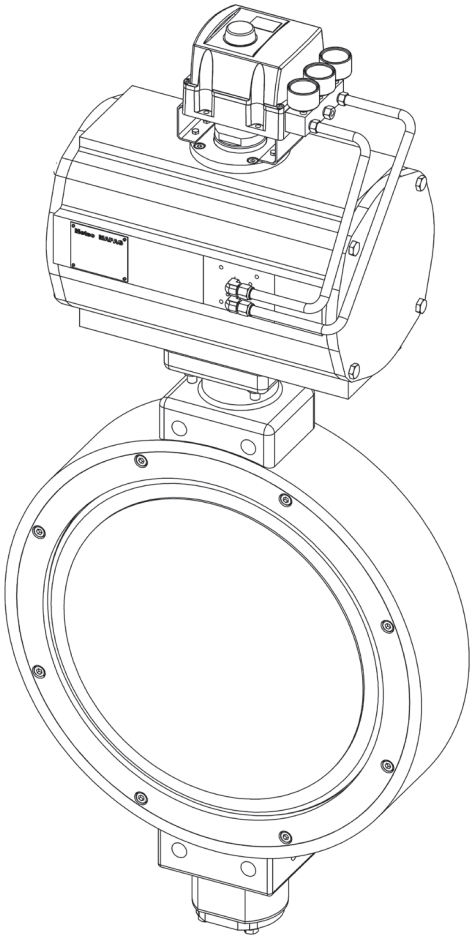
# Neles ™ high performance butterfly valve

## Series BO

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

These instructions provide the customer/operator with important information in addition to the customer/operator's normal operation and maintenance procedures. Since operation and maintenance philosophies vary, Valmet does not attempt to dictate specific procedures, but to provide basic limitations and requirements created by the type of equipment provided.

These instructions assume that operators already have a general understanding of the requirements for safe operation of mechanical and electrical equipment in potentially hazardous environments. Therefore, these instructions should be interpreted as applied in conjunction with the safety rules and regulations applicable at the site and the particular requirements for operation of other equipment at the site.

These instructions do not intend to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired, or should particular problems arise which are not covered sufficiently for the customer/operator's purposes the matter should be referred to Valmet.

The rights, obligations and liabilities of Valmet and the customer/operator are strictly limited to those expressly provided in the contract relating to the supply of the equipment. No additional representations or warranties by Valmet regarding the equipment or its use are given or implied by the issue of these instructions.

These instructions contain proprietary information of Valmet and are furnished to the customer/operator solely to assist in the installation, testing, operation and/or maintenance of the equipment described. This document shall not be reproduced in whole or in part nor shall its contents be disclosed to any third party without the written approval of Valmet.

## 1.1 Safety precautions

**CAUTION:**
**Never exceed the performance limits of the valve!**
Exceeding the limits indicated on the Identification plate of the valve may lead to damage and uncontrolled release of pressure.
It may lead to injury to persons and damage to property.

**CAUTION:**
**A valve under pressure may neither be opened nor removed from the pipeline!**
Opening or dismantling valve under pressure will inevitably lead to uncontrolled release of pressure.
Before dismantling the valve, the relevant pipeline section should be shut off, the valve made pressure less and the medium removed. Please consider the properties of the existing medium.
People and environment must be protected sufficiently against dangerous and poisonous substances.
Ensure that no medium can get into that pipeline section during maintenance work on the valve.
Errors during these precautionary measures may lead to injury to persons and damage to property.

**CAUTION:**
**Take note of the cutting action of the valve disc!**
Keep hands, other parts of the body, tools and other objects far away from the opening.
Do not leave any objects inside the pipeline.
If the valve is actuated, the valve disc acts as a cutting device.
The position of the valve disc can change even when the body is moved.
Before starting work on the valve, the supply air pipes of the actuator must be shut off and released.
Errors here may lead to injury to persons and damage to property.

**CAUTION:**
**Take note of the noise emissions!**
The valve can produce noise in the pipeline.
The sound level depends on the type of application.
The sound level can be calculated in advance using Valmet Flow Control Nelprof computer program.
Please follow the occupational safety regulations applicable to noise emissions.

**CAUTION:**
**If you lift the valve or valve unit using a crane, consider the weight!**
The valve or the valve unit may never be raised at the actuator, positioner, end switch and their piping.
Place the lifting device securely around the valve body.
Falling parts may lead to injuries and damage to property.
Exercise caution while lifting: the valve can rotate!

## 1.2 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 ASME Boiler and Pressure Vessel Code Section IX or other appropriate regulation.

**CAUTION:**
To prevent damage to the seat and seals, do not allow the temperature of the seat and body seal area to exceed 94°C (200°F) It is recommended that thermal chalks be used to check the temperature in these areas during welding.

**CAUTION:**
Ensure that any weld splatter does not fall onto the valve closing members e.g. ball, disc or seats. This may damage critical seating surfaces and cause leaks.

## 1.3 Warnings and safety notes

**NOTE:**
Each chapter of the following IMO contains individual warnings, notes and safety instructions which are highlighted by ⚠ that must be followed and respected without exception.

## 1.4 General disclaimers

**NOTE:**
Please read and follow the instructions and notes on the general disclaimers of liability for the receipt of goods, storage, handling, operation and maintenance of the valve at the end of this IMO.

# 2. PRODUCT & FUNCTION DESCRIPTION

High Performance Butterfly Valve Type BO; a single eccentric disc to shut off pipes and regulate the flow; soft-seated.

**Body types:**

- Type wafer

**Nominal sizes:**

- DN 200 … DN 900
- NPS 8 … NPS 36

**Pressure rating**

- PN10
- ASME Cl 150
- Operating pressure: max 2 bar

**Operating Temperature range:**

- Standard. operating temperature: -10°C … +130°C
- Long term storage temperature: -20°C … +80°C
- Environment temperature: -20°C … +80°C

**Functional description:**

The High Performance Butterfly Valve Type BO has been designed especially for deployment in pressure-changing systems for oxygen production, where it is required to operate under extreme demanding conditions due to the high cycle-related peak tightness requirements. The shut-off disc is made of aluminum to minimize the disc inertia and give the valve extremely short opening and closing times. An elastic sealing ring has been chosen as the sealing element.

The actuator force will be transmitted to the drive shaft as well as to the disc, by means of fatigue-resistant feather key connections.

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

The notch on the actuator shaft indicates the current position of the shut-off disc in the valve. The valve closes clockwise.

## 2.1 Intended use

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

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

If the process parameter is exceeded, it can lead to damage of the valve. The damaged parts must be changed immediately.

The pipeline and used medium 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 will take no liability for structural modifications carried out without the corporation’s explicit consent. Use original spare parts only.

Spare parts should be installed by Valmet service personnel. The specific spare parts can be found in Chapter 8.

Assembly work shall be handled only by qualified personnel.

Valmet does not assume any liability for structural modifications that are undertaken without specific approval by Valmet.

Use original spare parts only. These are to be installed by Valmet’s service personnel.

# 3. TRANSPORTATION, RECEPTION AND STORAGE

## 3.1 Scope of delivery

The BO valve typically is delivered completely along with a pneumatic actuator, equipped with positioner/solenoid valve and instrumentation.

## 3.2 Reception

Prior to leaving Valmet factory, the BO valve has been checked by our quality assurance department for seal-tightness and function and set for operation according to the job-related documents.

Check the valve including accessories for shipping damage. Prior to installation, the valve is to be carefully stored in a dry roofed room.

- Storage temperature = -20° to 80 °C
- Relative humidity 85% max. (non-condensing)

The valve must be warehoused with the factory-mounted covers.

The valve should be transported on-site only a short while before the installation. The covers on the openings are to be removed for installing the valve.

Avoid any dust, water or other contamination of the valve internals during final assembly at construction site.

The valve is delivered in closed position. A valve with an actuator and a spring retainer is delivered in the position set by the spring (spring opens or closes).

Further storage instruction can be found in M-1147-En.

## 3.3 Lifting

Depending on the size and weight of the valve, you will require a suitable lifting equipment. The valve is equipped with special lifting threads in the body. The use of ball-bearing sling swivel is recommended:

**Consider the weight of the entire unit (valve and actuator).**
**Lifting must only be carried out by trained and authorized personnel.**
**In horizontal transport position see pictures figure 3.**

