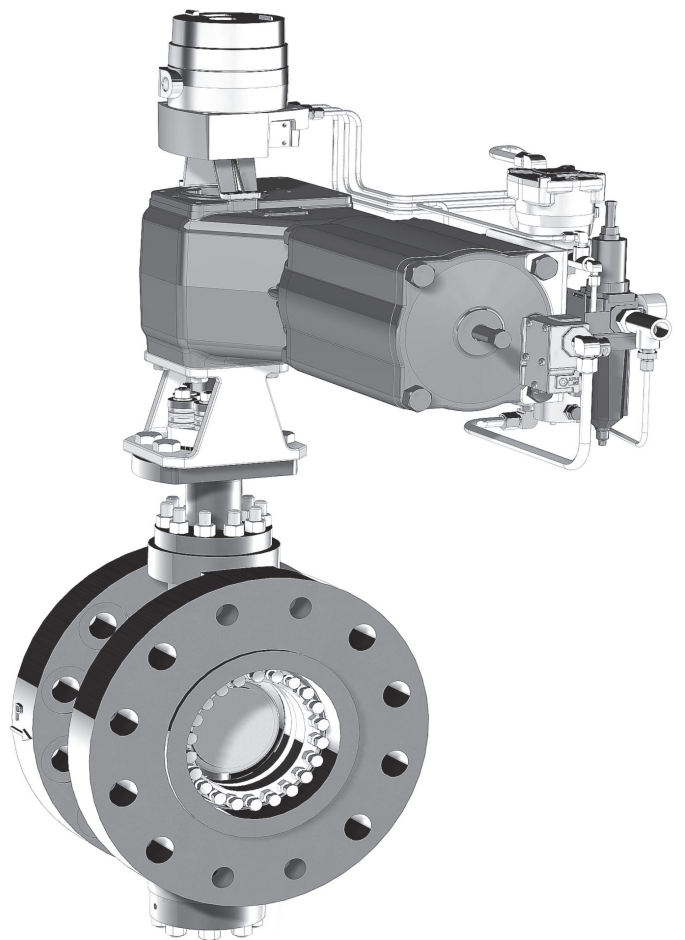


Metal seated high performance Neles™ butterfly valve Series BW

Installation, maintenance and
operating instructions



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READ THESE INSTRUCTIONS FIRST!

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

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

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1 General

1.1 Safety precautions

CAUTION:

Do not exceed the valve performance limitations!

Exceeding the limitations marked on the valve may cause damage and lead to uncontrolled pressure release.

Damage or personal injury may result.

CAUTION:

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

Dismantling or removing a pressurized valve will result in uncontrolled pressure release. Always isolate the relevant part of the pipeline, release the pressure from the valve and remove the medium before dismantling the valve. Be aware of the type of medium involved. Protect people and the environment from any harmful or poisonous substances. Ensure that no medium can enter the pipeline during valve maintenance.

Failure to do this may result in damage or personal injury.

CAUTION:

Beware of the disc's cutting movement!

Keep hands, other parts of the body, tools and other objects out of the open flow port. Leave no foreign objects inside the pipeline.

When the valve is actuated, the disc functions as a cutting device. The position of the disc can also be changed when moving the valve.

Close and detach the actuator pressure supply pipeline for valve maintenance.

Failure to do this may result in damage or personal injury.

CAUTION:

Beware of noise emissions!

The valve may produce noise in the pipeline. The noise level depends on the application. It can be measured or calculated using Neles Nelprof valve- sizing software.

Observe the relevant work environment regulations on noise emissions.

CAUTION:

Beware of a very cold or hot valve!

The valve body may be very cold or very hot during use.

Protect yourself against cold injuries or burns.

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.

Valve sizes DN 400 and over are equipped with lifting eye bolts.

Place the lifting ropes securely around the valve body.

Advise caution when lifting, because the disc may turn.

Damage or personal injury may result from falling parts.

NOTE:

Do not turn the disc more than 90°, since this could damage the seat. The valve is constructed so that the disc operates only between 0°- 90°.

1.2 Product & function description

High performance butterfly valve series BW; metallic sealing; bidirectional.

Type of body:

- Monoflange, lug
- Double flange
- Wafer
- Buttweld

Nominal size:

- DN 150 - DN 600
- NPS 6 - NPS 24

Pressure rating:

- PN 150 - PN 420
- CL 900 - CL 2500

Temperature range for standard valves:

- Operating temperature 0 °C to + 525 °C for carbon steel and low alloy steel
-50 °C to 525 °C for stainless steel
- Storage temperature 0 °C to +80 °C
- If operating temperature > +525 °C, please consult factory

Function description:

The high performance butterfly valve series BW has been designed to have a shut-off disc, in order to guarantee that the sealing element has a long service life.

The sealing element, a metallic sealing, is located in the valve body, safe from the wearing effect of the flow media, allowing it to retain its tightness for a long period of time.

The valve is closed when the disc is in a rectangular position to the flow direction. The distance between OPEN and CLOSED amounts to 90°, and the disc is driven by an actuator (manual, electric, pneumatic or hydraulic). There is a marking on the drive shaft as well as on the seat side of the extension. The valve is closed when the two markings are aligned.

The valve closes clockwise.

1.3 Intended use

The delivered valve has been designed especially in accordance with the requirements, which are noted in the order-related specification.

This applies especially to the operation parameter pressure, temperature medium and cycle rates.

If the process parameters are exceeded, this can lead to valve damage.

The damaged parts must be changed immediately.

The pipeline and medium used must be free of dirt – otherwise the tightness of the valve may be affected.

It is part of the intended use of the valve that the operating, mounting and maintenance personnel have read and understood this IMO manual.

Only qualified personal may perform the installation work.

Valmet assumes no liability for structural modifications carried out without explicit consent of the corporation.

Use original spare parts only.

Spare parts should be installed by Valmet service personnel.

1.4 Scope of delivery

The series BW valve is available in four versions: lug (monoflange), doubleflange, wafer, buttweld.

The valve is normally delivered with the actuator.

1.5 Visual inspection

Before leaving Valmet, the valve has been inspected for tightness and functionality by Valmet Quality Control and set for operation in accordance with the order-related specifications.

Before installation, please check the valve for possible transport damage. If delivery parts are damaged, please contact Valmet service personnel before any further actions.

Before installation, please check the valve for functionality.

Proceed as follows:

- Lifting ropes are necessary, depending on the size and weight of the valve.

Fasten the lifting ropes once around the valve body twice on the actuator (see Figure 1) for the horizontal transport position.

For valve sizes with a weight of more than 1t, the valve and actuator are equipped with lifting lugs to fix the lifting ropes.

If you fix the ropes on the actuator, the shaft may be damaged.

CAUTION:

Danger of twisting!

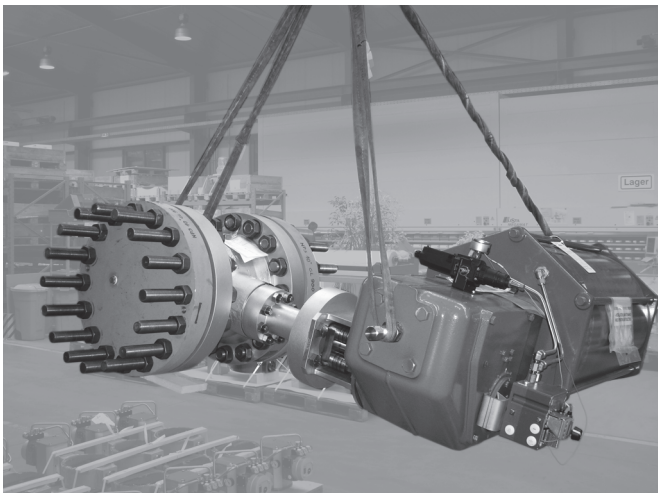


Fig. 1 Lifting in horizontal position

Fasten the lifting ropes on the actuator only for a vertical transport position. (see Figure 2)

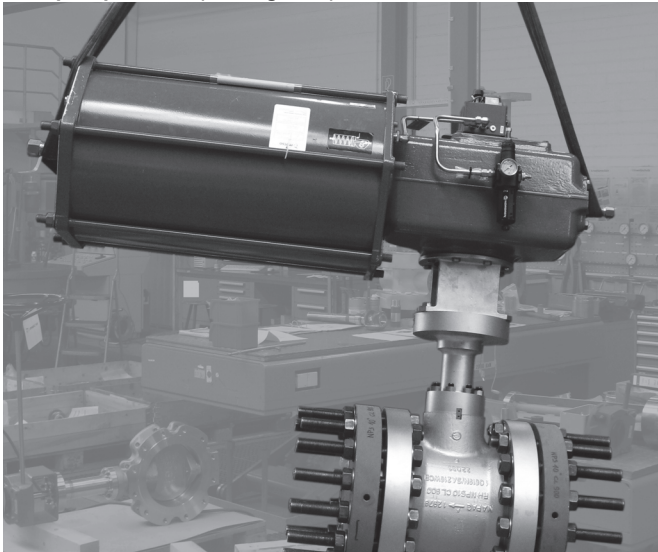


Fig. 2 Lifting in vertical position

- Visual inspection – all screws should be tightened correctly
- Visual inspection for damage on the following parts:
 - disc
 - shaft
 - actuator and tubing
 - gland packing
 - sealing elements
 - sealing surface of the valve
- Bring the valve into a vertical position.

The valve may move in an uncontrolled manner during the check. For this reason, ensure that the valve cannot move or tilt over under any circumstances.

Normally valid:

View from above on the drive shaft of the disc:

Counterclockwise rotation = OPEN, Clockwise rotation = CLOSE (see Figure 3).

