pressurized valve from a pipeline.

1. Depressurize and drain the pipeline.
2. Stroke the valve to fully OPEN position and put the locking pins (13) on place.
3. Disconnect automatic (electric, pneumatic or hydraulic) actuator from power supply to prevent injuries.
4. Disconnect flushing pipelines from the valve if flushing is installed.

Use lifting equipment on valves weighing over 25 kg (55 lbs).

5. Remove the flange connection bolts and lift the valve to a suitable working surface.
6. Lift the ring sleeves (4) out from the valve body and inspect for visible damage such as cuts, slits or erosion grooves. Depressions and evident flat spots are also to be taken as signs of damage.
7. Check if the gate (2) is damaged and needs to be replaced.
8. Clean the valve body (1).

Use only silicone based lubricants such as DOW# 111, DOW 4, DOW 44, GENERAL ELECTRIC COMPOUND G661, AND RHONE - POULENE RHODORSIL III.

9. Apply a thin layer of recommended silicone based lubricant to the sealing lip and to the outer face of the new ring sleeves. Insert the sleeves into the valve body - centering the ring sleeve within the bore.
10. Leave the valve to OPEN position until it is installed and follow the *storage* instructions if the valve is placed in stock.

6.6 Valve dismantling

Follow these instructions if you are to do full overhaul on the valve. Part numbers refer to *Mechanical structure.*

Removing the actuator, gate, and tower

1. Remove the valve from the pipeline as instructed in the earlier chapter 6.5.
2. Install locking pins (13) between the gate (2) and tower (3).
3. Remove the tower mounting bolts (5) bolts and lift the actuator, gate (2) and tower (3) off.
4. To detach the gate (2) from the actuator stem, remove retaining ring (17) and the clevis pin (16) from the clevis (14).

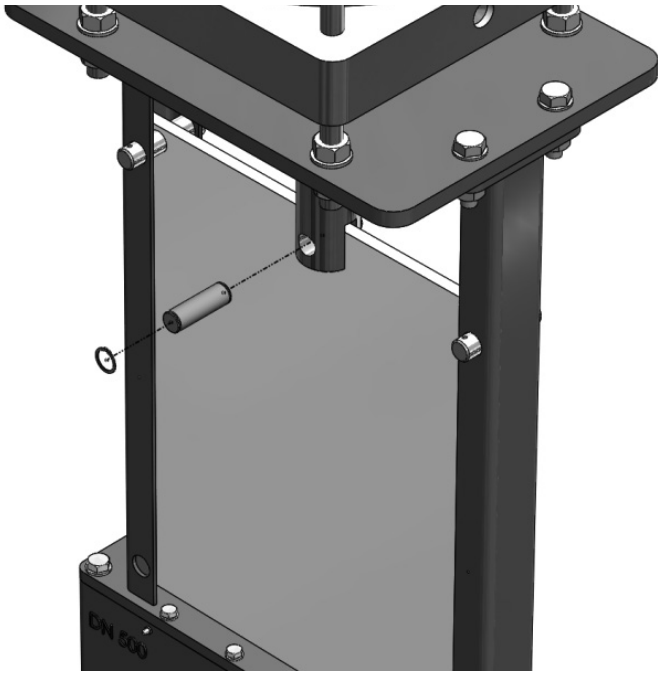


Figure 13. Removing the clevis pin.

5. Clean the gate (2) and inspect it for deep scars and transformations. Replace the gate if it's damaged to prevent accumulation of damage to the secondary seal (7) and ring sleeves (4).
6. Use a marker to mark the height of the clevis (14) on the cylinder shaft. The position is needed in valve assembly.
7. Remove the clevis locking screw (15) and the clevis (14).
8. Remove the bolts from between the actuator and tower (or adapter plate if equipped). Lift the actuator off the tower.
9. Refer to actuator manufactures' instructions for actuator sealing replacement or other maintenance work.

Dismantling the valve body

1. Disassemble the valve with the instruction above to the point where the actuator, gate (2) and tower (3) have been removed from the valve body (1).
2. Remove the ring sleeves (4) from the valve body and inspect for visible damage such as cuts, slits or erosion grooves. Depressions and evident flat spots are also to be taken as signs of damage. Change ring sleeves if damaged.
3. Remove the secondary seal (7).
4. Remove bottom cover plate (12).
5. Remove grease nipples (8).