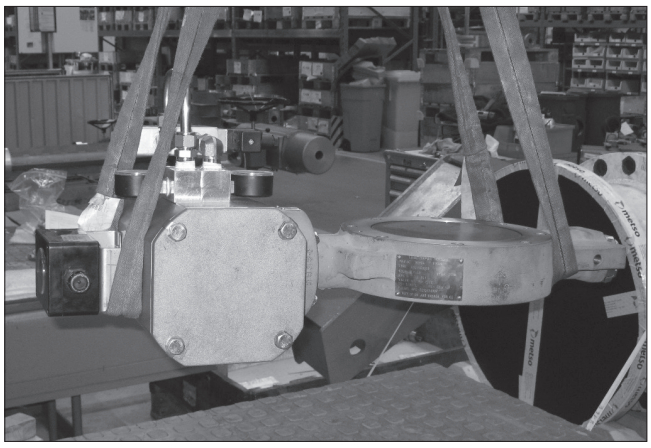


Fig. 1 Lifting

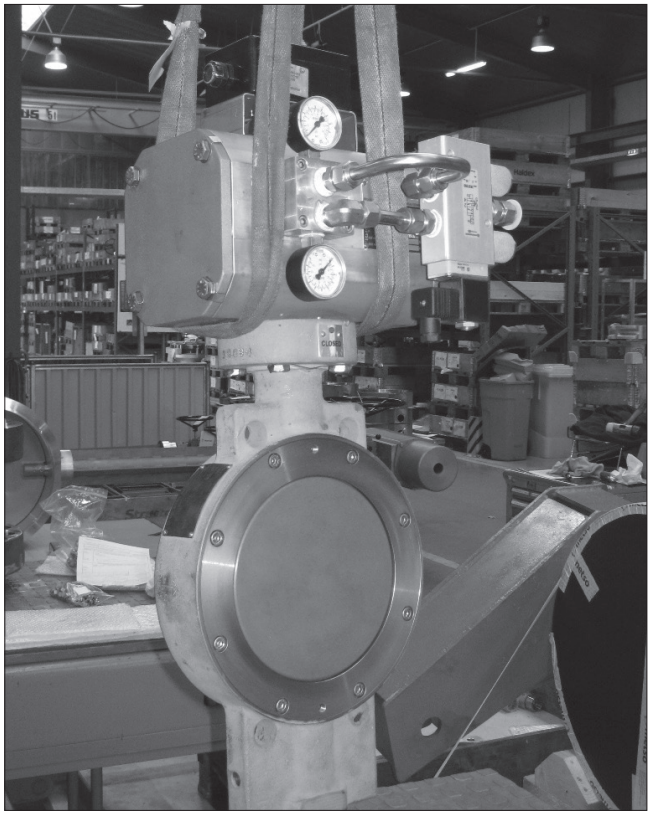


Fig. 2 Horizontal lifting for transport

## 3.4 Visual inspection

Check the valve for its function before installation. Please proceed as follows:

Visual inspection – are all screws properly tightened?

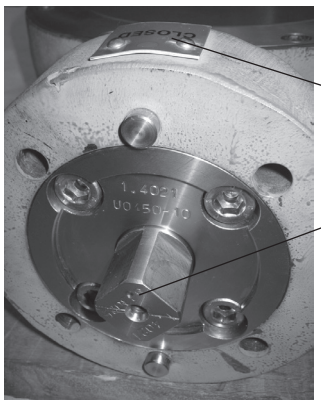
Visual inspection for damage to following components:

- Disc
- Drive shaft
- Actuator and instrumentation
- Piping and tubing
- Gland packing
- Seat and seat surface (if applicable)

**The BO valve may show uncontrolled movements during the functional test.**

**During operation of the valve: do to grab into the valve und any circumstances.**
**There is a high risk of serious hand and finger injuries.**

- Connect the power supply now. Re-assure yourself that the actuator opens into the correct direction of flow.
- Test the function of the valve. Allow the valve to open and close 2…3 times. The stop of the drive ensures that the disc cannot be turned beyond the factory-set closed position.
- Disconnect the energy supply after the functional test.
- If the valve does not work flawlessly in the functional test, please contact our qualified personnel.
  Indications for this may be:
- The valve does not move, moves too slowly or not uniformly.
- Unusual running noise can be heard.
- The disc does not move completely into the seated position.
- The disc does not open completely.



## 3.5 Marking and identification

The valve data are shown on the identification plate attached to the valve body neck.

In the service case, the factory number (Serial No.) is the one that uniquely designates the valve. This number is also attached to the body in case the identification plate can no longer be found.


Fig. 3 Identification plate and pressure/flow direction

### Further information:

| | | |
|---|---|---|
| Job no. | = | job number at Valmet Flow Control |
| Serial-No | = | unique fabrication number |
| Type | = | Type code of the valve |
| BODY | = | body material |
| YEAR | = | Year of manufacture |
| NPS or DN | = | Size [inch] or [mm] |
| CL or PN | = | Pressure class |
| PS | = | Operating pressure of the valve |
| Tag no. | = | Valve and fittings number |
| TS. | = | Operating temperature range of the valve in °C (medium) |
| P.O.No. | = | Order number of the customer / consignment number |
| FREE OF OIL AND GREASE FOR $O_2$ | | suitable for use in oxygen applications |

## 3.6 Atex and CE marking

The valve fulfills the requirements of the European Directive 2014/68/EU regarding pressure-related equipment and is marked according to this directive.

The CE sign is displayed on the identification plate (see Figure 3: identification plate).

## 3.7 Contact

Please contact your local Valmet partner.
You will find the contact information on the internet at:
**www.valmet.com/flowcontrol/valves/**

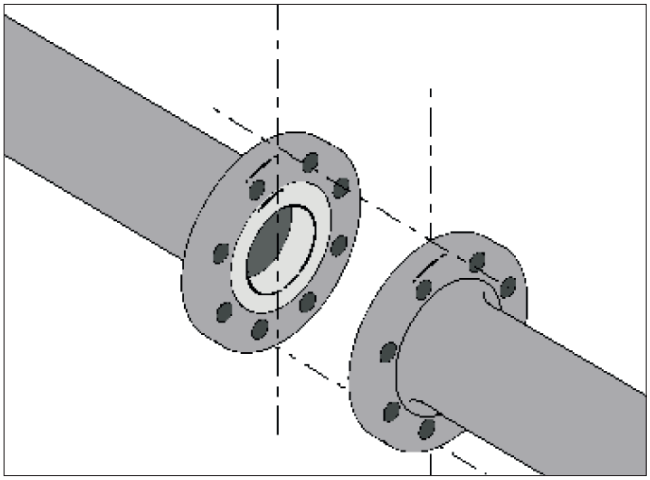
# 4. INSTALLATION

Assembly work at the BO valve shall only be carried out by qualified and Valmet certificated personnel!

## 4.1 Installation planning

Consider following aspects before assembly:

- Valve must be installed to allow free access to the actuator at any time.
- Actuators must be connected to the energy supply only after installing the valve.
- Do not correct pipeline misalignment or wrong installation space with flange bolts or external lateral force.
- The flange holes of both pipeline ends must be exactly aligned axially with each other.



- The sealing surfaces of the opposite flanges must be parallel to each other. The flange holes may not be distorted from one another, so that the valve is not exposed to any stresses during assembly.
- The pipeline must be suitably supported to safely support the weight of the valve and actuator and to avoid vibration during operation.

## 4.2 Preliminary

Prior to installation, ensure that the pipelines are free from any contamination and debris. Any contamination, such as welding spots, rust or dirt can impair the seal-tightness of the valve and damage the sealing surface of the disc or the seat.

This applies especially to the assembly of valves in the new installations. Even during operation, the medium may not carry any contamination that can deposit in the seat area.

Valves used in oxygen applications are delivered OIL AND GREASE FREE with very clean wetted surface conditions regarding any kind of hydrocarbons. There must be no use of any oil and grease usage during installation at any part of the valve!
Also do not touch the wetted of the valve without clean and dry gloves.

Lifting gear is required for installing larger valves in the piping. The weight of the valve including the actuator can be found in the job-related documentation.

## 4.3 Installation

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

**CAUTION:**
Note the weight of the valve or the entire actuator unit while handling!
The actuator must not be detached from the valve if the pipeline is under pressure as a consequence of a dynamic torque!

**CAUTION:**
When handling the valve or the valve package as a whole, consider the weight of the valve or the entire valve package.

**NOTE:**
Before detaching the actuator, note the mounting position and opening angle of the valve with respect to actuator and positioner/ limit switch so that the correct function is maintained in the following assembly.

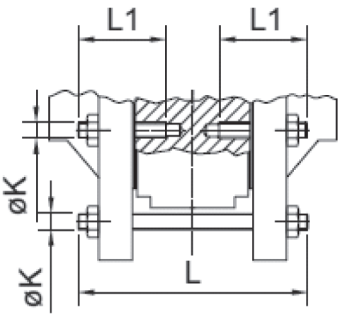
You must install the actuator, to allow free access to it any time. This especially applies also to a possible “emergency stop” operation by hand.

Proceed as follows for installing the valve:

- Ensure that the pipeline is clean and without debris.
- Turn the valve in such a manner that the arrow (P for pressure) on the body points to the pressure direction of the process.


Fig. 4 Marking of flow- and pressure direction

- Close the valve for the assembly.
- Note the minimum inner diameter of the pipeline is in accordance with ASME B36.10M, ASME B36.19M and / or DIN EN 10305-2 and DIN EN 10305-5.
- Fix the valve in the pipeline. Check that the valve orientation is correct, and the extension is positioned to the correct angle.
- Insert on both sides of the valve, between the valve body and the opposite flanges, a flange gasket in accordance with your operating conditions. These gaskets are not included in the standard scope of delivery. We deliver the desired gaskets on request.
- Piping bolt dimensions and amounts can be found in the following tables.




**Stud bolt dimensions type BO - Class 150**

| NPS | thread K | L | | L1 | |
|---|---|---|---|---|---|
| | | length | quantity | length | quantity |
| **8** | 3/4"-9UNC | 180 | 8 | | |
| **10** | 7/8"-9UNC | 195 | 12 | | |
| **12** | 7/8"-9UNC | 205 | 12 | | |
| **14** | 1”-8UN | 230 | 8 | 95 | 8 |
| **16** | 1"-8UN | 245 | 16 | | |
| **18** | 1 1/8"-8UN | 260 | 12 | 115 | 8 |
| **20** | 1 1/8"-8UN | 290 | 16 | 120 | 8 |
| **24** | 1 1/4"-8UN | 330 | 16 | 130 | 8 |
| **28** | 1 1/4"-8UN | 390 | 24 | 160 | 8 |
| **30** | 1 1/4"-8UN | 420 | 24 | 170 | 8 |
| **32** | 1 1/2"-8UN | 450 | 24 | 180 | 8 |
| **36** | 1 1/2"-8UN | 480 | 28 | | |
| **40** | 1 1/2"-8UN | 500 | 32 | 200 | 8 |
| flange connection acc. to ANSI B 16.5 for NPS <= 24”<br>flange connection acc. to ASME B 16.47 for NPS > 24” | | | | | |

**Stud bolt dimensions type BO - PN 10**

| DN | thread K | L | | L1 | |
|---|---|---|---|---|---|
| | | length | quantity | length | quantity |
| **200** | M20 | 170 | 12 | | |
| **250** | M24 | 190 | 12 | | |
| **300** | M24 | 200 | 12 | | |
| **350** | M24 | 210 | 12 | 80 | 8 |
| **400** | M27 | 230 | 16 | | |
| **450** | M27 | 250 | 16 | 90 | 8 |
| **500** | M30 | 270 | 16 | 105 | 8 |
| **600** | M33 | 320 | 16 | 115 | 8 |
| **700** | M33 | 340 | 20 | 125 | 8 |
| **750** | | | | | |
| **800** | M36 | 370 | 20 | 130 | 8 |
| **900** | M36 | 390 | 24 | 140 | 8 |
| **1000** | M39 | 425 | 24 | 160 | 8 |
| flange connection acc. to EN 1092-2 PN 10 | | | | | |

- Screw each other opposite stud bolts, flange screws and hex nuts crosswise and equal with a torque key in accordance with the parameter of the operator.