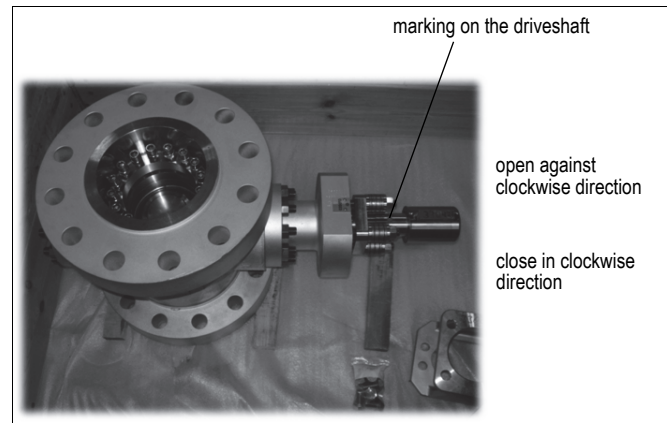


Fig. 3 Direction of rotation of the actuator and disc position

If the valve does not operate correctly during inspection, please contact Valmet personnel.

1.6 Marking and identification

The valve specifications are placed on the identification plate.

For maintenance and/or repair, the unique number (Unique-No) is needed to identify the valve

This number is also engraved in the valve body, so you can find it even if it cannot be easily detected from the Identification plate.

Further information:

Job-No	= Job number of Valmet
Unique-No	= Serial number of the valve
Type	= Type code of the valve
Body	= Body material
YEAR	= Year of manufacture
NPS or DN	= Size; CL or PN = Pressure class
ID-No.	= Customer identification number
Tag-No	= Valve number
TS.	= Valve max. working temperature in °C (medium)
PS	= Valve max. design pressure at max. temp
P.O.NO.	= Customer's order number / commission number
Cv	= Flow rate in gal/min
EX II 2GcTx	= ATEX-marking
CE	= CE0036 (notified body for PED)

To display the trim in the built-in condition of the valve, you will find the following markings (see Fig. 4):

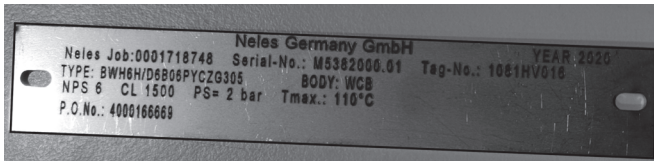
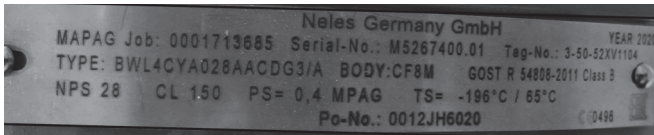


Fig. 4 Example of identification plates BWL and BWH

- Colored marking on the shaft.

If colored markings on shaft in direction of flow are aligned, the valve is "CLOSED". The sealing element is located on the side of the body where you see the colored marking.

Open and close like a tap. (seen from the actuator side).

1.7 ATEX, ASME & CE-marking

The valve meets the requirements of the European Directive 2014/68/EU relating to pressure equipment and the ASME B 16.34-2009, and has been marked in accordance with these directives.

The ATEX, ASME and/or CE markings are placed on the Identification plate (see Figure 3) in accordance with the specification of the valve.

1.8 Contact

Please contact your local Valmet Partner on:
www.neles.com/valves

2 Transport, reception and storage

Check the valve – including equipment – for any damage that may have occurred during transport.

Store the valve carefully before installation, preferably indoors in a dry place.

Storage temperature = -20° ... 80 °C

Humidity 85 % max (non-condensing)

The valve must be stored with the appropriate factory-made flow port protectors.

The valve is usually delivered in the closed position.

A valve equipped with a spring-return actuator is delivered in a position determined by the spring. During storage the valve must be lightly closed.

Transport the valve on-site not until the installation will be performed.

Remove the flow port protectors before installation.

3 Installation

Only qualified personnel are permitted to perform installation work on the valve!

3.1 Installation planning

Before installation, consider the following aspects:

- Install the valve so that the actuator is easy to access.
- Do not connect the power supply of the actuator (electrical, pneumatic or hydraulic energy) until the installation of the valve is completed.
- The flange holes of both pipe ends must be exactly aligned and the sealing surface of the opposing flanges must be exactly parallel. The flange holes must not be twisted against each other, to ensure that the installation cannot cause any stress in the valve. (see Figure 5)

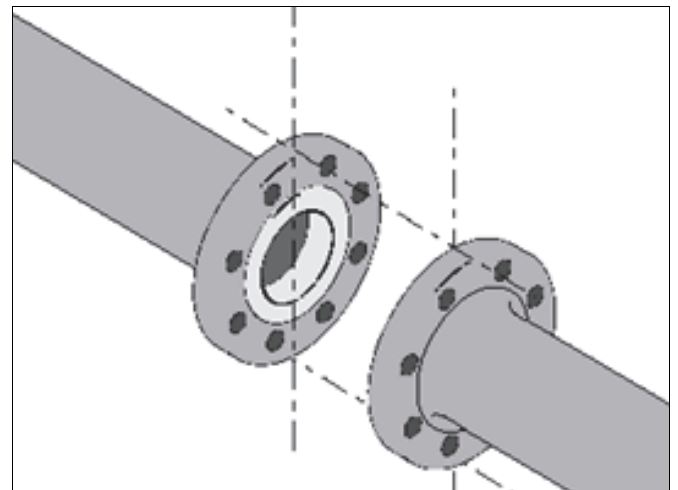


Fig. 5 Check the flange position before installing

3.2 Preliminary

Flush or blow the pipeline carefully before installing the valve. Foreign particles – such as sand, rust, dirt or welding residues – will affect the tightness of the valve and damage the disc-sealing surface and seat. This is very important for installation of valves in new plant sections. Also during this process, the medium must not carry any contaminant which may settle in the sealing area.

Advise caution when installing flaps with safety position “spring-to-open”.

If the disc accommodates the total length of the valve, the disc shall be closed prior to the installation (pneumatic, hydraulic, etc.). Be sure that the energy supply is safely fastened and cannot be damaged or break off during installation.

If there is a sudden shutdown of energy supply, the valve will be opened abruptly by the pre-stressed spring package. This may cause severe personal injury and material damage.

Heavy valves to be mounted in a pipeline need a hoist. The total weight of the valve package can be found in the order related documentation.

Place the lifting ropes securely around the valve body – not on the actuator. Otherwise, you may damage the valve (see Figures 1 and 2).

3.3 Installation

To install the high performance butterfly valve, proceed in the following way:

- If no indication of the valve installation direction is given, install the valve to have the shaft side on the upstream side.
- If the mounting direction is mentioned, bring the valve in a position so that the arrow (P=pressure) follows the process pressure direction. (see Figure 6)



Fig. 6 Mounting direction

- Close the valve for installation. In the open position, the disc-sealing surface can accommodate the total length of the valve body and may be damaged at installation.
- Please note the minimum piping inside diameter according to ASME B36.10M, ASME B36.19M respectively DIN EN 10305-2 and DIN EN 10305-5.
- Insert a flange gasket on both sides of the valve between the valve body and pipeline flange. Gaskets are not included to the standard delivery.
- Piping bolt dimensions and quantities can be found in Fig. 7 and Tables 1-3.
- Screw the stud bolts opposite to each other as well as the bolts, flange screws and hex nuts crosswise and equal with a torque key, in accordance with the parameter of the operator (see Figure 8).
- Connect the energy supply as the final procedure.

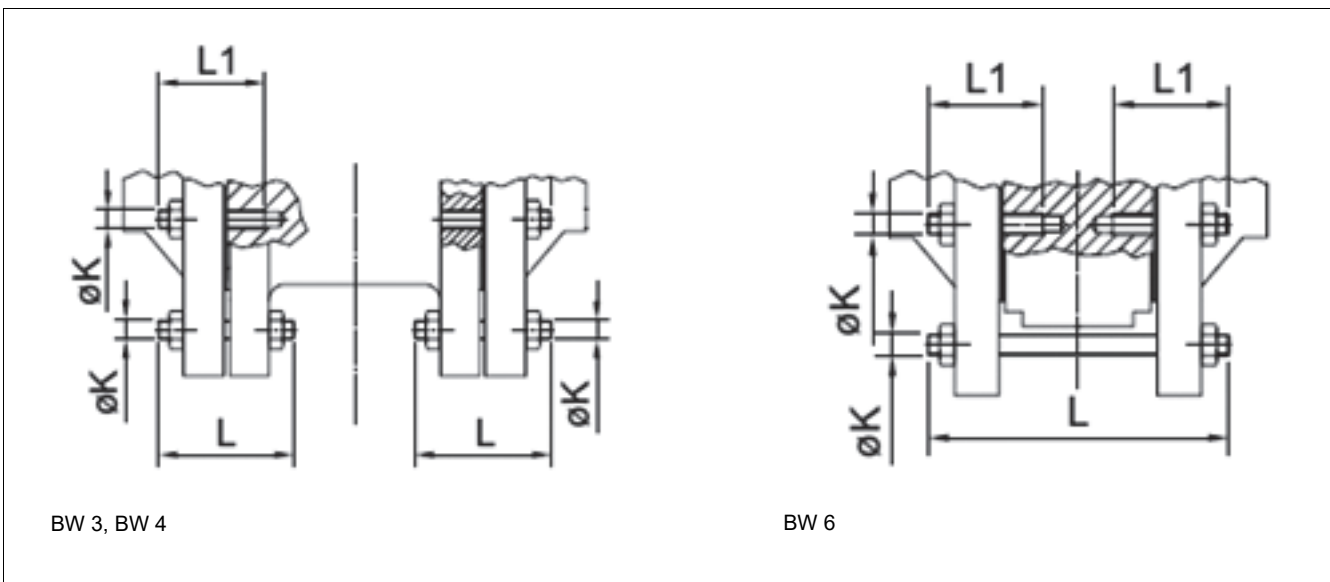


Fig. 7 Stud bolt dimensions

BW3 (double-flanged)