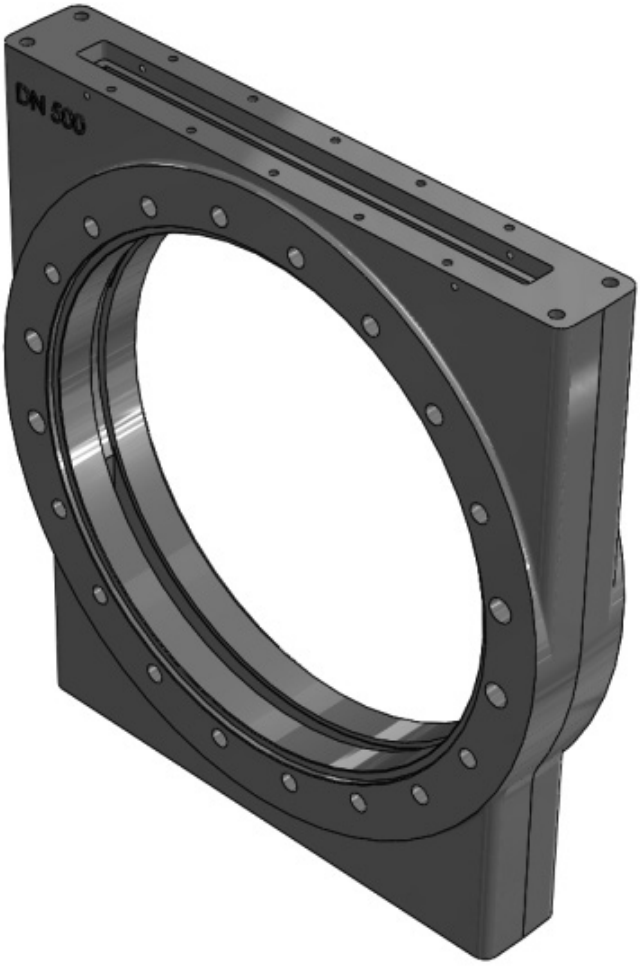


Figure 14. Dismantled valve body.

6. Clean the body (1) from the inside and ensure that the bores are flawless.
7. When all valve parts have been cleaned and inspected, continue to *Valve assembly*.

6.7 Valve assembly

Follow the general tightening torques in Table 10, when specific tightening instructions are not given in this document or in other supplied documentation. Part numbers in assembly instructions refer to *Mechanical structure.*

Table 10. General tightening torques (bolt class 8.8, lubrication MoS_2).

Size	M6	M8	M10	M12	M16	M20	M24
Tightening torques Nm (ft-lbs)	7 (5)	17 (13)	33 (24)	57 (42)	140 (103)	282 (208)	499 (368)

Valve body, secondary seal, and gate assembly

1. Install the secondary seal (7) in the sealing slot with the possible sealing lip facing towards valve bore. Apply recommended silicon lubricant to any inner contours and outside of the new secondary seal.
2. Install grease nipples (8).

Use only silicone based lubricants such as DOW# 111, DOW 4, DOW 44, GENERAL ELECTRIC COMPOUND G661, AND RHONE - POULENE RHODORSIL III.

3. Insert a piece of timber in the bore as shown in Figure 15. It is to prevent excessive gate drop before clevis pin is installed.
4. Apply recommended silicon lubricant on the chamfered edge and sides of the gate (2) and slide it through the opening at the top of the valve body until it stands safely on the piece of timber.
5. Continue to the tower and actuator assembly in the next chapter.