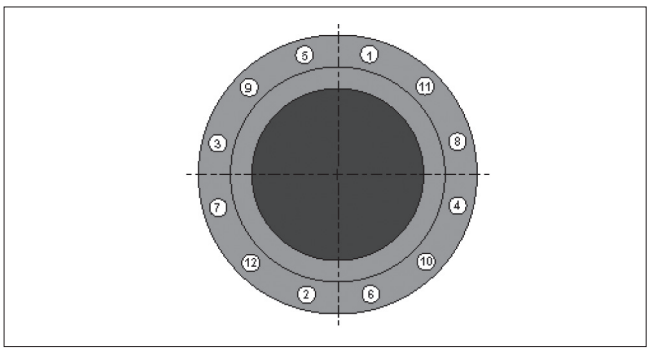



Fig. 5 Sample for crosswise installation of flange bolts.

## 4.4 ATEX version

ATEX certified valves have to be professional connected by the end user to a main grounding point at the site in accordance with the applicable regulations of the respective countries.

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 is a single, extra marked screw at, e.g., the body, flange or bracket. (see Fig. 6)

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

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

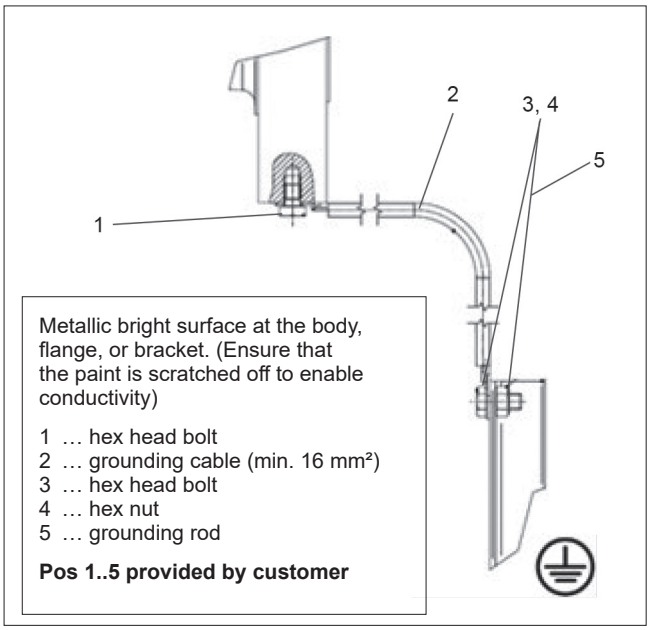



Fig. 6 Earthing

## 4.5 General

## 4.6 Detaching preparation

If the actuator is mounted on a valve in a pipeline, following requirements must be check before detaching the actuator:

- Ensure that errors are not caused due to removing the actuator.
- Test carefully whether a hot medium has flown through the pipeline and whether the actuator is cooled off sufficiently, to prevent any hazard due to extreme temperatures.
- Reassure yourself that the worker does not face any risks from the medium that has recently passed through the valve.
- If you do not make the disassembly by yourself, warn the qualified personnel of eventual risks.

## 4.7 Detaching

Proceed in the following sequence for detaching the actuator:

When replacing the installed actuator on the piping / piping, make sure that:

- No pressure is applied to the piping and the target valve is removed from the process.
- Ensure that the valve is in closed position.
- Manually mark the position of the stem to the stuffing box with a waterproof marker.
- Disconnect the energy supply to the actuator. In addition, press the EMERGENCY STOP switch for energy supply to the actuator or activate the remote control, so that no one can reconnect the energy supply by mistake.

If you control the actuator using a remote control, then you must mount the device at the actuator to interrupt the energy supply for reasons of safety (for example: emergency stop).

## 4.8 Mounting actuator

Proceed as follows for installing the actuator:

- Before attaching the actuator, set the valve in its defined closed position. Check the mark that it is in line between stem and stuffing box.
- If a new Neles actuator is used, turn stopper screw completely in the actuator to avoid overturn of the disc.
- Push the selector shaft of the actuator carefully onto the valve shaft. Note that the actuator adjoins the bracket exactly and is aligned with it, so that no stresses may occur at the valve shaft.
- Note that the marking on the drive shaft corresponds to the position of the disc. Note that the closed disc may not be in zero position.
- Put actuator on the valve in that way, that the previous marking is accurate leveling position.
- Adjust the actuator that for closed position the marking is exactly in line.
- Secure the actuator to the bracket using the screws and tighten them on their cross tips.
- Finally connect the energy supply.

# 5. ORDERING SPARE PARTS

For ordering spare parts, the following information is necessary:

- Unique / Identification number of the valve (from identification plate – see Figure 3)
- Type code of the valve (from identification plate) with size and pressure specification.
- If possible, take a photo of the identification plate.
- Machine name, start-up date.
- ID number and number of “Spare sets” required.
- Following parts can be changed with the recommended spare part sets:

| Quantity/ Valve | Description | Contents |
|---|---|---|
| 1x | Set 1 (Soft parts) | Pos. 304, 320 |
| 1x | Set 2 (Sealing) | Pos. 404, 410, 411, 435, 447, 472, 474, 475, 476 |
| 1x | Set 3 (Heavy overhaul) | Pos. 201, 301, 401, 402, 430 |

Customer gets always: set 1
set 1 + set 2
set 1 + set 2 + set 3

- All parts must be cleaned accurately before reassembly.
- Check the shafts for wear. If you find grooves or other damage, it is recommended that you replace the shafts (401, 402).

# 6. CLEANING AND MAINTENANCE

Type BO high performance butterfly valves are extensively maintenance-free.

For cleaning, use only a soft and lint-free cloth. Do not under any circumstances use pointed or sharp tools (knife, file, screwdriver, etc…) or sandpaper. Similarly, do not use any cleaning agents that may cause undesirable chemical reactions with the residues of the medium or attack the sealing elements.

- Check the tightness of the valve at regular intervals.
- You should replace the sealing element (320) after two years at the latest.
- At the same time, check the condition of the following parts and change them if necessary:
- O-rings (472, 474),
- U-ring (475),
- Bearing bushings (410, 424)
- After dismantling the valve, you must replace the lock washer (447).

In order to avoid longer downtimes during maintenance work, you should order spare parts in good time and keep them in stock.

For ordering the necessary spare parts set, please contact your Valmet Service Partner.

If you outsource the butterfly valve cleaning operation, it is essential that you draw attention to the dangers of the medium being used as well as to any residues that may be present.

**Note:** Earlier BO-valves are equipped with F1-actuators. The actual BO-valve series is equipped with B1-actuators. The F1-actuator can be changed to a B1-actuator with a mounting set to the existing valve.

The mounting kit basically consists of an adapter plate, coupling and bolts.

| Change from F1 to B1 actuatror | | | | | |
|---|---|---|---|---|---|
| DN | NPS | F1 | B1 | requested Mounting SET | Assemby draw. |
| 200 | 8 | A60 | B1CU11FL | MA0221251 | F98904 |
| 250 | 10 | A60 | | | |
| 300 | 12 | A60 | | | |
| 350 | 14 | A120 | B1CU13FL | MA0221018 | |
| 400 | 16 | A120 | | | |
| 450 | 18 | A120 | | MA0220625 | |
| 500 | 20 | A250 | B1CU20/70FS | MA0220501 | F98897 |
| 600 | 24 | A250 | | MA0220244 | |
| 700 | 28 | A500 | B1CU25/95FS | MA0220094 | F98919 |
| 800 | 32 | A500 | | MA0217827 | |
| 900 | 36 | A500 | | MA0220368 | |
| 1000 | 40 | A500 | | | |