Table 1 Stud bolt dimensions
BW3 - Class 900

NPS	thread K	L	
		length	QTY
6	1 1/8"-8UN	190	24
8	1 3/8"-8UN	220	24
10	1 3/8"-8UN	240	32
12	1 3/8"-8UN	260	40
14	1 1/2"-8UN	280	40
16	1 5/8"-8UN	290	40
18	1 7/8"-8UN	330	40
20	2"-8UN	350	40
24	2 1/2"-8UN	440	40
26	2 3/4"-8UN	460	40
28	3"-8UN	480	40
30	3"-8UN	490	40
32	3 1/4"-8UN	530	40
34	3 1/2"-8UN	560	40
36	3 1/2"-8UN	570	40
38	3 1/2"-8UN	610	40
40	3 1/2"-8UN	620	48
42	3 1/2"-8UN	640	48
44	3 3/4"-8UN	670	48
46	4"-8UN	710	48
48	4"-8UN	720	48

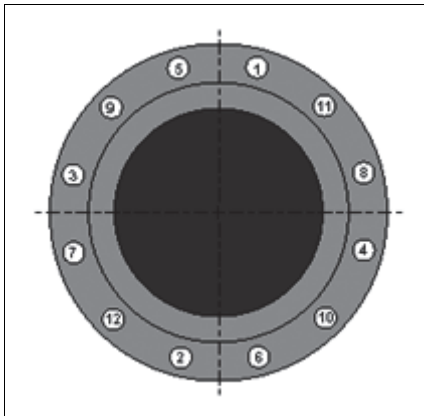
Table 2 Stud bolt dimensions
BW3 - Class 1500

NPS	thread K	L	
		length	QTY
6	1 3/8"-8UN	260	24
8	1 5/8"-8UN	300	24
10	1 7/8"-8UN	340	24
12	2"-8UN	380	32
14	2 1/4"-8UN	420	32
16	2 1/2"-8UN	460	32
18	2 3/4"-8UN	500	32
20	3"-8UN	550	32
24	3 1/2"-8UN	630	32

Table 3 Stud bolt dimensions
BW3 - Class 2500

NPS	thread K	L	
		length	QTY
6	2"-8UN	350	16
8	2"-8UN	390	24
10	2 1/2"-8UN	490	24
12	2 3/4"-8UN	550	24
14	3 1/4"-8UN	660	24
16	3 1/2"-8UN	720	32
18	3 1/2"-8UN	760	32

Fig. 8 Sample for a crosswise installation with twelve flange holes.



3.4 ATEX-version

ATEX certified valves shall be professionally connected by the end user to a main grounding point at the site, in accordance with the applicable regulations in effect in the countries concerned. The grounding of the valve is the responsibility of the end user. Operation without grounding is not permitted!

The grounding connection is a marked screw with the earthing symbol. This screw can be found from eg., the body, flange or bracket (see Figure 9).

The grounding cable must be installed with a braided wire having at least 16 mm² of conductive area to the grounding point in the piping construction.

ATEX certified valves must only be serviced and maintained by Valmet Service or authorized personnel.

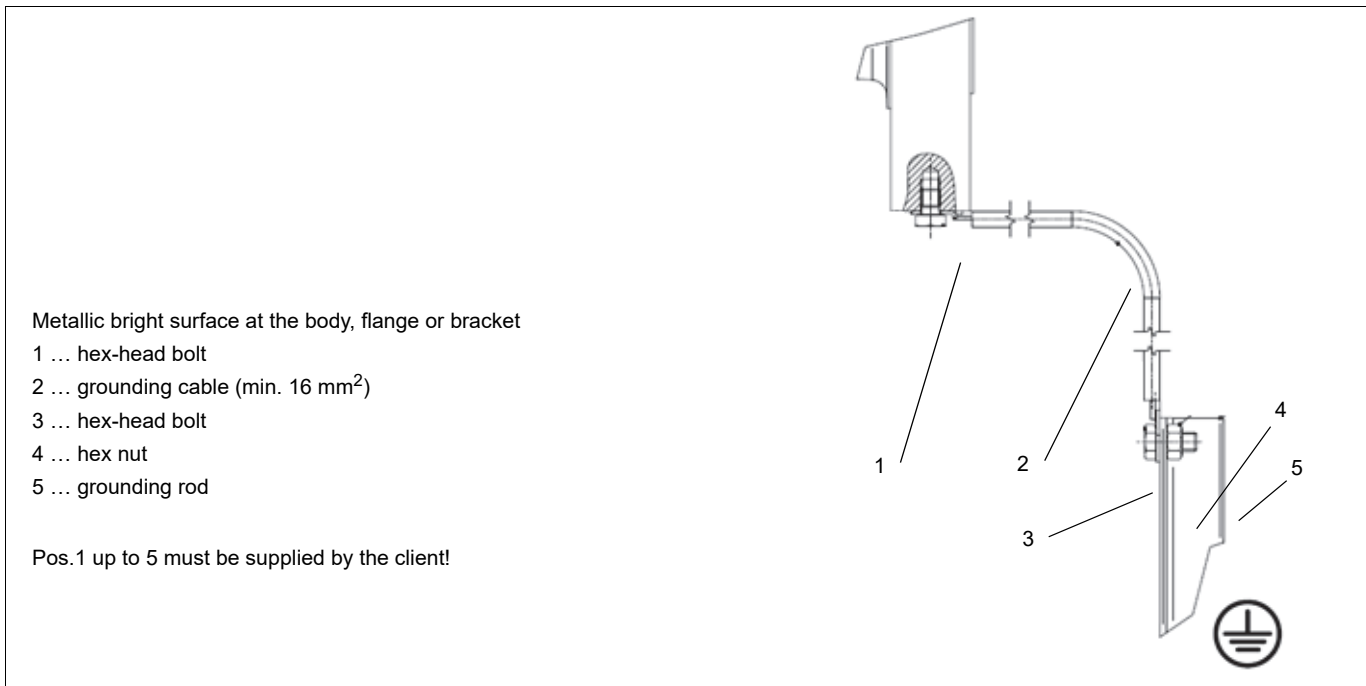


Fig. 9 Grounding

3.5 Demounting

Ensure that:

- the pipeline is pressureless, flushed and empty.
- the mentioned valve is disconnected from the process.
- the valve is in a defined position (normally closed).

CAUTION:

Danger of explosion!

Follow the end-user safety instructions!

For demounting the valve, proceed in the following order:

- Close the valve.
- When detaching the actuator to demount the valve, the actuator should be tagged to the bracket and the valve body with a waterproof marker (Figure 10). It makes it easy to find the correct position of the actuator at reassembly and the actuator cannot cause a malfunction.
- Further instructions for detaching the actuator can be found in Chapter 4.

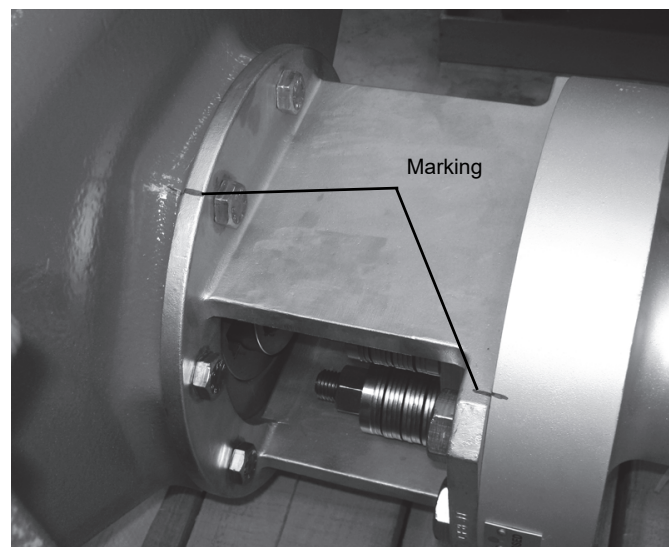


Fig. 10 Before detaching the actuator, tag its position to the shaft and the disc on the bracket.

- **Switch off the energy supply of the actuator.**
- Detach the actuator.
- Support the valve carefully with a hoist. Place lifting ropes in the correct position on the body (not the shaft!) of the valve.
- Demount the valve by unscrewing the opposite pipe-flange bolts crosswise.
- Lift and transport the valve carefully to protect it from damage.

3.6 Cleaning and maintenance interval

CAUTION:

Observe the safety precautions mentioned in Section 1.1 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.

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 BW-Series 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(s) should be replaced.

Time in storage should be included in the inspection interval.

NOTE:

Check the tightness of the valve at regularly intervals.

Valmet recommends to inspect the condition of the following parts after two years at the latest to change them if necessary, see Fig. 11:

- gland packing (451),**
- metallic sealing element (321),**
- sealings (107, 304, 470),**
- axial bearing (404),**
- bearings (420, 424, 425)**

After assembling the valve, you must always replace the locking plate (447).

To order the necessary spare parts set, please contact your Valmet Service Partner.