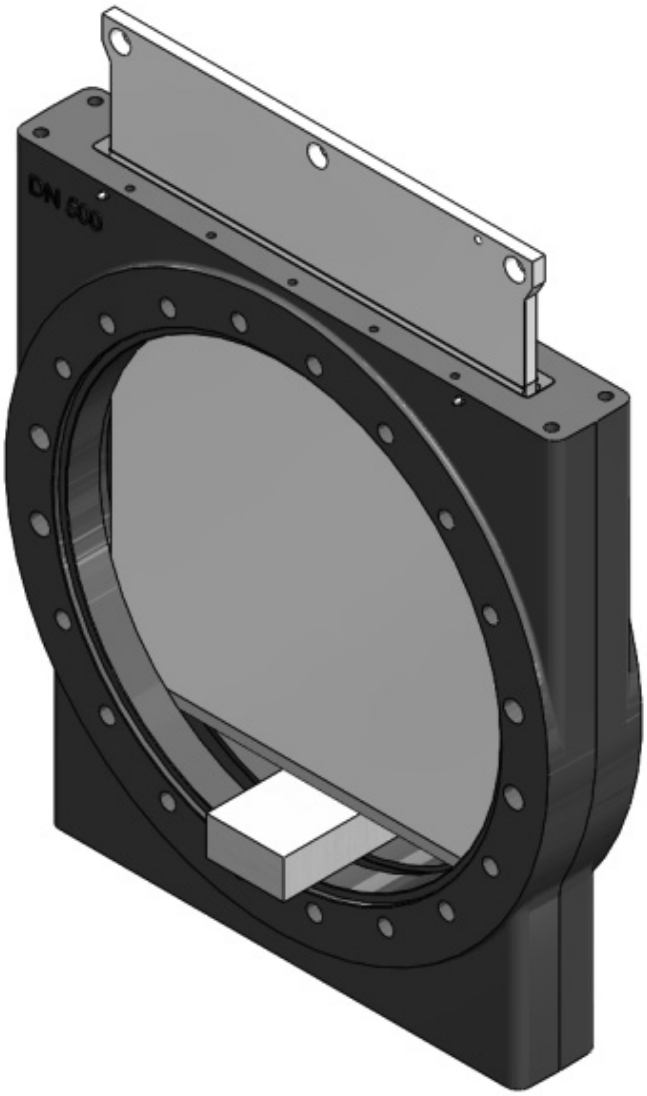


Figure 15. Detail of timber insert.

Tower and actuator assembly

1. After the valve body and gate have been assembled, lift and fit the tower (3) on the valve body. Install the tower mounting bolts hand tight (5).
2. Tighten the mounting bolts by starting from the middle as shown in the Figure 16.
3. Fit the actuator (and possible adapter plate) on the top of the tower (3) using the correct bolts and nuts.
4. Assemble the clevis (14) to the actuator stem if it was dismounted.
5. Stroke the actuator stem down or lift the gate to fit the clevis pin (16) through the aligning holes of the gate (2) and clevis (14). Secure the clevis pin with the retaining rings (17).
6. Install the bottom cover plate (12) and tighten the bottom cover bolts (10).
7. Continue to test the stroke in the next chapter.

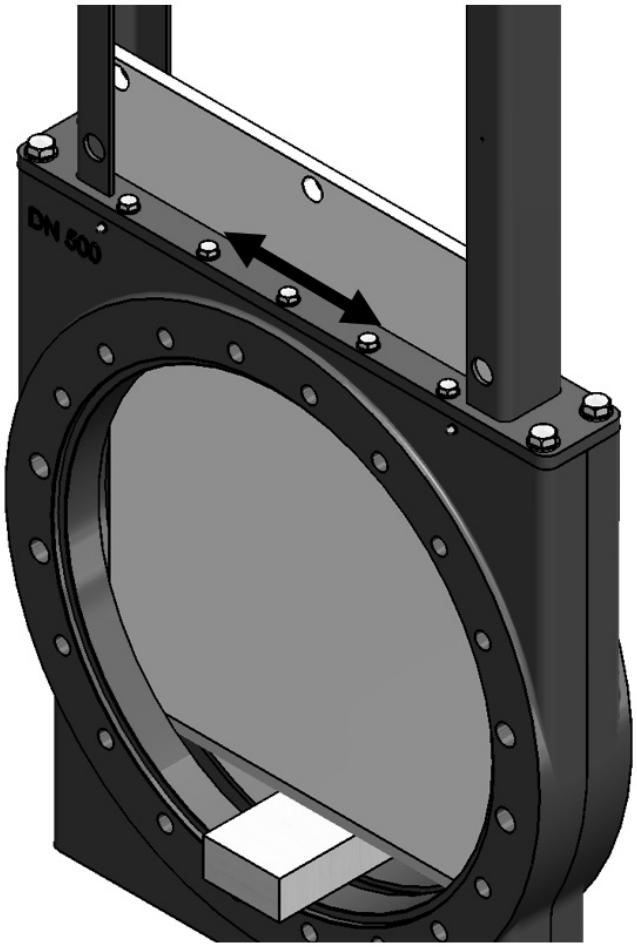


Figure 16. Tightening the tower mounting bolts.

Testing and adjusting the valve stroke

Only personnel with appropriate training are allowed to energize the valves. Check and adjust the valve stroke if you dismantle the valve or assemble a pneumatic or hydraulic actuator. This is not needed with manual actuators. Refer to the electric actuator documentation for specific stroke adjustment instructions.

	⚠ **WARNING!**
	Crushing hazard. Keep your hands and feet clear of moving parts. De-energize actuators before maintenance.

1. Assemble the valve according to the instructions above.
2. Connect the actuator to power source and stroke the valve to fully OPEN position.
3. Stroke is adjusted correctly if gate (2) can now be locked with the locking pins (13). Otherwise continue to the next step for stroke adjustment. See Figure 17.
4. Measure how much the gate (2) must be adjusted.
5. Disconnect automatic actuator from power supply to prevent injuries.
6. Remove retaining ring (17) from the clevis pin (16) and remove the clevis pin.
7. Push the gate (2) down to get space for the clevis (14) to turn.
8. Loosen the clevis locking screw (15)
9. Rotate the clevis (14) on the stem to adjust it up or down according the dimension measured above.
10. Re-install the clevis and test if the locking pins (13) fit in now. Repeat adjustment if pin does not fit in place. Continue to the next chapter if valve is adjusted correctly.