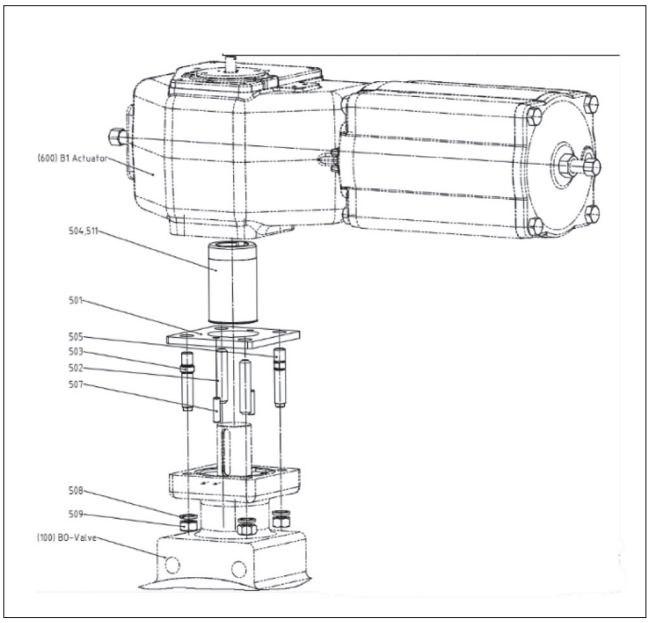
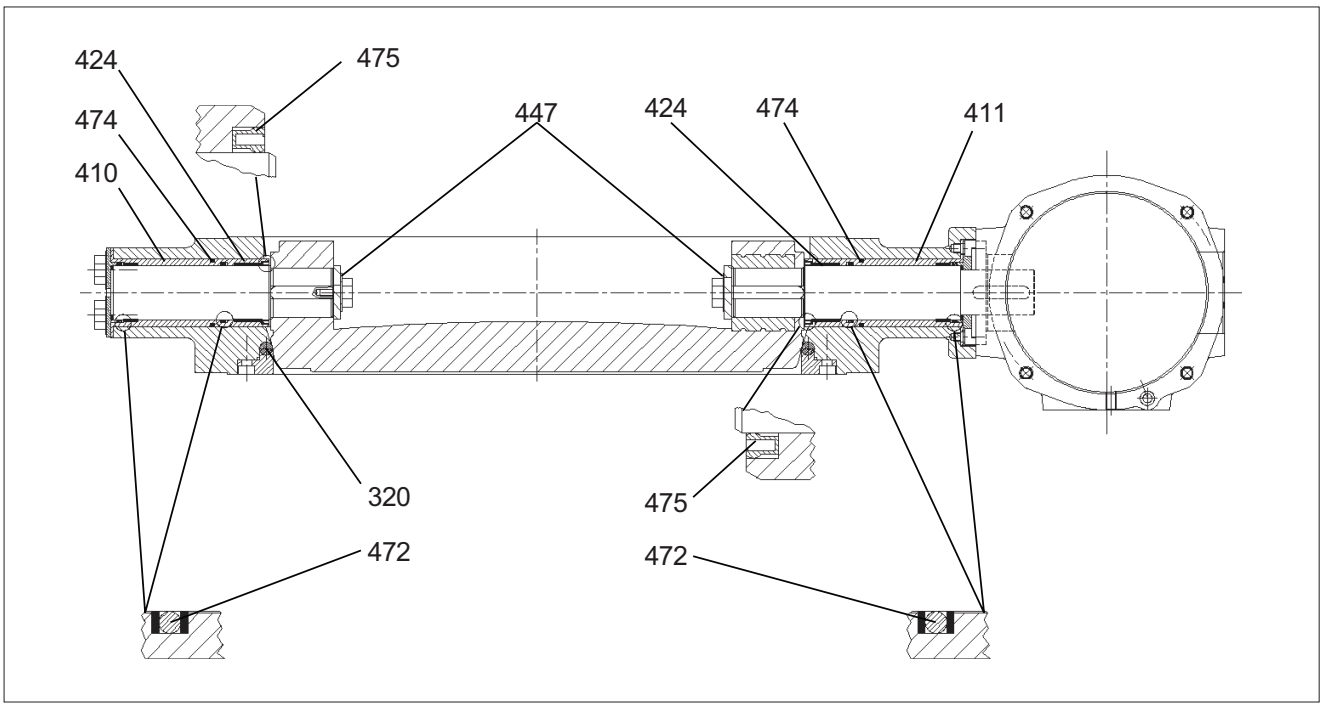
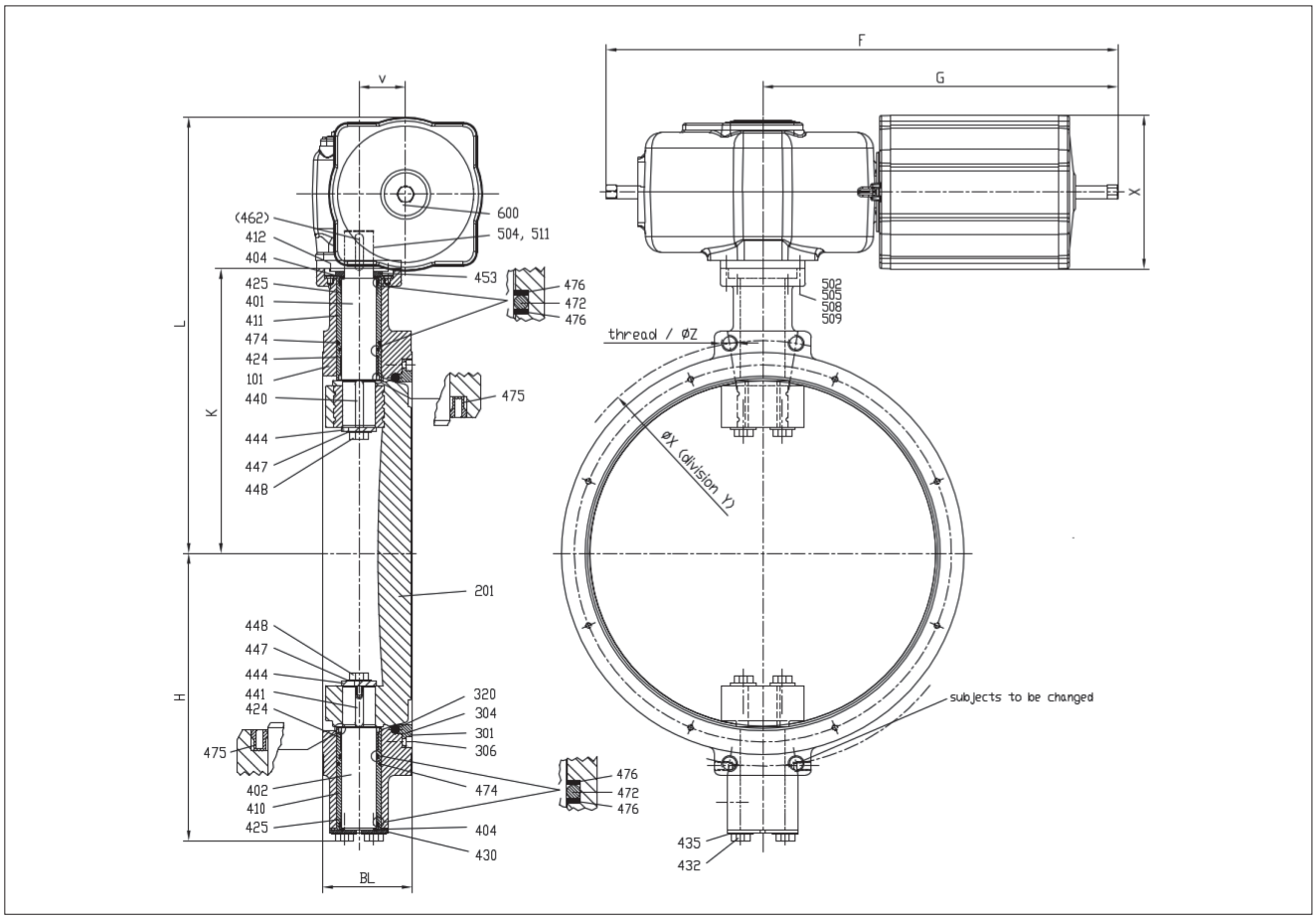