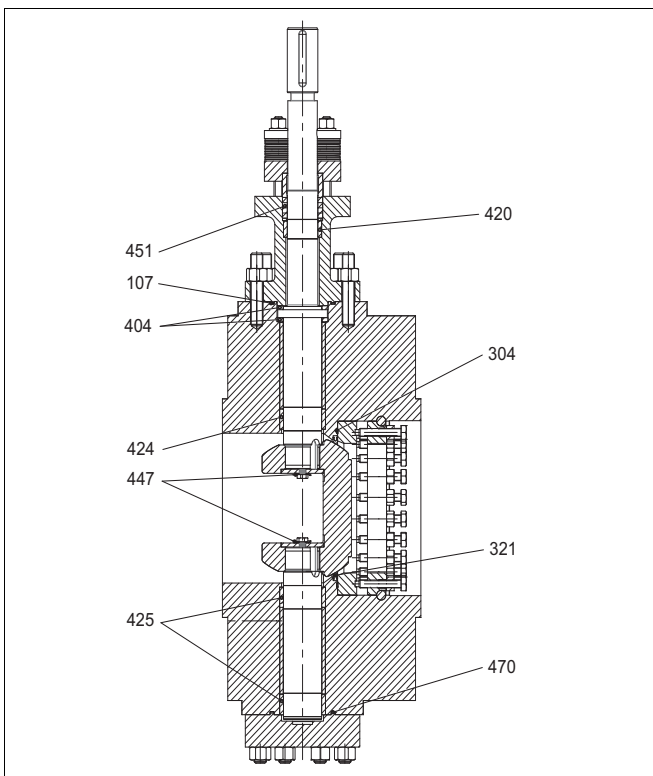


Fig. 11 Sealings and bearings

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 Detaching and mounting the actuator

4.1 General

The actuator mounting is in accordance with DIN/ISO 5211. All actuators based on this standard can be easily mounted on the valve. Typical installations are with pneumatic- and hydraulic actuators with valve controllers for control, ESD or on/off use, or with electric actuator or manual gear.

CAUTION:

When handling the valve or valve package, bear in mind its weight!

The actuator cannot be removed from the valve when the pipeline is under pressure due to dynamic torque!

NOTE:

Before dismantling, carefully observe the position of the valve with respect to the actuator and positioner/limit switch to ensure that the package can be properly reassembled.

The actuator must be mounted to be easily accessible, particularly for possible emergency manual override.

4.2 Mounting preparation

The actuator used is normally on the customer's request. For safe mounting on site, you need a hoist and lifting ropes.

CAUTION:

When handling the actuator, bear in mind its weight!

4.3 Mounting

To mount the actuator, proceed in the following order:

- Turn the valve to the closed position before mounting the actuator.
- Carefully position the indexing shaft of the actuator on the valve shaft. Bear in mind that the actuator must be mounted exactly and flush to the bracket, so that no stress is allowed to occur on the valve shaft.
- Ensure that the jag on the indexing shaft conforms to the position of the disc (see Figure 13).
- Fix the actuator with the appropriate screws and lock them cross-wise. Finally, check the closed position of the valve by means of multiple depth measurements. The detected data is not allowed to deviate more than 0.3mm (see Figure 12).
- As the last procedure, connect the energy supply.

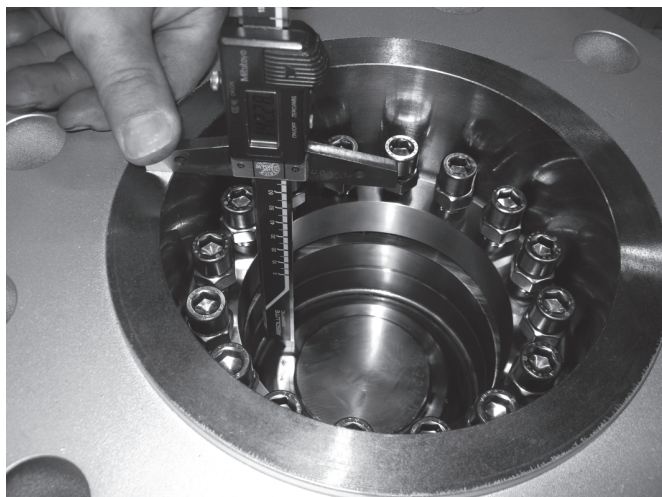


Fig. 12 Checking the closed position by means of depth measurement

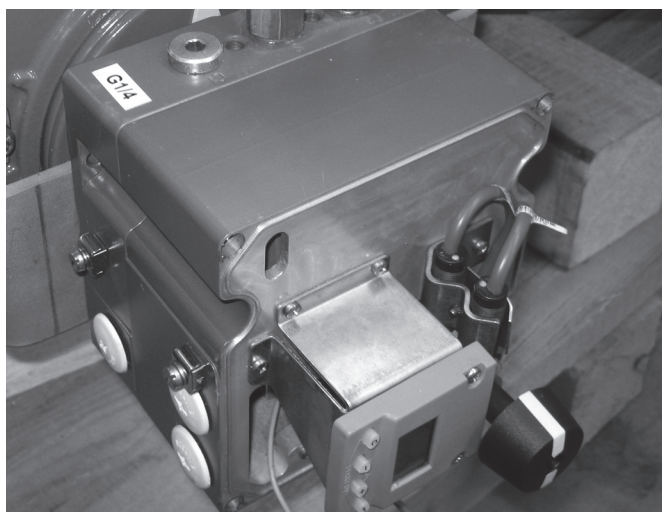


Fig. 13 The markings on the actuator conform to the position of the disc

4.4 Detaching preparation

If the actuator is mounted in a pipeline the following conditions shall be met before starting to detach the actuator:

- Ensure, that the detaching of the actuator will not cause any fault.
- Check carefully if hot medium has been flown through the pipeline and if the actuator has cooled down sufficiently, so there exists no danger because of extreme temperature.
- Ensure the flow medium of the pipeline does not cause any danger to the service technician.

Dismantling of the actuator shall be done only by qualified personnel.

4.5 Detaching

To detach the actuator, proceed in the following order:

- Ensure that the pipeline is pressureless and the mentioned valve is undocked from the process.
- Ensure the valve is in a defined position (normally closed).
- Switch off the energy supply of the actuator.
- Support the actuator with lifting ropes.
- Unbolt the screws between the bracket and the actuator. Pull the actuator carefully, vertical from the valve shaft.
- Lift and transport the actuator carefully in order to protect it from damage.

Ensure that the energy supply of the actuator is safely switched off before starting to detach the actuator.

5 Tools

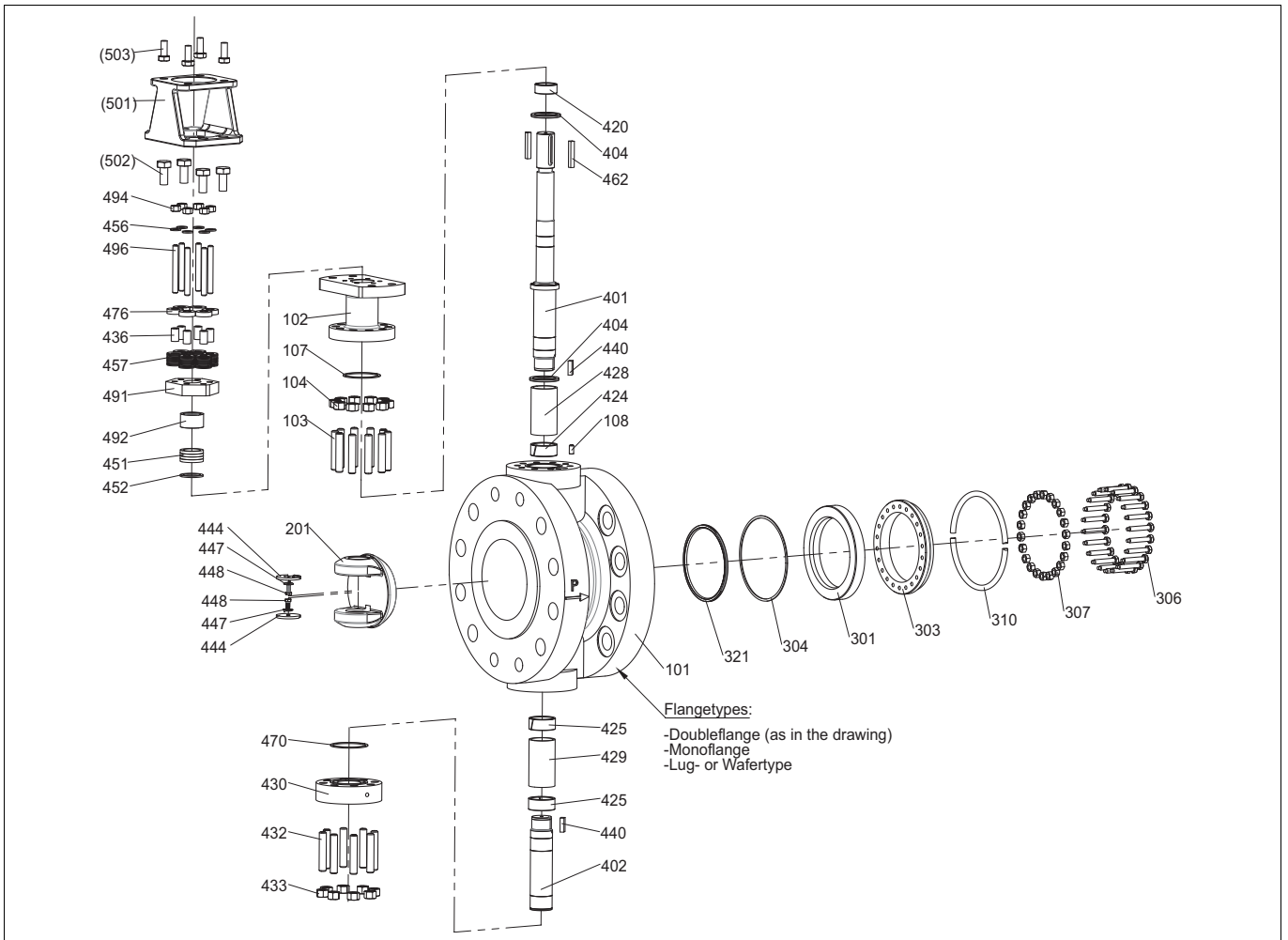
- No special tools are needed for servicing the valve.