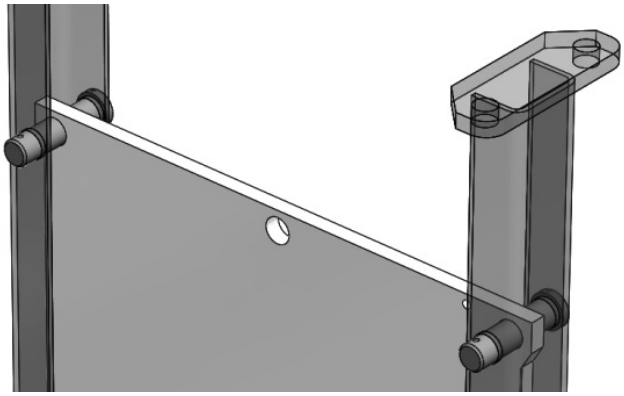


Figure 17. Stroke correctly adjusted.

Final assembly and testing

1. Before stroking to the valve automatically, ensure that the adjustments are done as instructed in this manual.
2. If the valve is with an electric actuator, manually close the valve to halfway (half the stroke) before actuating the valve automatically. This is done to ensure that the valve is opening in the right direction, wiring connections are done properly and prevent any damage to the valve.
3. Stroke the valve with the actuator to fully OPEN and fully CLOSED position to ensure smooth operation and the correct positioning of the gate.
4. Install the ring sleeves (4).
5. Lubricate valve grease nipples (8) as instructed in *Lubrication.*
6. Install all removed safety guards and other accessories according to the manufacturer's instructions.
7. Run a few open/close cycles and leave the valve open. If the valve operates smoothly, it is ready to be installed on the pipeline. Follow the *Installation* instructions.

6.8 Troubleshooting

Table 11. Troubleshooting.

Problem	Possible reason	Action
Leakage from bottom cover plate	Loose flushing pipeline connections or bottom cover plate	Check the flushing connection and bottom cover plate tightness
	Damaged ring sleeve and/or gate	Check ring sleeves and gate and change as needed
Leakage from flange connection	Flange connection is loose	Tighten the flange connection bolts to correct torque
	Flange connection bolts are too long	Measure the bolts and change as needed
	Pipeline flanges and valve are misaligned	Check that the flanges are parallel and concentric to valve
Leakage from the secondary seal	Tower mounting bolts loose	Tighten tower mounting bolts
	Secondary seal worn out	Replace secondary seal
Valve does not open/close or valve is not tight	Fault in actuator, limit switch or control system	Check and fix actuator operation
	Clogged up with solids	Clean gate and body cavity. Check or install flushing.
	Damaged gate, ring sleeve or secondary seal	Check and change damaged parts
Valve does not open/close smoothly	Insufficient lubrication	Lubricate valve and increase scheduled lubrication. Lubricate the actuator.
Opening/closing force too high*	Insufficient lubrication	Lubricate valve and increase scheduled lubrication. Lubricate the actuator.
	Flange or tower mounting bolts too tight	Check and loosen bolts
	Damaged gate, ring sleeve or secondary seal	Check and change damaged parts
Ring sleeve lifetime is short	Insufficient flushing	Check flushing flow and pressure or install flushing
	Insufficient lubrication	Increase scheduled lubrication
	Unsuitable ring sleeve material for process	Check with Valmet Flow Control
	Damaged gate	Check gate for scrapes and bending and change if damaged