Fig. 7 Example mounting kit for B1_11 and B1_13


424
475
474
447
424
474
411
410
320
475
472
472

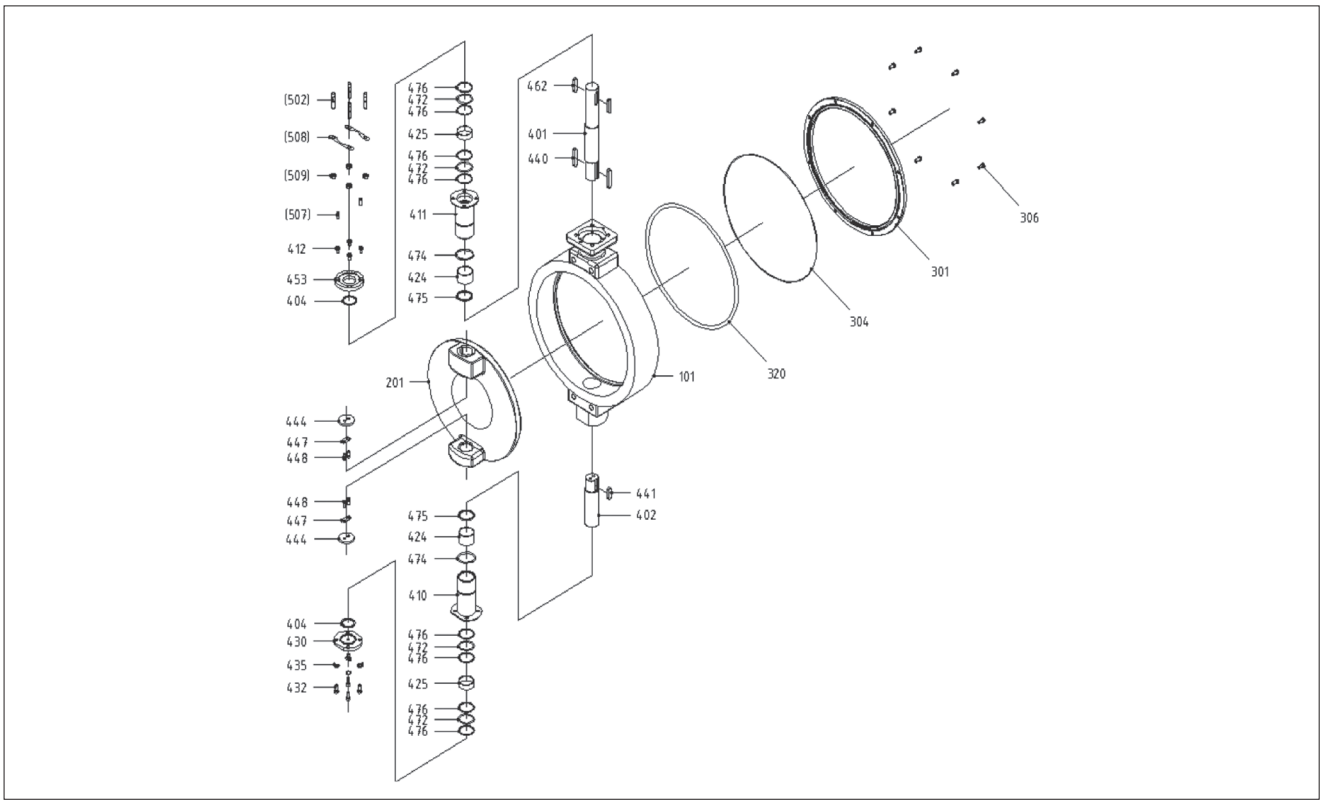
# 7. DIMENSIONS




| Size DN/inch | Actuator | Dimensions | | | | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BL | H | K | L | F | B | X | V | Actuator kg | Valve kg |
| 200/8” | B1CU11/40FL | 71 | 250 | 245 | 409 | 535 | 375 | 135 | 51 | 35 | 28 |
| 250/10” | | 76 | 265 | 260 | 424 | | | | | | 34 |
| 300/12” | | 83 | 290 | 285 | 449 | | | | | | 49 |
| 350/14” | B1CU13/55FL | 92 | 325 | 330 | 535 | 640 | 445 | 175 | 65 | 68 | 58 |
| 400/16” | | 102 | 355 | 350 | 555 | | | | | | 72 |
| 450/18” | | 114 | 385 | 380 | 585 | | | | | | 108 |
| 500/20” | B1CU20/70FS | 127 | 405 | 400 | 680 | 880 | 590 | 215 | 97 | 161 | 134 |
| 600/24” | | 154 | 490 | 485 | 765 | | | | | | 187 |
| 700/28” | B1CU25/95FS | 165 | 545 | 535 | 855 | 1075 | 725 | 265 | 121 | 289 | 262 |
| 750/30” | | 190 | 570 | 560 | 880 | | | | | | 310 |
| 800/32” | | 190 | 585 | 580 | 900 | | | | | | 360 |
| 900/36” | | 203 | 655 | 650 | 970 | | | | | | 460 |
| 1000/40” | | 216 | 725 | 720 | 1040 | | | | | | 580 |

| DN | Flange PN10 | | | | Flange PN16 | | | | NPS | Flange Cl150 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØX | ØY | thread | ØZ | ØX | ØY | thread | ØZ | | ØX | ØY | thread | ØZ |
| 200 | 295 | 8 | | 22 | 200 | 295 | | 22 | 8 | 298,5 | 8 | | 7/8” |
| 250 | 350 | 12 | | 22 | 250 | 355 | | 26 | 10 | 362,0 | 12 | | 1” |
| 300 | 400 | 12 | | 22 | 300 | 410 | | 26 | 12 | 431,8 | 12 | | 1” |
| 350 | 460 | 16 | M20 | | | | | | 14 | 476,3 | 12 | 1” | |
| 400 | 515 | 16 | | 26 | 400 | 525 | | 30 | 16 | 539,8 | 16 | | 1 1/8” |
| 450 | 565 | 20 | M24 | | | | | | 18 | 577,9 | 16 | 1 1/8” | |
| 500 | 620 | 20 | M24 | | | | | | 20 | 635,0 | 20 | 1 1/8” | |
| 600 | 725 | 20 | M27 | | | | | | 24 | 749,3 | 20 | 1 1/4” | |
| 700 | 840 | 24 | M27 | | | | | | 28 | 863,6 | 28 | 1 1/4” | |
| | | | | | | | | | 30 | 914,4 | 28 | 1 1/4” | |
| 800 | 950 | 24 | M30 | | | | | | 32 | 977,9 | 28 | 1 1/2” | |
| 900 | 1050 | 28 | M30 | | | | | | 36 | 1085,8 | 32 | 1 1/2” | |
| 1000 | 1160 | 28 | M33 | | | | | | 40 | 1200,2 | 36 | 1 1/2” | |

# 8. EXPLODED VIEW BO VALVE AND PART LIST




| Part No. | Qty. | Description | Material | Spare part |
|---|---|---|---|---|
| 101 | 1 | Body | Carbon Steel | |
| 201 | 1 | Disc | Aluminum hard coated | 3 |
| 301 | 1 | Sealing Ring | Stainless Steel | 3 |
| 304 | 1 | O-ring seal | FKM | 1 |
| 306 | 8 | Cylinder head screw | Stainless Steel | |
| 320 | 1 | Seat | FKM | 2 |
| 401 | 1 | Drive shaft | Stainless Steel | 3 |
| 402 | 1 | Shaft | Stainless Steel | 3 |
| 404 | 2 | Thrust bearing | Metal + Teflon coating | 1 |
| 410 | 1 | Bearing bushing | Stainless Steel | 3 |
| 411 | 1 | Bearing bushing | Stainless Steel | 3 |
| 412 | 8 | Cylinder head screw | Stainless Steel | |
| 424 | 2 | Bearing | Metal + Teflon coating | 1 |
| 425 | 2 | Bearing | Metal + Teflon coating | 1 |
| 430 | 1 | Cover | Stainless Steel | |
| 432 | 4 | Hexagon screw | Stainless Steel | |
| 435 | 4 | Washer, Retaining plate | Stainless Steel | |
| 440 | 2 | Key | Stainless Steel | 3 |
| 441 | 1 | Key | Stainless Steel | 3 |
| 444 | 2 | Clamping disc | Stainless Steel | 3 |
| 447 | 2 | Lock Washer, Retaining plate | Stainless Steel | 3 |
| 448 | 4 | Hexagon screw | Stainless Steel | 3 |
| 453 | 1 | Packing Gland, Flange | Stainless Steel | |
| -462 | 2 | Key | Stainless Steel | 3 |
| 472 | 4 | O-ring packing | FKM | 1 |
| 474 | 2 | O-ring packing | FKM | 1 |
| 475 | 2 | Sealing | PTFE | 1 |
| 476 | 8 | Bearing protection, back up ring | PTFE | 1 |
| 502 | 4 | Hexagon head screw | Stainless Steel | |
| 507 | 2 | Pin | Stainless Steel | |
| 508 | 2 | Retaining plate | Stainless Steel | |
| 509 | 4 | Hexagon nut | Stainless Steel | |

1&2) Maintenance after 750 000 cycles or every 1 year
3) Maintenance after 1500 000 cycles or every 2 years

# 9. TROUBLESHOOTING

## 9.1 BO valve does not close tight

- The BO valve is a high-performance system which is designed for fast open and close cycles.
- The sealing element is designed to have a flexible and pressure supported seat in the seat groove of the valve body.
- Never close the valve by exerting excess force. This leads to the risk of irreparable damage.
- Test whether the energy supply is connected.
- Test whether the “closed” position of the actuator and the “closed” position of the disc are in alignment.
- Valve leakage is not always caused by a damaged seat or disc. The reason can also be that the disc is not in the correct closed position.
- Check the position of the actuator relative to the valve. The screws may be loose or the bracket damaged.
- Check the adjustment in the closed position.
- The marking line parallel to the disc on the valve shaft head shows roughly the closed position of the disc.
- If closing position is not reached it ca be any blocking inside of the valve (between disc and seat), anything blocking the lever system or something inside the actuator.
- Check the sealing surface of the disc and body and the sealing element for possible damage. Dismantle the valve. Test whether any foreign objects are present between the disc and seat. Remove the foreign objects or deposits, if necessary.
- Replace damaged parts, if necessary.

In addition, please refer to the information in the “Cleaning and Maintenance” chapter in the Maintenance section of this IMO.

## 9.2 Leakage of gas

- Check if the actuator is assembled well and valve drive shaft and actuator shaft connection are aligned with each other. Avoid lateral forces to be applied on the drive shaft.

## 9.3 High torque or no correct switching time

- Check if actuator is equipped with correct supply air
- Check if solenoid valve is operating well.
- Check if actuator itself is working properly.
- If all pre-checks do not lead to a failure, the valve must be maintained. Check if valve shows any internal damages, corrosion, scratches or bumps at moving parts.
- Check and substitute all metal parts. Check shaft bearings, lever bearings and sealing element, and replace, if necessary.
- For disassembly, please read the maintenance section of this IMO at chapter 10ff of this IMO.

# 10. MAINTENANCE

## 10.1 Cleaning and maintenance intervals

Butterfly valves of the BO valve series are mainly maintenance-free. The BO valves are designed for a 5-year maintenance free operation.

- Check the valve regularly for its tightness. Valmet recommends replacement of the sealing element (320) and the packing rings (472) on demand but at latest after 2 years.
- Check and replace shaft bearing and bearing protection of the valve.
- If the medium is contaminated with particles that may impair the seal-tightness of the valve, then the sealing surface of the disc must be cleaned regularly. Contamination may damage the sealing surface of the metal seated disc or the sealing element.
- Auxiliaries that may attack the sealing surface. Use water, soapsuds or other liquid solvents and a lint-free rag.
- Inspect all bolts and nuts after cleaning. Evidence of corrosion, cracking, galling, stretching or thread deformation (by thread gauge) or other damage is cause for rejection and replacement with new bolting.