6 Ordering spare parts

When ordering spare parts, always include the following information:

- The unique number of the valve (on the type plate – see Figure 4 – as well as additionally stamped on the valve body)
- Name of plant, date of startup
- Type code (on the type plate – see Figure 4) with information about size and pressure
- If possible, a picture of the type plate
- Number of the parts list, part number, name of part and quantity required

7 Exploded view and parts list



PARTS LIST

Part nr.	Qty.	Description	Material
101	1	Body	ASTM A217 gr. WC6
102	1	Extension	ASTM A217 gr. WC6
103	variable	Stud	ASTM A193 gr. B7
104	variable	Hexagon nut	ASTM A194 gr. 7
107	1	Seal	Graphite
108	1	Socket head set screw	A2 Stainless steel
201	1	Disc	EN 10213-1.4931+ENP
301	1	Seal ring	ASTM A182 gr. F12 cl.2
303	1	Ring	ASTM A182 gr. F12 cl.2
304	1	Seal	Graphite
306	variable	Hexagon screw	ASTM A193 gr. B7
307	variable	Hexagon nut	ASTM A194 gr. 7
310	1	Retaining ring	EN 10302-1.4923
321	1	Sealing element	EN 10302-1.4923+Ag
401	1	Drive shaft	1.4923+Al2O3/TiO2
402	1	Shaft	1.4923+Al2O3/TiO2
404	2	Thrust washer	EN 13835-0.7660
420	1	Bearing sleeve	EN 13835-0.7660
424	1	Bearing sleeve	EN 13835-0.7660
425	2	Bearing sleeve	EN 13835-0.7660
428	1	Spacer ring	AISI 304
429	1	Spacer ring	AISI 304
430	1	Cover	ASTM A182 gr. F12 cl.2
432	variable	Stud	ASTM A193 gr. B7
433	variable	Hexagon nut	ASTM A194 gr. 7
436	6	Sleeve	AISI 316
440	variable	feather key	EN 10302-1.4923
444	2	Clamp disc	AISI 316
447	2	Shim	A2 Stainless steel
448	2	Hexagon screw	ISO 3506 A2-70
451	4	Packing ring	Graphite
452	1	Anti extrusion ring	AISI 316
456	6	Washer	AISI 316
457	72	Disc spring	DIN 17222-1.8159
462	1	Feather key	EN 10302-1.4923
470	1	Seal	Graphite
476	6	Spring washer	AISI 316
491	1	Gland	AISI 316
492	1	Compression sleeve	AISI 316
494	6	Hexagon nut	ASTM A194 gr. 8M
496	6	Stud	ASTM A193 gr. B8M2 cl. 2B
501	1	Bracket	AISI 316
502	variable	Hexagon screw	ISO 3506 A2-70
503	variable	Hexagon screw	ISO 3506 A2-70

8 Troubleshooting

Valve leakage at the shut-off disc

- Never close the valve by force: irreparable damage may occur.
- Check if the energy supply is connected.
- Check if the closed position of the actuator is in accordance with the closed position of the disc.
- Check the sealing surface of the disc and the sealing element for damages. If necessary dismantle the disc.
- Check if there is foreign material between the disc and the sealing element. If necessary, remove foreign material or deposits.
- If necessary, replace the damaged parts.

For dismantling, see chapter maintenance.

Observe the notes in Chapter 10. "Cleaning and maintenance".

Escape of fluid or gas...

...at the gland packing

1. Check if the gland is still precompressed by the disc springs. Possibly the disc springs are damaged. In this case you must change them
2. If the precompression is too less you must retighten the nuts, but not up to the stop thereby the disc springs will be damaged.
3. If the precompression of the disc springs is in order then the gland packing is damaged and you must change it

Notes for dismantling are found in the chapter on maintenance.

...at the cover plate

Check to see that all cover screws are tightened well. If necessary, change the sealing.

Notes for dismantling are found in the chapter on maintenance.

9 Safety instructions

Please pay attention to the following safety instructions when doing maintenance and when operating the high performance butterfly valve:

1. For safety reasons, you are not allowed to carry out modifications to the method of operation of the butterfly valve or its actuator.
2. Only specialist personnel are allowed to carry out installation work on the high performance butterfly valve.
3. There is a danger during the functional test that the disc of the valve may move uncontrollably and suddenly due to the energy supply. Therefore, ensure that the valve can not move or tip under any circumstances during the functional test.
4. Take care during the installation of valves with the safety position "spring open". If the disc extends over the installation length of the valve, the valve must be closed before installation (pneumatically, hydraulically, etc.). Ensure in particular that the energy supply is safely secured and cannot be damaged or torn in any way during installation.
If the energy supply is suddenly interrupted, the valve opens abruptly. This can lead to severe injury and damage to materials.
5. During possible maintenance work, there is considerable risk of injury by the accidental use of the remote control. If you plan to perform remote control for the work with the valve, ensure that the energy supply of the actuator is switched off.
6. Ensure that the cleaning substance will not cause any unwanted chemical reactions in connection with possible residues in the high performance butterfly valve.
7. If you work in the area of the sealing surface of the disc, secure the latter with wooden wedges to prevent the risk of crushing. Take care that by doing this the sealing surface of the disc is not damaged.
8. If the seals are destroyed by a medium which is too hot, the medium used may leak at the shaft.

9.1 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 chucks 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.

10 Maintenance

10.1 Cleaning and maintenance interval

CAUTION:

Observe the safety precautions mentioned in Section 1.1 before maintenance!

CAUTION:

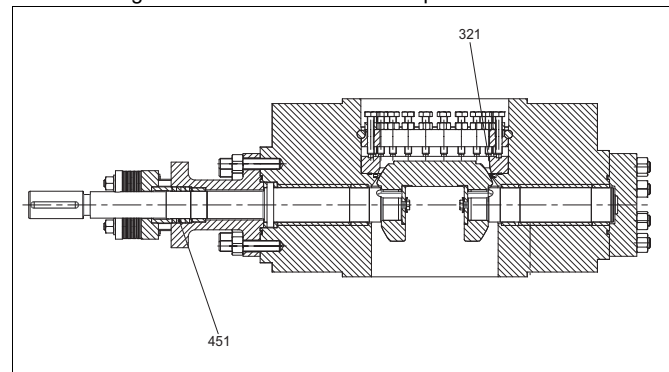
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package.

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 regularly. Please see the preventive maintenance recommendations below.

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 Neles experts. During this periodic inspection the parts detailed in the Spare Part Set(s) should be replaced.

Time in storage should be included in the inspection interval.



NOTE:

Check the valve regularly for its tightness. We recommend replacement of the metallic sealing element (321) and the packing rings (451) on demand or in critical applications after a period of two years at most, see Fig. 14.

Fig. 14 Replacement of metallic sealing element and packing rings

If the medium has contamination which could impair the tightness of the valve, the sealing surface of the disc must be cleaned regularly. Contamination can damage the sealing surface of the disc or sealing element.

Cleaning substances which could attack the sealing surface or the metallic seal shall not be used to remove residues. Use water, soap suds or other solvents as well as a soft, lint-free cloth.

CAUTION:

Never use cutting, scraping or grinding tools like files or emery paper. Do not use solvent containing substances which can cause unwanted chemical reactions with the residues of the medium or/and attack the seal.

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.

10.2 Preliminary

In order to avoid longer shutdowns during the maintenance work, suitable spare parts should be kept ready or procured in time. Take the delivery times and transportation into account.

- Ensure that the pipeline is free of pressure and free of process gases and fluids.
- Check that the valve has cooled down or warmed up to the extent that there is no longer any risk of extreme temperatures.
- Find out which medium passed through the valve when before it was dismantled from the pipeline. There could be residues in the valve. Ensure that there is no risk of poison or acid when coming into contact with the residues. Appropriate protective clothing, eye protections and respiratory protection shall be used. The operator's safety instructions must be followed.
- When installing and dismantling the valve, the valve must be closed in order to rule out damage during installation and dismounting.

10.3 Demounting

When dismantling the valve, please proceed as follows:

- Close the valve.
- If the actuator must be removed from the valve, mark the position of the actuator to the bracket and to the body with a permanent marker before dismantling (see Figure 15). In this way, you can find the right position of the actuator when re-mounting, and it cannot trigger a malfunction.

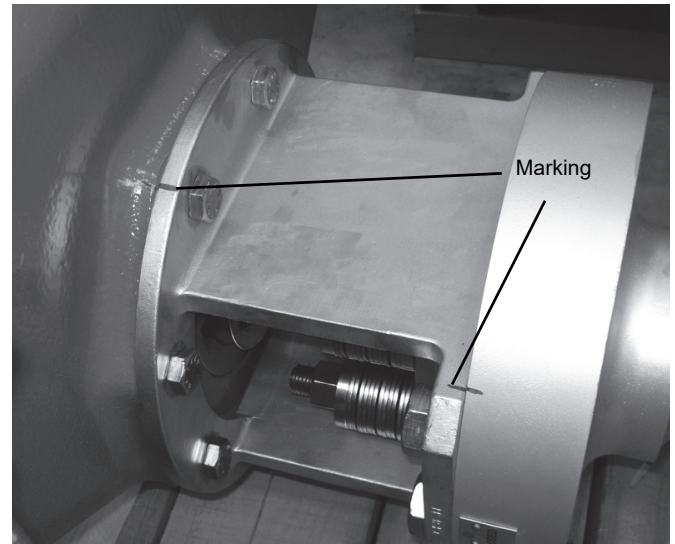


Fig. 15 Marking the position of the actuator

- **Switch off the power supply of the actuator.**

Dismount the actuator. For further instructions, see Section 4.5 in this IMO.