Appendix A: Dimensions

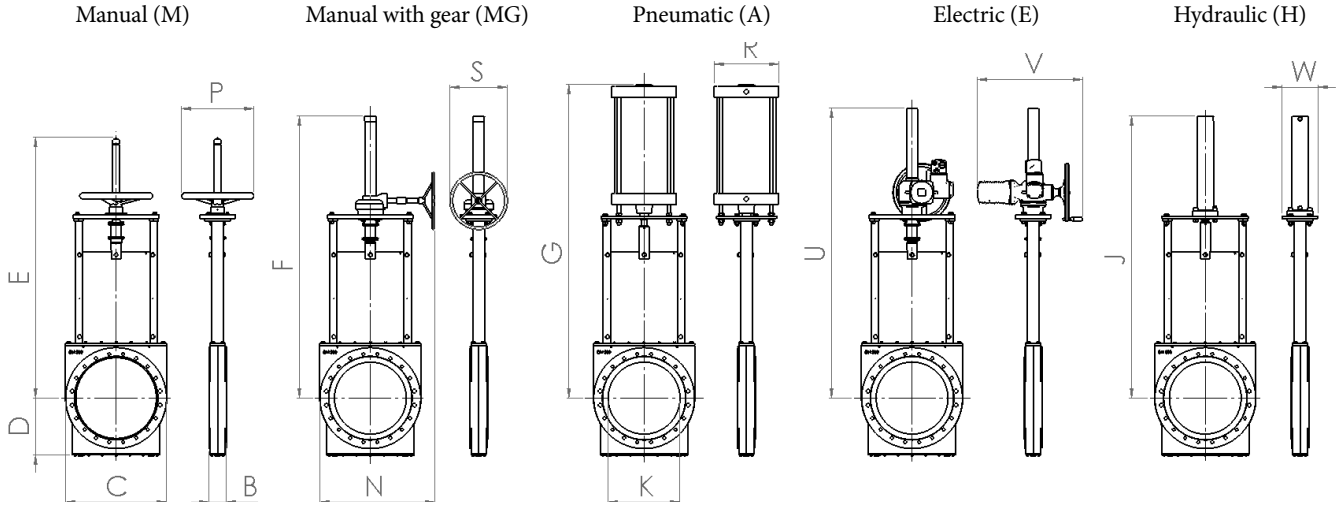


Figure 18. SKW valve dimensions.

Valve size DN	Dimensions in mm																Weight in kg					T
	B	B*	C	D	E	F	G	J	U	K	N	P	R	S	V	W						
					M	MG	A	H	E		MG	M	A	MG	E	H	M	MG	A	E	H	
50	54	58	165	102	566	-	586	-	-	-	-	350	110	-	-	-	20	-	17	-	-	G1/2”
80	57	61	200	112	628	-	683	-	739	80	-	350	110	-	513	-	24	-	22	48	-	G1/2”
100	57	61	230	132	648	-	725	-	751	100	-	350	120	200	513	-	30	-	28	51	-	G1/2”
150	64	68	285	157	921	-	972	-	879	150	-	350	176	200	513	150	42	-	49	64	-	G1/2”
200	76	80	346	188	1006	1148	1115	988	972	200	427	350	220	200	513	150	61	87	75	83	59	G1/2”
250	76	80	410	223	1133	1164	1316	1168	1150	250	459	350	284	200	537	180	82	-	113	104	-	G1/2”
300	83	87	483	262	-	1380	1512	1278	1363	300	535	-	340	400	537	200	-	134	190	150	-	G 1”
350	83	87	533	285	-	1455	1661	1521	1481	350	560	-	340	600	724	200	-	145	215	184	146	G 1”
400	95	99	600	322	-	1574	1799	1700	1600	400	698	-	340	400	724	200	-	186	260	222	187	G 1”
450	95	99	645	352	-	1875	2049	1831	1834	450	771	-	450	400	724	250	-	229	318	262	243	G 1”
500	121	125	705	403	-	1962	2180	1962	2015	500	801	-	450	500	731	250	-	316	400	370	320	G 1”
600	121	125	825	447	-	2250	2323	2291	2234	600	861	-	630	600	795	250	-	461	592	532	484	G 1”

Valve size inch	Dimensions in inch																Weight in lbs					T
	B	B*	C	D	E	F	G	J	U	K	N	P	R	S	V	W						
					M	MG	A	H	E		MG	M	A	MG	E	H	M	MG	A	E	H	
3	2.13	2.28	6.50	4.02	22.28	-	23.07	-	-	-	-	13.78	4.33	-	-	-	44	-	37	-	-	G1/2”
4	2.24	2.40	7.87	4.41	24.72	-	26.89	-	29.09	3.15	-	13.78	4.33	-	20.20	-	53	-	48	106	-	G1/2”
6	2.24	2.40	9.06	5.20	25.51	-	28.54	-	29.57	3.94	-	13.78	4.72	7.87	20.20	-	66	-	62	112	-	G1/2”
8	2.52	2.68	11.22	6.18	36.26	-	38.27	-	34.61	5.91	-	13.78	6.93	7.87	20.20	5.91	92	-	108	141	-	G1/2”
10	2.99	3.15	13.62	7.40	39.61	45.20	43.90	38.90	38.27	7.87	16.81	13.78	8.66	7.87	20.20	5.91	134	191	165	183	130	G1/2”
12	2.99	3.15	16.14	8.78	44.61	45.83	51.81	45.98	45.28	9.84	18.07	13.78	11.18	7.87	21.14	7.09	180	-	249	229	-	G1/2”
14	3.27	3.43	19.02	10.31	-	54.33	59.53	50.31	53.66	11.81	21.06	-	13.39	15.75	21.14	7.87	-	295	418	330	-	G 1”
16	3.27	3.43	20.98	11.22	-	57.28	65.39	59.88	58.31	13.78	22.05	-	13.39	23.62	28.50	7.87	-	319	473	405	321	G 1”
18	3.74	3.90	23.62	12.68	-	61.97	70.83	66.93	62.99	15.75	27.48	-	13.39	15.75	28.50	7.87	-	409	572	488	411	G 1”
20	3.74	3.90	25.39	13.86	-	73.82	80.67	72.09	72.20	17.72	30.35	-	17.72	15.75	28.50	9.84	-	504	700	576	535	G 1”
24	4.76	4.92	27.76	15.87	-	77.24	85.83	77.24	79.33	19.69	31.54	-	17.72	19.69	28.78	9.84	-	695	880	814	704	G 1”