Never use cutting, scraping or grinding tools such as files or sandpaper to clean seat surface. Moreover, do not use any solvent based cleaning agents that may cause unwanted chemical reactions upon contact with residues of the medium or attack the seal.

While assigning cleaning and maintenance work to qualified external firms and / or qualified external personnel, it is mandatory to make them aware of the dangers of the used medium and possibly present residues. The IMO must be handed over to the responsible service person always.

For proper maintenance, the valve must be removed from the pipeline. Follow the instructions in following chapters.

## 10.2 Preliminary

Suitable spare parts sets should be kept ready and / or provided on time to avoid longer downtimes during maintenance work. Please take into account the delivery and transport times.

Before dismantling the BO valve, the following prerequisites must be met:

- Ensure that the pipelines are pressure less and free of process-related gases and fluids.

Check whether the valve has already cooled down or warmed up to the extent that there are no more hazards due to extreme temperatures.

- Inform yourself about the medium that last passed through the valve. Residues may occur in the valve. Make sure that there is no poisoning or acid-burn risk when coming in contact with the residues. Protect yourself using appropriate protective clothing, safety goggles and a breathing mask, where appropriate. It is mandatory to follow the safety instructions for operating personnel.

- If you do not make the disassembly by yourself, instruct the qualified personnel, and provide them with protective clothing, if necessary. While assembling, and disassembling the BO valve, the BO valve must be closed to exclude any incidental damage.

## 10.3 Removing valve from the pipeline

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

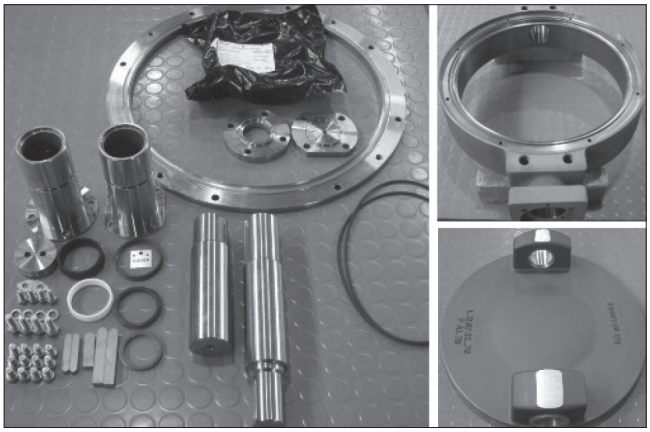
- The pipeline is pressure less and cleaned well.
- The relevant valve must be disengaged from the process and completely depressurized.
- The valve is in a defined position – “closed” in general. It is mandatory to follow the safety instructions of the operator! Proceed in the following sequence for dismantling the valve:
- Close the valve.
- It is generally most convenient to detach the actuator and its auxiliary devices (see paragraph 4.6), before removing the valve from the pipeline. If the valve package is small or difficult to access, it may be more practical to remove the entire package at the same time.
- If the actuator must be removed for dismantling the valve, mark its direction to the bracket and the body with a waterproof felt-tip pen before dismantling the actuator. In this manner, you can correctly reposition the actuator during reinstallation and prevent it from triggering any faulty function.

Disconnect the energy supply to the actuator. In addition, press the EMERGENCY STOP switch for energy supply to the actuator or activate the remote control, so that no one can reconnect the energy supply by mistake.

- Dismantle the actuator.
- Secure the valve carefully using lifting ropes. Handle the valve with actuator or the bar-shaft valve as described in chapter 3.3.
- Release the valve by loosening the screws opposite to one another or the nuts in a crosswise manner.
- Transport the valve securely, so that they do not move during transport and eventually get damaged.

# 11. ASSEMBLY OF THE VALVE

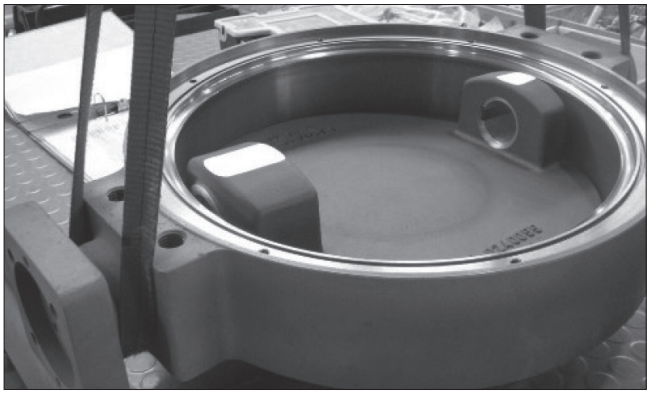
Maintenance at BO valve should only be executed by authorized and trained Valmet personnel.



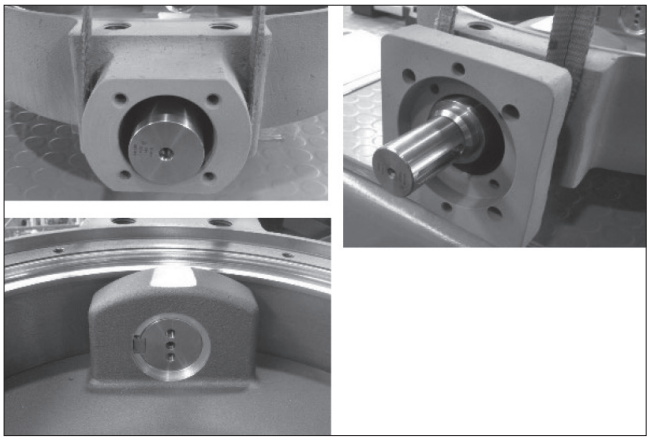
- Prepare all parts, check that they are without damage.

## 11.1 Assembly of disc and shafts

- All parts must be oxygen cleaned.
- Place the disc (201) on a wooden support and place the body (101) over it that the bore of disc hubs and shaft bores in the body are in line.



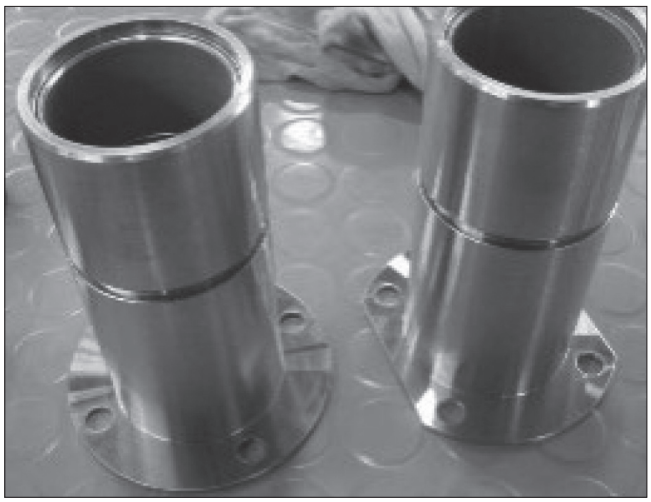
- Insert the keys (440, 441) in the driveshaft (401) and in the lower shaft (402), push them through the body (101) bores in the disc hubs (201) until to their final position.



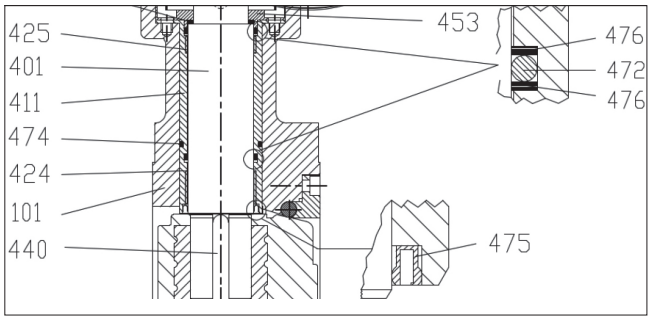
- Assemble the clamp disc (444) to the shafts with the bolts (448) and the lock washers (447) and lock the bolts by bending the edges of the lock washer.

## 11.2 Assembly of bearing bushing

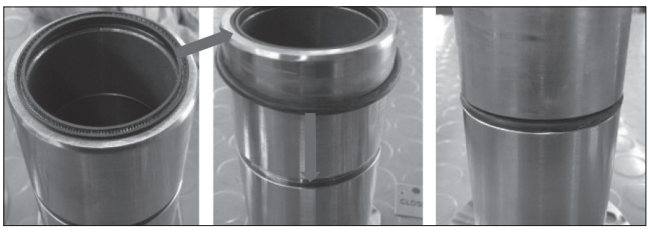
- The bearing bushings are wear parts. The maintenance can be done by disassembly and replacement of the wear parts.



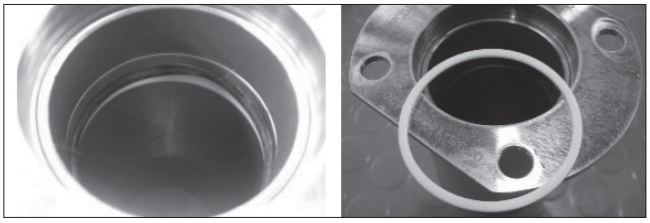
- Take the bearing bushings (410, 411) with the inserted DU-bearings.



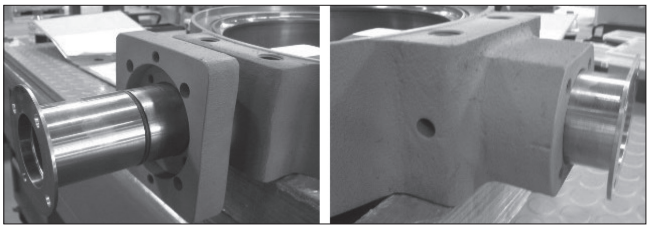

- Carefully insert the spring supported PTFE sealing (475) at the upper place of the bearing bushings until they are completely inside the bushing.
  Then take the O-ring (474) push it over the bushings until they snap into the groove.