- Support the valve with lifting ropes. Put the lifting ropes on the body (not on the shaft) of the valve.
- Remove the valve by loosening the screws or nuts (opposite to each other) crosswise.
- Transport the valve in such a way that it cannot move or be damaged during transportation.

10.4 Reassembly

To re-install the disc valve please proceed as follows:

- Close the disc valve.
- Make sure the marking at the actuator shaft is in line with the marking on the body when reinstalling the valve (see Figure 16).
- There is a marking at the end of the actuator shaft and on the shaft extension of the valve. The marking at the actuator shaft must be in line with the marking on the body when re-installing the valve.
- When the markings are aligned, the valve is closed

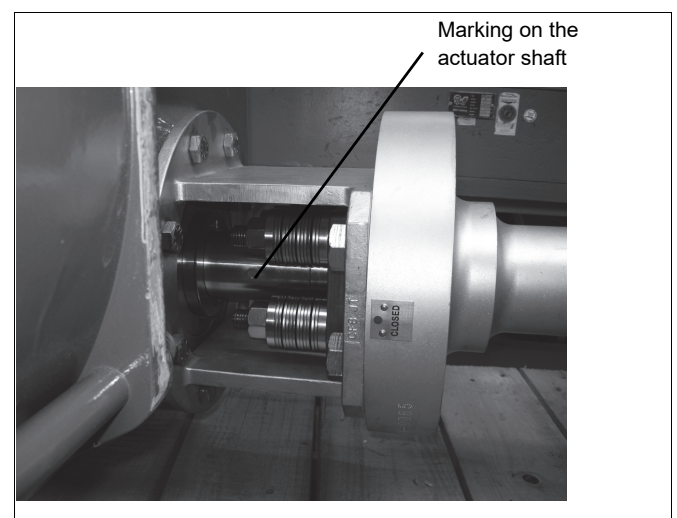


Fig. 16 Installation markings

- Put the actuator in the closed position.
- Ensure that the actuator is placed in the correct position on the actuator shaft by using the marking made on the bracket and the actuator when the valve was dismantled (see Chapter 4). The alignment shall be as exact as possible for all components (body –

bridge – actuator). Use the same marking for this that you made on the bracket and on the actuator when you dismantled the valve, and ensure as exact alignment of all parts (body – bridge – actuator) as is possible (see Chapter 4)

- Install the butterfly valve to the pipeline (see Chapter 3).

10.5 Replacement of the metallic seat ring

Please proceed as follows:

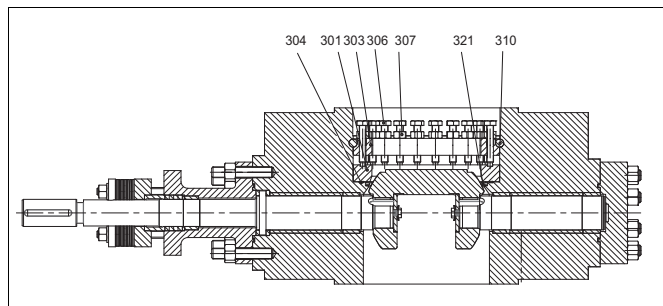


Fig. 17 Replacement of the metallic seat ring

Demount the valve in its CLOSED position (see Figure 17). For further instructions, see Section 4.5 of this IMO.

1. Secure the valve on a solid base or workbench so that it cannot slip or tip.

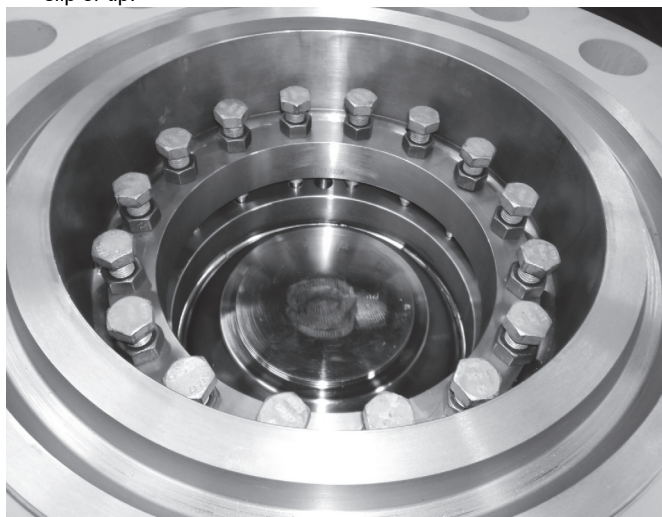


Fig. 18 Valve in CLOSED position

2. Loosen the hexagon-head screws (306) (see Figure 19).

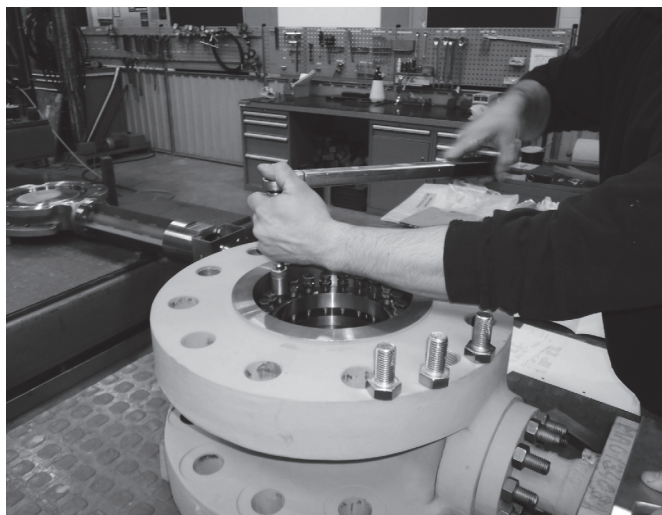


Fig. 19 Loosen the screws (306)

3. Demount the retaining ring (310) (see Figure 20).



Fig. 20 Demount the retaining ring (310)

4. Remove the rings (301, 303) and the sealing (304). (see Figures 21 - 23)



Fig. 21 Remove the outer seal lock ring (303)



Fig. 22 Remove the inner seal lock ring (301)



Fig. 23 Remove the sealing ring (304)

5. Now you can remove the metallic seat ring (321) (see Figure 24).



Fig. 24 Replace the metallic seat ring (321)

6. Before replacing the metallic seat ring and the sealing the parts shall be cleaned thoroughly.
7. Before reassembly check all parts for traces of wear. Use Molykote BR2 for the hexagon-head screws on the top and on the thread of the screws. (see Figure 25 - 26)



Fig. 25 Lubricate the screws with Molykote

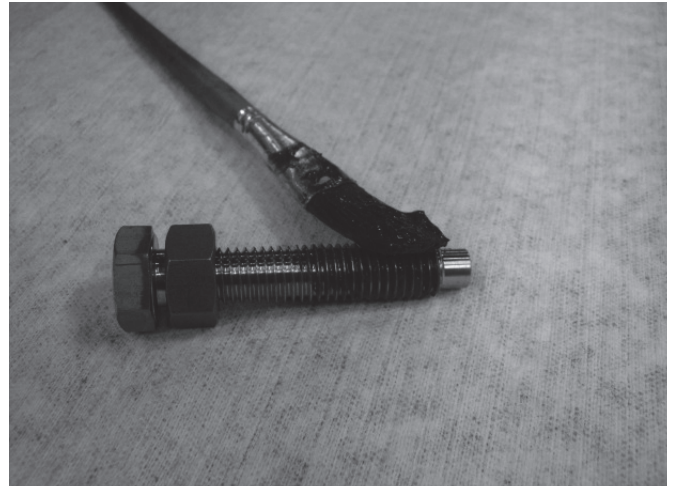


Fig. 26 Lubricate the screws with Molykote

8. Check the high performance butterfly valve for its tightness before reinstallation. Instruction can be in Section 3.3 "Installation".

10.6 Replacing worn parts

In order to replace worn parts, proceed as follows:

See Figures 27-33, the corresponding part numbers being within brackets.

1. Remove the actuator and the adapter (501) by loosening the hexagon-head screws (502, 503).
2. Demount the metallic seat ring (321) as shown in Section 12.5.
3. Swivel the disc 180° to have free access to the clamping discs (444) and the retaining plates (447).
4. Demount the cover (430) on the backside of the valve. Now you can remove the sealing (470) and the shaft (402).
5. On the front side (actuator side), remove the gland (491) and the packing rings (451).
6. Demount the shaft extension (102).
7. Remove the sealing (107) and the actuator shaft. (401).