Bigger sizes on request.
B* = ring sleeve uncompressed
M = handwheel
MG = manual with gearbox
A = pneumatic
E = electric
H = hydraulic
T = flushing connection.
Manual and electric valve stems are covered by bellows.

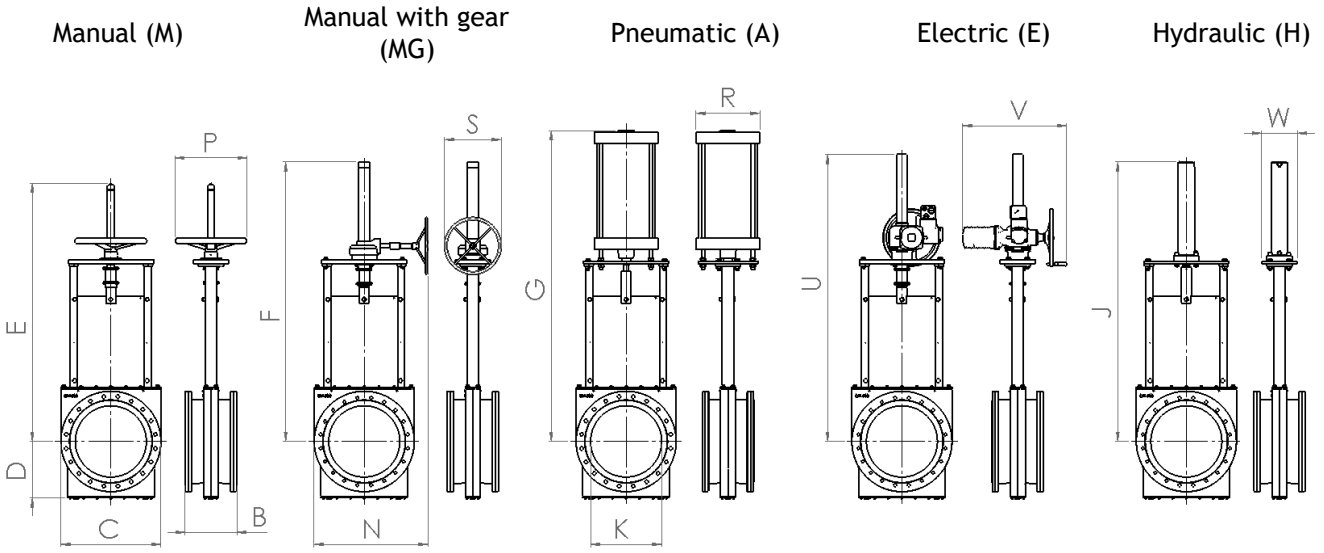


Figure 19. SKF valve dimensions.

Valve size DN	Dimensions in mm																Weight in kg					T
	B	B*	C	D	E	F	G	J	U	K	N	P	R	S	V	W						
					M	MG	A	H	E		MG	M	A	MG	E	H	M	MG	A	E	H	
80	175	179	200	112	628	-	683	-	739	80	-	350	110	-	513	-	32	-	31	57	-	G 1/2"
100	175	179	230	132	648	-	725	-	751	100	-	350	120	200	513	-	39	-	41	64	-	G 1/2"
150	178	182	285	157	921	-	972	-	879	150	-	350	176	200	513	150	41	-	66	80	-	G 1/2"
200	184	188	346	188	1006	1148	1115	988	972	200	427	350	220	200	513	150	85	-	100	108	-	G 1/2"
250	226	230	410	223	-	1164	1316	1168	1150	250	459	-	284	200	537	180	-	-	143	142	-	G 1/2"
300	257	261	483	262	1133	1380	1512	1278	1363	300	535	-	340	400	537	200	-	187	253	203	-	G 1"
350	257	261	533	285	-	1455	1661	1521	1481	350	560	-	340	600	724	200	-	215	282	252	216	G 1"
400	279	283	600	322	-	1574	1799	1700	1600	400	698	-	340	400	724	200	-	284	349	320	285	G 1"
450	311	315	645	352	-	1875	2049	1831	1834	450	771	-	450	400	724	250	-	335	420	368	344	G 1"
500	359	363	705	403	-	1962	2180	1962	2015	500	801	-	450	500	731	250	-	447	527	501	451	G 1"
600	372	376	825	447	-	2250	2323	2291	2234	600	861	-	-	600	795	250	-	629	-	700	652	G 1"