- Insert PTFE rings (2x 476) with O-Ring (472) in between carefully inside both bearing bushing (410, 411) and finally check the proper fit.
  Repeat the sequence with the outer bearing protection PTFE and O-Ring (2x 476 and 472)



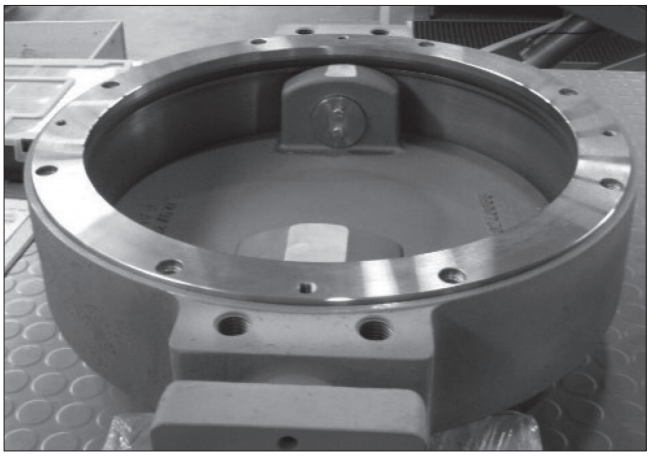
- Finally insert and push the bearing bushing (411, 410) over the drive shaft (401) and lower shaft (402) simultaneously and inside the body (401), until the disc (201) is centered over both bearing bushings.



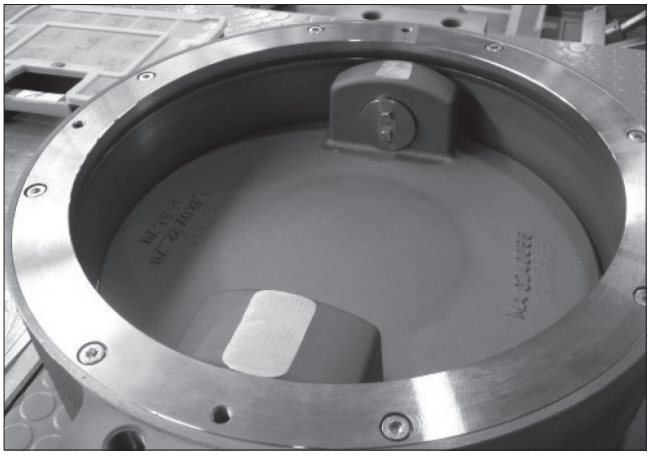
- Take care that O-Rings inside and outside don't get damaged while the insert step. Push the bearing bushings (411, 410) entire into the body (101) until to their final position.
- Assemble the lower thrust bearing (404) into the cover (430). The sliding surface must aim to the moving shaft (402). Insert the Bolts (432) with the locking washer (435) and tighten the bolts cross over and symmetrically.
- Repeat the same step with the upper thrust bearing (404) and the gland ring (453), insert the screws (412) and tighten them.
- Check that the disc can now be smoothly cycled without strong force and without noise.

## 11.3 Replacement and assembly of the seat

- Before the seat can be disassembled, the disc (201) must be cycled by 180°.
- Now the flange (301) can be removed by loosening and unscrewing the screws (306).
- Place the sealing O-Ring (304) into the small groove of the body.
- Place the seat O-Ring (321) into the round groove of the body. The seat O-Ring is slightly smaller than the groove diameter. This is correct!
- Place the flange ring (301) over it and take care the O-Rings keep their position and don’t get damaged.



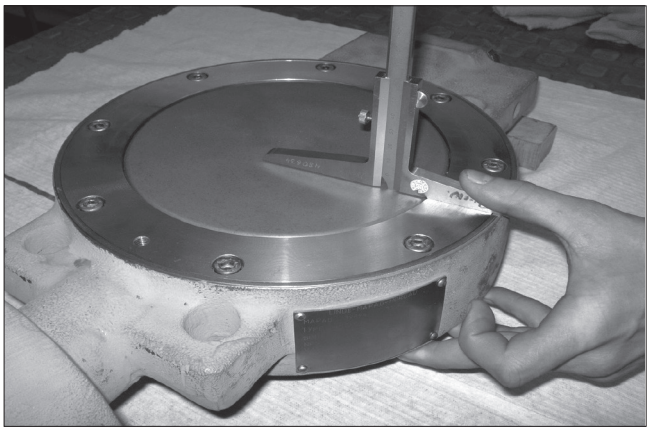
- Insert the screws (306) and fix the flange (301) until it is completely screwed down to the body.



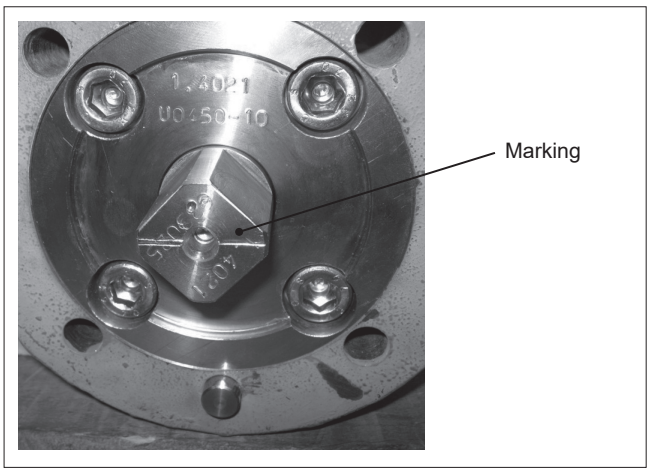
- Check the seat by using your finger, that it can be easily pushed backwards into the groove over the entire diameter of the seat.
- Finally cycle the disc by 180° in the closing position.
- The disc must cycle smoothly without disturbance and noise.

## 11.4 Actuator assembly

- Turn the valve to the closed position before mounting the actuator.
- Position the indexing shaft of the actuator on the valve shaft carefully. Bear in mind that the actuator must be mounted exactly and flush to the bracket, so that no stress is caused to the valve shaft.



- Make sure that the jag on the indexing shaft conforms to the position of the disc.




- Fix the actuator with the appropriate screws and lock them crosswise. Finally, check the closed position of the valve by means of multiple depth measurements. The detected data must not deviate more than 0.3mm.
- Finally, connect the energy supply.

# 12. VALVES IN OXYGEN SERVICE

## 12.1 Maintenance / Repair work

**ATTENTION:**

Oxygen application are high risky applications, and a lot of special precautions must be considered to avoid all kind of incidents!

**If the needed minimum requirements for oxygen application would not carefully and accurately be kept it could cause terrible incidents like explosions or similar.**

**In the worst-case people could get terrible injured or they could get died.**

Valmet has a lot of experience with valves for oxygen applications. We have special trained people who know, what they have to do, and we have special assembly and testing environments for this oxygen cases.

**Due to this**

**Valmet highly recommend the customer <u>not</u> to carry out <u>any</u> repair or maintenance themselves on valves for oxygen service.**

**Just contact the Valmet specialists. They will take care about your needs.**

In addition, please note that the valve will automatically lose the Valmet warranty if it would have been maintained or repaired outside Valmet.

On the next page are just some very brief basic information concerning valves for oxygen application.

## 12.2 Minimum requirements for oxygen application valves

The following four things are just a few of the minimum things which have to be considered during maintenance or repair of a valve for oxygen applications.

1. All installed parts must fulfill the required cleanliness level. This is valid for each single part as well as for the whole assembled valve.
2. All used non-metallic parts must have as minimum an oxygen compatibility approval based on the worst-case process conditions.
3. If grease has to be used based on technical needs, then only grease, which has as minimum an oxygen compatibility approval based on the worst-case process conditions.
4. A final inspection concerning the achieved cleanliness level must be carried out.

**Do never install a valve when you are not sure if all these 4 things are fulfilled!!**

## 12.3 General HSE Requirements (Health Safety Environment):

Take care that all local and international necessary health, safety and environment laws and instructions are fulfilled before starting any service, maintenance, or repair work. Keep this HSE requirements during the whole work until it is finished.

All construction activities shall be carried out with the utmost safety. Related safety procedures shall be verified and approved by the local responsible HSE Management of the plant site before any work would have been started.

## 12.4 Cleaning <u>during</u> and <u>after</u> service:

We just will highlight once more, that as minimum the shown *Minimum requirements for oxygen application valves* (chapter 12.2) have to be fulfilled very carefully and accurately if any kind of maintenance or repair or service job has been carried out.

We will not give any more details here. Please follow strictly to our recommendation given in paragraph 12 on this page!

# 12.5 Tightening torques of valve screws

Allowable tightening torques for screws of the steel type A2- 70.2 and A4-70 with metric coarse-pitch thread according to DIN 13. The utilization is 70%of $R_p$0.2, friction coefficient 0.16.