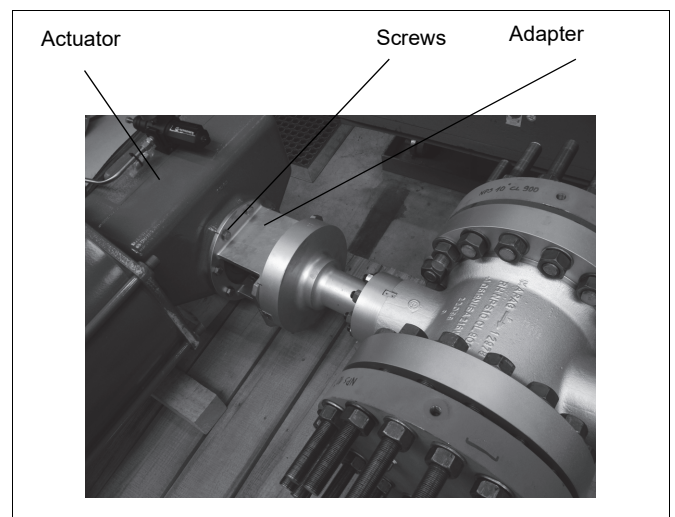


Fig. 27 Remove the actuator

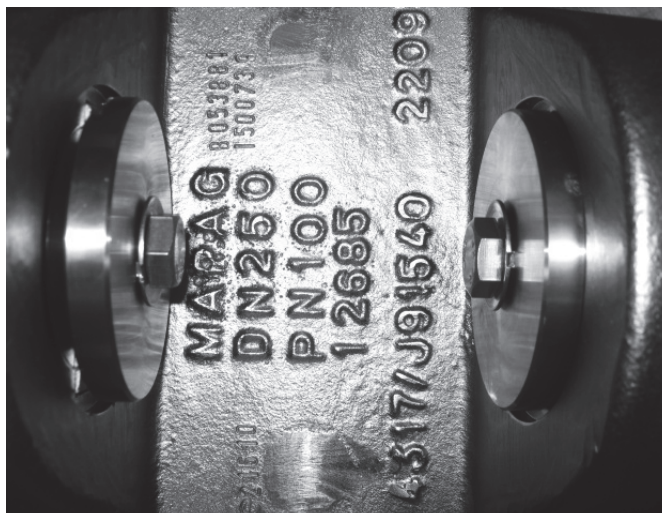


Fig. 28 Disc backside

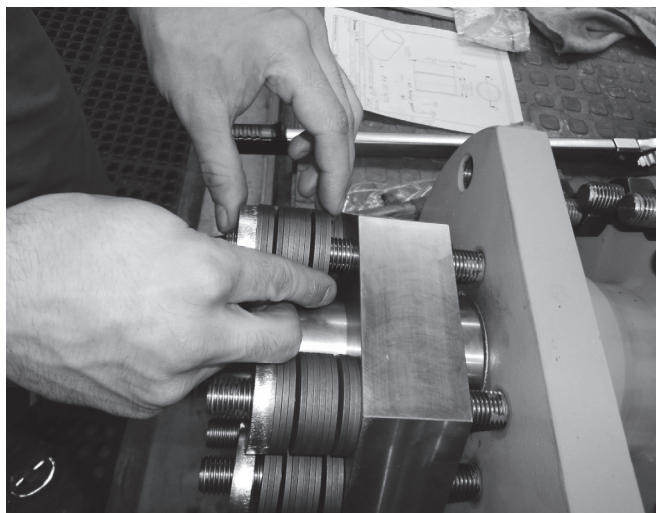


Fig. 31 Remove the gland and the packing ring (491, 451)

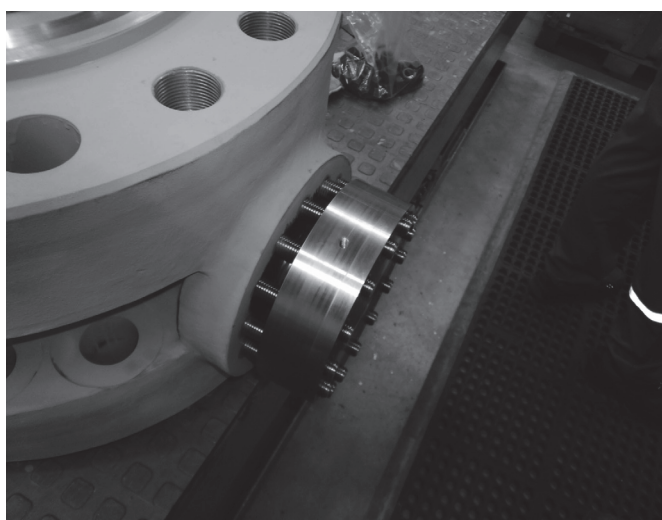


Fig. 29 Remove the cover (430)



Fig. 32 Remove the extension (102)

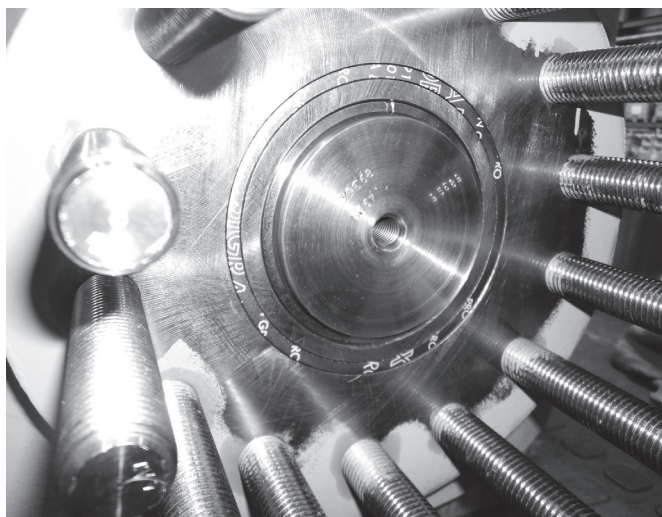


Fig. 30 Remove the sealing ring (470)

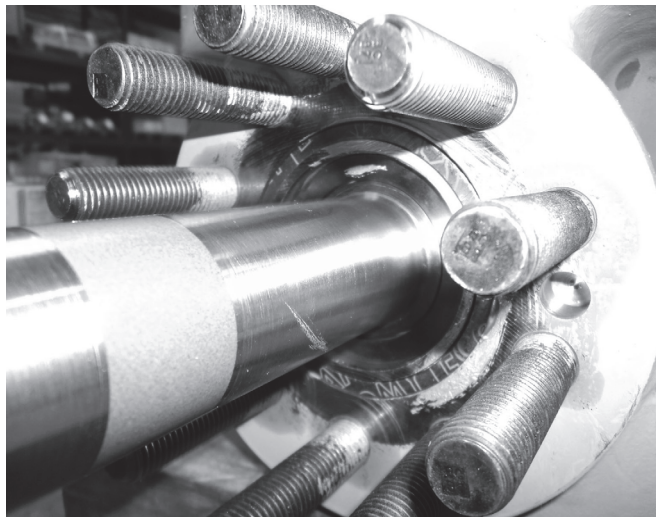


Fig. 33 Remove the sealing ring and the actuator shaft (107, 401)

Now the following parts can be changed with the recommended spare part sets:

Table 4 Spare part sets

Quantity / Valve	Description	Contents
1x	Set 1 (Soft parts)	Pos. 107, 451, 470
1x	Set 2 (Sealing)	Pos. 321, 404, 424, 425, 447, 456, 457 304, 420, 452, 476
1x	Set 3 (Heavy overhaul)	Pos. 201, 401, 402 301, 303, 310, 491, 440, 462, 492

8. All parts must be cleaned accurately before reassembly.
9. Check the shafts for wear. It is recommended to replace the shafts if any grooves or other damage is found.
10. The reassembly takes place in reverse order. To avoid damage to the seals, install the bearing bushings (420, 424, 425) with extreme care.
11. Tighten the cover screws (103, 432) using a suitable torque wrench for the given torques, in compliance with Section 10.8.
12. Check the high performance butterfly valve for its tightness before reinstallation. The instructions for installation can be found in Section 3.3 Installation.

10.7 Replacing the gland packing

CAUTION:

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

Pre-compressed graphite rings are used as a standard gland packing. The packing construction is live loaded as standard.

The graphite packing (451) shall be changed if leakage occurs even after the hexagon nuts (494) have been tightened as recommended.

- Make sure the valve is not pressurized.
- Unfasten the nuts (494) and remove the washer (456), the spring washer (476), the disc springs (457), the sleeve (436), the gland (491) and the compression ring (492).
- Remove old packing rings (451). Do not damage the surface of the packing ring counterbore and shaft. It is not necessary to change the anti-extrusion ring (452).
- Clean the gland and packing ring counterbore. Install new set of graphite packing. Slip the rings onto the shaft. Ensure that there are no burrs in the keyway groove which could damage the packing. Position the cut ends of the graphite rings at 90° angle to each other.
- Mount the compression ring.
- Install the gland.
- Put the sleeves on the studs.
- Mount the disc springs according Figure 34.
- Put the spring washers on top.
- Add the washers.
- Place the nuts on the washer.
- Compress the gland packing by tightening the nuts crosswise with a torque wrench until the disc springs have a value of compression ($h_1 - h_2$) as in Table 5.
- Carry out 3-5 operation cycles with the valve. Suitable range of movement is about 80 %. It is not necessary to fully close or open the valve during operation.
- Re-tighten the nuts with a torque wrench until the disc springs have a value of compression ($h_1 - h_2$) as in Table 5 if necessary.

If leakage still occurs when the valve is pressurized, re-tighten the nuts but do not exceed the value of compression ($h_1 - h_2$) in Table 5 by 50 % or do not fully compress the disc springs.

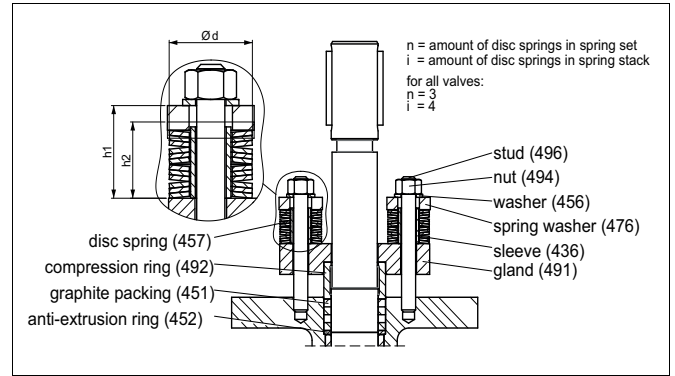


Fig. 34 Gland packing

Table 5 Tightening of gland packing

Shaft diameter at packing [mm]	Body class	Stud	Spring outside diameter d [mm]	Compression h1-h2 [mm]	Height uncompressed h1 [mm]	Height compressed h2 [mm]			
30	900, 1500	M12	35.5	1.6	37.2	35.6			
	2500			2.1		35.1			
35	900, 1500			1.6		37.2	35.6		
	2500			2.1			35.1		
40	900, 1500			M16		45	1.7	44	35.5
	2500						2.2		35
45	900, 1500	2.1	44		41.9				
	2500	2.9			41.1				
50	900, 1500	2.4			44		41.6		
	2500	2.9					41.1		
55	900, 1500	2.4		44		41.6			
	2500	3.2				40.8			
65	900, 1500	M20	50			2.3	50.4	48.1	
	2500					2.7		47.7	
70	900, 1500				2.3	50.4		48.1	
	2500				2.9			47.5	
75	900, 1500			2.3	50.4			48.1	
	2500			3				47.4	
85	900, 1500	2.6	50.4	47.8					
	2500	3.5		46.9					
95	900, 1500	M30		71		3.4	69.4	66	
	2500					4.5		64.9	
105	900, 1500				3.7	69.4		65.7	
	2500				4.9			64.5	
120	900, 1500		4.2		69.4			65.2	
	2500		4.7					64.7	

10.8 Valve screws – Clamping torque

Permissible clamping torque for screws of category A193 Gr. B7(M) and A193 Gr. B8M2 with standard metric thread, according to DIN 13. The values are only valid for standard configuration.