Valve size inch	Dimensions in inch																Weight in lbs					T
	B	B*	C	D	E	F	G	J	U	K	N	P	R	S	V	W						
					M	MG	A	H	E		MG	M	A	MG	E	H	M	MG	A	E	H	
3	6.89	7.05	7.87	4.41	24.72	-	26.89	-	29.09	3.15	-	13.78	4.33	-	20.20	-	70	-	68	125	-	G 1/2"
4	6.89	7.05	9.06	5.20	25.51	-	28.54	-	29.57	3.94	-	13.78	4.72	7.87	20.20	-	86	-	90	141	-	G 1/2"
6	7.01	7.17	11.22	6.18	36.26	-	38.27	-	34.61	5.91	-	13.78	6.93	7.87	20.20	5.91	90	-	145	176	-	G 1/2"
8	7.24	7.40	13.62	7.40	39.61	45.20	43.90	38.90	38.27	7.87	16.81	13.78	8.66	7.87	20.20	5.91	187	-	220	238	-	G 1/2"
10	8.90	9.06	16.14	8.78	44.61	45.83	51.81	45.98	45.28	9.84	18.07	-	11.18	7.87	21.14	7.09	-	-	315	312	-	G 1/2"
12	10.12	10.28	19.02	10.31	-	54.33	59.53	50.31	53.66	11.81	21.06	-	13.39	15.75	21.14	7.87	-	411	557	447	-	G 1"
14	10.12	10.28	20.98	11.22	-	57.28	65.39	59.88	58.31	13.78	22.05	-	13.39	23.62	28.50	7.87	-	473	620	554	475	G 1"
16	10.98	11.14	23.62	12.68	-	61.97	70.83	66.93	62.99	15.75	27.48	-	13.39	15.75	28.50	7.87	-	625	768	704	627	G 1"
18	12.24	12.40	25.39	13.86	-	73.82	80.67	72.09	72.20	17.72	30.35	-	17.72	15.75	28.50	9.84	-	737	924	810	757	G 1"
20	14.13	14.29	27.76	15.87	-	77.24	85.83	77.24	79.33	19.69	31.54	-	17.72	19.69	28.78	9.84	-	983	1159	1102	992	G 1"
24	14.65	14.80	32.48	17.60	-	88.58	91.46	90.20	87.95	23.62	33.90	-	-	23.62	31.30	9.84	-	1384	-	1540	1434	G 1"

Bigger sizes on request
B* = ring sleeve uncompressed
M = handwheel
MG = manual with gearbox
A = pneumatic
E = electric
H = hydraulic
T = flushing connection
Manual and electric valve stems are covered by bellows.

Appendix B: Type code

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
SKW	0100	B010	J	00	S1	N	C	B	A	A

1. Sign	Product type
SKF	Slurry Knife Gate Valve Flanged (LUGGED)
SKW	Slurry Knife Gate Valve Wafer (SEMI-LUGGED)
SKH	Slurry Knife Gate Valve High Pressure (LUGGED)

2. Sign	Body size	
0050	DN 50	2"
0080	DN80	3"
0100	DN100	4"
0125	DN125	5"
0150	DN150	6"
0200	DN200	8"
0250	DN250	10"
0300	DN300	12"
0350	DN350	14"
0400	DN400	16"
0450	DN450	18"
0500	DN500	20"
0600	DN600	24"
0650	DN650	26"
0700	DN700	28"
0750	DN750	30"
0800	DN800	32"
0900	DN900	36"
1000	DN1000	40"
1100	DN1100	44"
1200	DN1200	48"
1350	DN1350	54"
1400	DN1400	56"
1500	DN1500	60"

3. Sign	Working pressure
B004	4 bar
B006	6 bar
B007	7 BAR (Only AS Table D and BS Table D)
B010	10 bar
B014	14 BAR (Only AS Table E and BS Table E)
B020	20 bar

For further information on the new type code on valve and actuators, see the product Technical bulletin.