Table 1 Tightening torques for valve screws

| Ø | Stressed cross section | Load [1] Force a the screw | | Pre-stressing force | Tightening torque |
|---|---|---|---|---|---|
| | AS [mm²] | Rp0.2 [N] | Rm [N] | N | Nm |
| M4 | 8.8 | 3951 | 6146 | 2489 | 2.13 |
| M6 | 14.2 | 6390 | 9940 | 4026 | 4.19 |
| M7 | 20.1 | 9045 | 14070 | 5698 | 7.3 |
| M8 | 36.6 | 16470 | 25620 | 10376 | 17.5 |
| M10 | 58.0 | 26100 | 40600 | 16443 | 35.2 |
| M12 | 84.3 | 37935 | 59010 | 23899 | 60.3 |
| M14 | 115.0 | 51750 | 80500 | 32603 | 95.8 |
| M16 | 157.0 | 70650 | 109900 | 44510 | 146.2 |
| M18 | 192.0 | 86400 | 134400 | 54432 | 203.1 |
| M20 | 245.0 | 110250 | 171500 | 69458 | 285.7 |
| M22 | 303.0 | 75750 | 151500 | 47723 | 212.4 |
| M24 | 353.0 | 88250 | 176500 | 55598 | 273.9 |
| M27 | 459.0 | 114750 | 229500 | 72293 | 405.3 |
| M30 | 561.0 | 140250 | 280500 | 85358 | 549.0 |

[1] values correspond to 100% of yield strength

# 13. EU DECLARATION OF CONFORMITY FOR ATEX APPROVED VALVES

## EU DECLARATION OF CONFORMITY

for ATEX approved valves

Manufacturer:
Valmet Flow Control GmbH
Von-Holzapfel-Straße
86497 Horgau
Germany

EU Authorised Representative: Valmet Flow Control Oy, Vanha Porvoontie 229, 01380 Vantaa, Finland. Contact details: +358 10 417 5000

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

| | |
|---|---|
| Product: | Neles Butterfly Valves |
| Type: | B-series (BA, BD, BE, BH, BK, BM, BN, BO, BW) |
| ATEX group and category: | II 2 GD, II 3 GD |
| Ex GAS: | Ex h IIC 85°C…Tmax Gb |
| Ex DUST: | Ex h IIIC T85°C…T(Tmax) Db |

Tmax= valve max. temperature in name plate

Manufacturer's certificates:

| Standard / Directive | Notified Body and NoBo number | Certificate No. |
|---|---|---|
| ISO 9001:2015 | LRQA (Certification body) | 10531829 |
| PED 2014/68/EU Module H | DNV Business Assurance Italy S.r.l. 0496 | 142306-2013-CE-FIN-ACCREDIA |
| ATEX 2014/34/EU Annex IV | DNV Product Assurance AS Norway 2460 | Presafe 18 ATEX 91983Q Issue 6 |

ATEX 2014/34/EU Annex VIII technical files are archived by Notified Body number 0537

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

| | |
|---|---|
| PED 2014/68/EU | Valve |
| ATEX 2014/34/EU | Non-electrical equipment |

Main components:

Valve:
The valve is suitable for service up to PED Cat III
Valve design standard: ASME B16.34

Installation, Maintenance and Operating instructions manual (IMO) must be followed before installation in order to ensure proper and safe mounting and usage of equipment.

The product above is manufactured in compliance with the applicable European directives and technical specifications/standards (EN10204). The product is in conformity with the customer order.

Instrumentation and accessories having equal protection concept, level and performance specification with the original can be presumed to be in conformity with this Declaration of Conformity.

Protection from e.g. static electricity caused by the process or connected equipment must be considered by the user (EN 60079-14 § 6). EN 60079-19 applies for modifications.

Non-electrical equipment is according EN 80079-37:2016 and EN 80079-36:2016. The actual surface temperature of non-electrical equipment is depended on the process and ambient conditions (EN 80079-36:2016 § 6.2.5 and 6.2.7). The protection from high or low temperature must be considered by the end user before put into service.

The product does not possess any residual risk according to hazard analysis conducted under the applicable directives providing that the procedures stated by the IMO are followed and the product is used under conditions mentioned in the technical specifications.

Documents with digital and/or e-signature conveyed by Valmet Flow Control conform to the Regulation (EU) No 910/2014 as well as the national code on e-signatures. In order to secure the integrity of the document, the authenticity of the sender, and indisputableness of the dispatch the identification is covered by individual ID codes, passwords, and by regularly changing passwords. The authorization to sign documents is based on organizational position and/or is task related. The impartial third party in the company bestows the access right with predefined authorities to particular databases.

Horgau 10.9.2024

Juha Virolainen, Global Quality Director

# 14. HOW TO ORDER – TYPE CODE

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|---|---|---|---|---|---|---|---|---|
| - | BO | 6 | C | - | 16 | F1 | N | - |

| 1. sign | |
|---|---|
| - | |

| 2. sign | PRODUCT SERIES / DESIGN |
|---|---|
| | Single eccentric high cycle, soft seated butterfly valve |

| 3. sign | BODY CONSTRUCTION |
|---|---|
| 6 | Wafer |
| Y | Special, to be specified |

| 4. sign | BODY PRESSURE RATING |
|---|---|
| C | ASME class 150 |
| J | DIN PN 10 |
| K | DIN PN 16 |

Note: max dp = 1,8 bar

| 5. sign | BEARING AND DESIGN |
|---|---|
| - | Standard: Soft bearings |
| Y | Special design |

| 6. sign | SIZE<br>**Note:** Pressure rating = ASME –> inch sizes<br>Pressure rating = DIN –> metric sizes |
|---|---|
| - | **Inch:** 08, 10, 12, 14, 16, 20, 24, 28, 32, 36, 40<br>**Metric:** 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000 |

| 7. sign | |
|---|---|
| F | **Body:** DIN 1693 – 0.7043 (GGG40.3) / EN1543 - EN-GJS-400-18-LT<br>**Disc:** F-AL70, hard coated |
| F1 | **Body:** DIN 1693 – 0.7043 (GGG40.3) / EN1543 - EN-GJS-400-18-LT + coating (ENP)<br>**Disc:** F-AL70, hard coated |
| G | **Body:** EN 10250 – 1.0570 (S355J2G3)<br>**Disc:** F-AL70, hard coated |
| G1 | **Body:** EN 10250 – 1.0570 (S355J2G3) + coating (ENP)<br>**Disc:** F-AL70, hard coated |
| Y | SPECIAL, to be specified |

| 8. sign | SEAT, PACKING & SHAFT MATERIAL |
|---|---|
| N | **Shaft sealing:** FKM (VITON)<br>**Sealing Element:** FKM (VITON)<br>**Shaft:** EN 1.4021 or equal,<br>**T** = -10 … 200 °C |
| Y | SPECIAL, to be specified |

| 9. sign | FACE-TO-FACE AND FACING<br>With sign “Y” always check suitability from factory |
|---|---|
| - | Without sign valve facing according to the valve body pressure rating<br>DIN-rating: EN1092-1<br>ASME-rating:<br>- ASME B 16.5 sizes 4” – 24”<br>- ASME B 16.47 **Series A** #150 - 600 sizes 26” |
| Y | Special, to be specified |

# 15. GENERAL DISCLAIMER

## 15.1 Lifting

1. Always use a lifting plan created by a qualified person to lift this equipment. Lifting guidance is provided in this IMO (Installation, Maintenance and Operation manual) to assist in lifting plan development. Think about the center of gravity (CG) of the equipment being lifted. Make sure the CG is always under the central lifting point.
2. Valves may be equipped with lifting threads on the body or on the flanges. These are 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.

## 15.2 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 of the ball or disc. Do not leave objects near or in the valve port which may fall in and need to be retrieved.

## 15.3 Receive, 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.

## 15.4 Operating

8. The identification plate (ID-plate, type plate, nameplate, or engraved markings) on the valve gives the information of max. process conditions to the valve.
9. (For soft seats) The practical and safe use of this product is determined by both the temperature and pressure ratings of the seat and body. Read the identification plate and check both ratings. This product is available with a variety of seat materials. Some seat materials have pressure ratings that are lower than the body ratings. All body and seat ratings are dependent on the valve type, size and material of the body and seat. Never exceed the marked rating.
10. Temperatures and pressures must never exceed values marked on the valve. Exceeding these values may cause uncontrolled release of pressure and process 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.

## 15.5 Maintenance

21. Respect the safety warnings above!
22. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.
23. Maintain the valve within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.
24. Always make sure that the valve and the pipeline is depressurized before starting any kind of maintenance work at a valve.
25. Always check the position of the valve before starting maintenance work. Follow the Lock out /tag out (LOTO) rules at the site before starting any maintenance activity.
    - See IMO for the correct stem position.
    - Consider that the positioner may give the wrong signals.
26. Sealing materials (soft sealing parts) should be changed when the valve is maintained. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired valve.
27. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
28. Valve pressure 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 manufacturers (OEM) replacement parts or repaired to factory specifications by an authorized Valmet service partner in order to maintain the warrantee.
29. Do not use sharp tools, grinding machines, or files to work on functional surfaces such as sealing, seating or bearing surfaces as this can damage these surfaces.
30. Check the condition of sealing surfaces on the seats, closure device (disc, ball, cage, plug, etc.), body and body cap. Replace parts if there are significant wear, scratches, or damage.
31. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
32. Do not weld on pressure bearing parts without an ASME and PED qualified procedure and personnel.
33. Pressure bearing parts of valves in high temperature applications must be carefully examined for the effects of material creep and fatigue.
34. Make sure that the valve is positioned in the correct flow direction into the pipeline.
35. If the valves are marked to be suitable for explosive atmospheres, the correct function of the discharging device must be tested before returning to service.
36. Always work in a clean environment. Avoid getting particles inside the valve due to machining, grinding, or welding nearby.
37. Never store a maintained valve without flow port protection.
38. When pressure testing valve seats, never exceed the maximum operating pressure of the system or the maximum shut-off pressure marked on the valve identification plate.
39. Actuator mounting and unmounting:
    - Before installing the actuator on to the valve, be sure the actuator is properly indicating the valve position. Failure to assemble these to indicate correct valve position may result in damage or personal injury.
    - When installing or removing a linkage kit, best practice is to remove the entire linkage assembly, including couplings which may fall off the valve during lifting or when position changes.
    - Mounting sets have been designed to support the weight of the Valmet actuator and recommended accessories. Use of the linkage to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.
40. The valve should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the valve between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.

41. Repairs on valves for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
    - Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
    - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
    - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test 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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