Table 6 Clamping torque, for standard configuration only

Thread	Cover tube & cover plate		Sealing element	
	Clamping torque / Nm	Preload force / N	Clamping torque / Nm	Preload force / N
M8x1,25	15	9900	21	14000
M10x1,5	29	15400	41	22000
M12x1,75	51	22900	72	32500
M16x2	123	42100	175	60000
M20x2,5	240	65900	340	94000
M24x3	416	95000	590	125500
M30x3,5	830	151000	1180	215700
M36x4	1440	220000	2050	314000
M42x4,5	2300	303000	3250	432800
M48x5	3450	396000	4900	565700
M56x5,5	5500	545000	7800	778500

11 Type code

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	/	/	13.	14.
	BW	3	G/D	1	B	56	P	N2	N1	N1	G3				

1. sign	
-	

2. sign	PRODUCT SERIES / DESIGN
BW	Metal seated butterfly valve, triple eccentric available as Double flanged, Lug, Wafer or Butt weld end type.

3. sign	BODY CONSTRUCTION
2	Flanged, long pattern
3	Flanged, short pattern
4	Lug or Mono flange or single flange
6	Wafer
7	No Entry + Butt Weld ends
8	Top entry, Side Access + Butt Weld ends
9	Top entry, Top Access + Butt Weld ends
Y	Special, to be specified

4. sign Body	BODY PRESSURE RATING	4. sign Trim	TRIM PRESSURE RATING Use trim rating e.g. /C if not full rated
C	ASME class 150	/C	ASME class 150
D	ASME class 300	/D	ASME class 300
F	ASME class 600	/F	ASME class 600
G	ASME class 900	/G	ASME class 900
H	ASME class 1500	/C	ASME class 150
H	ASME class 1500	/H	ASME class 1500
I	ASME class 2500	/I	ASME class 2500

BW1H/F...-> full rated body #1500, de-rated trim #600. Corresponding PN pressure classes also available.

5. sign	SEAT DESIGN
1	U-Type Metal seat with coating (sign 11). Max tightness in preferred direction API 598 or FCI 70.2 cl V (std), FCI 70.2 cl VI (optional), EN12266 Rate B. Non-preferred direction, FCI 70.2 cl V (Air).
2	Double seat, metal + soft (Tmax limited by soft seat). Max tightness in preferred direction, API 598, FCI 70.2 cl VI, EN12266 Rate A. Non-preferred direction, FCI 70.2 cl VI (Air). Max pressure 100 bar.
4	Double seat on valve body + leak off connection between the seat. Max tightness in preferred direction, API 598. Max tightness in non-preferred direction, FCI 70.2 cl VI (Air).
8	Solid proof. One sealing ring on the disc + seat on the body. Max tightness in preferred direction, API 598, FCI 70.2 cl V. Max tightness in non-preferred direction, 100 x FCI 70.2 cl V (Air).
Y	Special construction.

6. sign	BEARING AND BODY DESIGN
A	Soft bearings, PTFE or eq. on metal net Tmax 250 °C, trim rating max #600.
B	Metallic or carbon bearings for high temperature. (e.g. GGG-CrNi or stellite or high performance carbon bearings). Tmax 500 °C.
H	Metallic or carbon bearings for high temperature. (e.g. GGG-CrNi or stellite or high performance carbon bearings). Temp: 500-850 °C.
HH	H + cooling ribbons. (e.g. GGG-CrNi or stellite or high performance carbon bearings) cooling ribbons. Temp: 850-1150 °C.
S	Construction B + Steam jacket.
Y	Special construction.

For NACE, add "N" to sign. 6 "B" -> "BN"

7. sign	SIZE Note: Pressure rating = ASME -> inch sizes Pressure rating = PN -> metric sizes
BW	Inch: 04, 06, 08, 10, 12, 14, 16, 18, 20, 24, 28, 30, 32, 36, 38, 40, 42, 48, 52, 54, 56, 60, 64, bigger sizes on request Metric: 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1500, 1600

NOTE:

- The factory will keep the right to change the material if the material is same e.g. from casting to forged
- With slash "/" the materials are double marked

8. sign	BODY	9. sign	DISC	10. sign	SHAFT, PINS AND KEY
P	ASTM A216 WCB/ 1.0619	N2	ASTM A487 CA6NM (similar to 1.4317)	N2	1.4021 (-10 °C to +400 °C)
F	ASTM A352 LCC	G5	1.4931	N1	1.4923
N	ASTM A217 WC6	N	ASTM A217 WC6	C	ASTM SA564 Gr. 630(17-4PH)
U	ASTM A351 CK3MCuN (SM0254)	U	ASTM A351 CK3MCuN (SM0254)	U	UNS31254 (SM0254)
U2	ASTM A890 4A (similar to 1.4517)	U2	ASTM A890 4A (similar to 1.4517)		
U3	ASTM A890 GR. 5A (similar to 1.4469)	U3	ASTM A890 5A (similar to 1.4469)		
		G9	1.4923	K5	1.4462
G				G	1.4313 (similar to A487 CA6NM)
				N	XM-19 (Nitronic 50 HS)
A	ASTM A351 CF8M / 1.4408	A	ASTM A351 CF8M eq. AISI 316/1.4408	C2	Gr. 660/1.4980 (pressure class 900 and above)
A2	ASTM A351 CF3M (AISI316L)	A4	ASTM A351 CF8C eq. AISI 347/1.4552	C3	1.4980 (-200 °C to + 815 °C)
		C2	ASTM A638 Gr. 660 (similar to 1.4980)		
				A	F316
		A2	ASTM A351 CF3M eq. AISI316L		
H	ASTM A494 CW-6M (Hastelloy C)	H	ASTM A494 CW-6M (Hastelloy C)	H1	HAST C
T	Titanium	T	Titanium	T	Titanium

NOTE: Check the recommend material combination from the Factory

NOTE: The list of materials have been shortened due to space limitations. Please consult Valmet to find the availability of other materials.

11. sign	SEAT MATERIAL
	Ferritic/Martensic
C	U-shape, 1.4923 or eq. + silver coated (disc ENP - Ni-coated) T = -200 °C... + 850 °C
C2	U-shape, A564 Gr 630 H1150M (17-4PH) /1.4542 + silver coated (disc ENP - Ni-coated) T = -30 °C... + 325 °C
	Austenitic
A	U-shape, 1.4980 or eq. + silver coated T = -200 °C... + 850 °C. If sign 6 includes NACE -> ASTM A638 gr. 660 is used.
A1	U-shape, 1.4980 or eq. + silver coated (disc HCr coated) T = -200 °C... + 400 °C.
	Other SEAT MATERIAL
S	Stellite/stellited sealing + stellited sealing surface, disc ENP - Ni-coated
Y	Special, to be specified

12. sign	PACKING CONSTRUCTION
T3	Live loaded PTFE packing
T2	Live loaded PTFE double packing with one 1/4" NPT leak off connection for shaft seal
G3	Live loaded graphite packing. Inherently firesafe.
G2	Live loaded graphite double packing with one 1/4" NPT leak off connection for shaft seal. Inherently firesafe.
Y	Special, to be specified

13. sign	SURFACE FINISH FOR PIPE FLANGE FACE
-	Ra 3.2 - 6.3, standard, without sign cover: EN 1092-1 Type B1 (Ra 3.2 - 12.5) ASME B16.5, Ra 3.2 - 6.3 (125 - 250 µm) DIN 2526 Form E (Ra 4)

14. sign	SPECIAL FLANGE FACING TYPES/FORMS always check suitability from factory
05	Ring Joint
06	DIN EN 1092-1 Form F (tongue)
16	ANSI B16.5 Large Tongue (Ra 3.2)
Y	Special, to be specified

15. sign	FLANGE A sign for flange code needed, always check suitability from factory
-	Without sign according to valve body pressure rating ASME B 16.47 Series A #150 - 600, size 26" -60", #900 size max 48".
B	ASME 16.47 Series B (size 26" and bigger)
J	PN 10
K	PN 16
L	PN25
M	PN40
N	PN63
P	PN100
R10	JIS 10K (14 bar)
R16	JIS 16K (27 bar)
R20	JIS 20K (34 bar)
R30	JIS 30K (50 bar)
R40	JIS 40K (66 bar)
R63	JIS 63K (105 bar)
Y	Special, to be specified

16. sign	Additional options
G1	1 grounding device NOTE: if the valve construction contains intrinsical grounding feature (graphite packing or conductive bearings) no additional grounding device is needed (e.g. for ATEX)
G2	2 independent grounding devices NOTE: if the valve construction contains intrinsical grounding features (graphite packing and conductive bearings) no additional grounding device is needed (e.g. for ATEX)

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