4. Sign	Flange drilling
J	PN 10 EN 1092
K	PN 16 EN 1092
L	PN 25 EN 1092
M	PN 40 EN 1092
C	ANSI 150 (ASME B16.5)
D	ANSI 300 (ASME B16.5)
B	BS TABLE D
A	AS TABLE D
E	AS TABLE E
R	JIS 10K
S	JIS 16K
Y	Other

5. Sign	Body material
00	Grey Cast iron EN 1561-GJL-250
01	Ductile Iron EN 1563-GJS-450
02	AISI 316 (EN 1.4408 /A351 CF8M)
08	Ductile Iron EN 1563-GJS-500
0Y	Other

6. Sign	Gate material
S1	AISI 316
S2	Duplex 2205
S3	Duplex 2101
S4	17-4PH®
S5	ALLOY C-276
S6	DUPLEX 2507
S7	AISI 316L
S8	AISI 904L

7. Sign	Gate coating
N	None

8. Sign	Ring sleeve / seat
C	NR Natural rubber
B	EPDM Ethylene Propylene
D	NBR Nitrile

9. Sign	Gate coating
B	EPDM Ethylene propylene
T	PTFE gland packing (SKF700-1500 and SKH series)

10. Sign	Ring sleeve material
A	FEZN (Standard)
C	All Stainless steel, A4-80

11. Sign	Ring sleeve material
A	Standard EN 1092-1/A Flat Face
B	EN 1092-1/B1 Raised Face (Only SKH series)
R	ASME B16.5 RF, Raised Face (Only SKH series)

APPENDIX C: 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 ~~point~~ 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 which are intended for use 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 Disc & Ball movement even when the valve is disassembled. Discs and balls 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

General disclaimers

Recieve, handle 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 THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE VALVE FROM THE PIPELINE OR BEFORE ANY DISASSEMBLY:Be sure you know what fluid 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 fluid involved in addition to any other PPE normally required.
- Depressurize the pipeline, bring to ambient temperature, and drain the pipeline fluid.
- 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 butterfly valve's offset shaft creates greater disc 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 BUTTERFLY VALVE WITHOUT A HANDLE OR AN ACTUATOR MOUNTED ON IT!
- WARNING: DO NOT REMOVE A HANDLE OR AN ACTUATOR FROM A BUTTERFLY VALVE UNDERPRESSURE!
- Before you install the butterfly valve in or remove it from the pipeline, cycle the valve closed. Butterfly valves must be in the closed position to bring the disc 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 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 type 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 fluid. Damage or personal injury may result.
11. The operating torque of the valve may rise over time due to wear, particles or other damage 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, a number of factors should be taken into account when selecting a valve for a given application. Therefore, some situations in which the valves are used are outside the scope of this manual.
17. It is the end user's responsibility to confirm compatibility of the valve materials with the intended service, however if you have questions concerning the use, application, or compatibility of the valve for the intended service, contact Valmet for more information.
18. Never use a valve with enriched or pure oxygen if the valve is not explicitly designed and cleaned for oxygen. Selected materials and design have a major impact on the safety to operate the valve with oxygen.
19. Valves intended for use in or with explosive atmospheres must be equipped with a grounding device and marked according ATEX (or equivalent international standards).
20. Manual handles are available for specific butterfly valve sizes and maximum line pressures. Do not operate a valve with a handle or wrench outside the size and pressure limits stated in the IMO. High line pressure may create a large enough force to pull the handle from the operator's hands. Damage or personal injury may result.

Maintenance

14. Respect the safety warnings above!
15. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.Maintain the valve within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.

16. Always make sure that the valve and the pipeline is depressurized before starting any kind of maintenance work at a valve.
17. 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.
18. Sealing materials (soft sealing parts) should be changed when the valve is maintained. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired valve.
19. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
20. Valve pressure bearing parts and all internals must be inspected for corrosion or erosion which may result in reduced wall thickness on pressure bearing parts. Damaged pressure bearing 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 warrantee.
21. 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.
22. Check the condition of sealing surfaces on the seats, closure device (disc, ball, cage, plug, etc.), body and body cap. Replace parts if there are significant wear, scratches, or damage.
23. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
24. Do not weld on pressure bearing parts without an ASME and PED qualified procedure and personnel.
25. Pressure bearing parts of valves in high temperature applications must be carefully examined for the effects of material creep and fatigue.
26. Make sure that the valve is positioned in the correct flow direction into the pipeline.
27. 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.
28. Always work in a clean environment. Avoid getting particles inside the valve due to machining, grinding, or welding nearby.
29. Never store a maintained valve without flow port protection.
30. 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.
31. 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. Use of the linkage to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.
32. 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.
33. 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 fluid 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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