

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

## MODEL BC



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## 0.- DESCRIPTION

The BC model knife gate is a square-port low-pressure valve for solid loaded fluids, mainly used in bulk handling and silo outlet applications.


The BC valve complies with the following European directives:

- **DIR 2006/42/EC (machines)**
- **DIR 97/23/EC (PED)** Fluid: Group 1 (b), 2 (Cat. I, mod.A)

It may also comply with the directive:



- **DIR 94/9/EC (Explosive Atmospheres)**

The BC valve may comply with the directive regarding equipment and protective systems for their use in explosive atmospheres. In these cases, the logotype  shall appear on the identification label of the valve. This label shows the exact classification of the zone where the valve can be used. The user will be liable for its use in any other zone.

This directive only applies in the following atmospheric conditions:

$$0,8 \text{ bar} \leq P \leq 1,2 \text{ bar}$$

$$-20^{\circ}\text{C} < T < 60^{\circ}\text{C}$$

Any increase in temperature due to frictional warmth is negligible, since the relative speed of the moving parts is extremely low.

The risk analysis associated to this directive does not take into account the fluid that goes through the valve, even when such fluid produces an explosive atmosphere. The user must take into account the risks that the fluid generates, such as:

- heating of the valve surface.
- generation of electrostatic charges caused by displacement of the fluid.
- shock waves caused by the installation (water hammer), internal crashes generated by the pellets or the risks due to foreign bodies susceptible of being present in the installation.

## 1.- HANDLING

The valves are packed according to the appropriate transport standards. If you receive the packing damaged, please inform the transport company in writing and contact your Orbinox representative.

When handling an Orbinox valve please pay attention to the following points:



- **Do NOT attach lifting gear to the valve actuators or gate guards.** They are not designed to bear the weight, and could easily be damaged.
- **Do NOT lift the valve by the valve bore.**  
This can cause damage to the seating surfaces and seals.
- Check that selected lifting gear is rated to carry the weight of the valve.
- The valve can be handled using eyebolts, soft straps or slings.
- Eyebolts: make sure the eyebolts have the same thread as the boltholes and they are all well secured. Ideally when using lifting gear to move an Orbinox valve, it should be supported by two or more eyebolts screwed into the tapped fixing holes in the valve body.
- Soft straps: with the valve in the closed position, the straps should be placed between the gland area and the bore such that the valve is balanced.

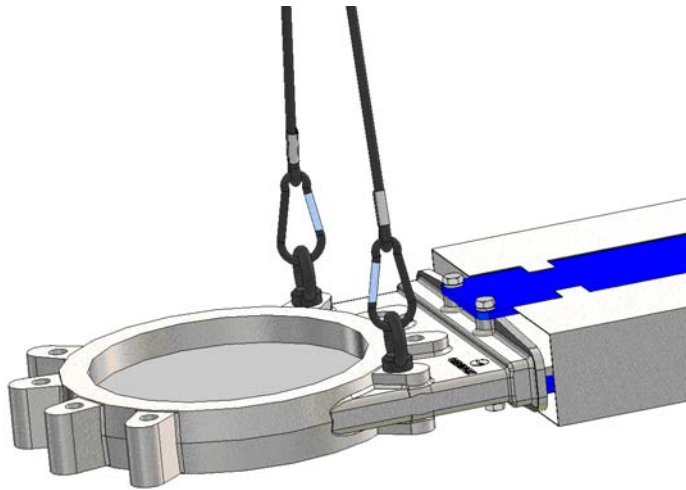


Fig. 1 Handling with eyebolts

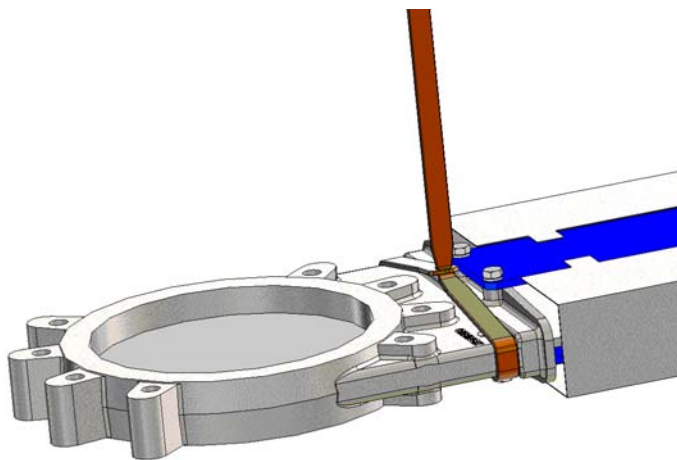


Fig. 2 Handling with soft straps

## 2.- INSTALLATION



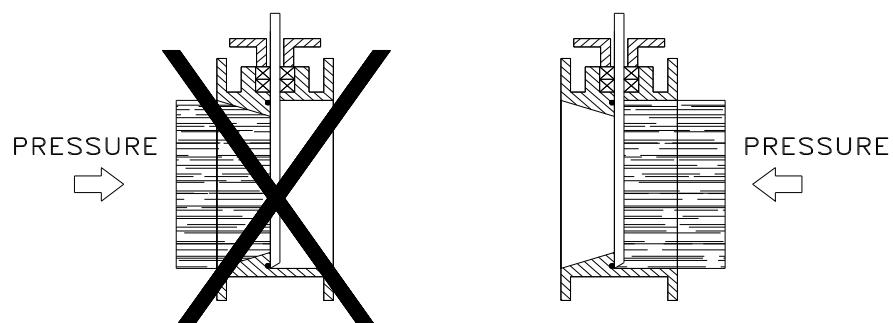
To avoid personal injury or damage to property from the release of process fluid:

- Those in charge of handling and maintenance of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (gloves, safety shoes, etc).
- Shut off all operating lines to the valve and place a warning sign.
- Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve.
- According to **EN 13463-1 (15)**, during installation and maintenance operations, use hand tools (**non electric**) with Working Allowance.

Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage. Make sure the internal cavities within the valve body are clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean.

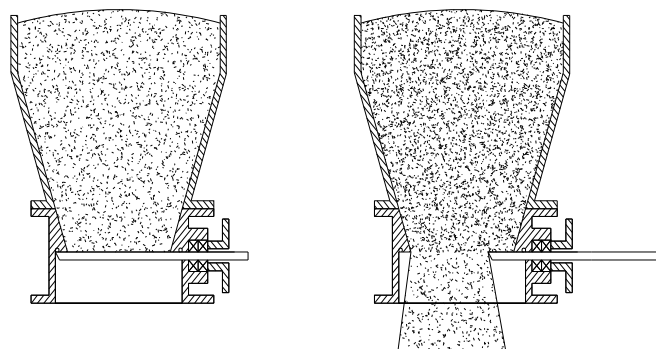
The valve is unidirectional. The valve should be set up so that the greatest pressure acts towards the seat. Except on those cases where the valve is mounted under silo (see next pictures).

### a) Pressure towards the seat

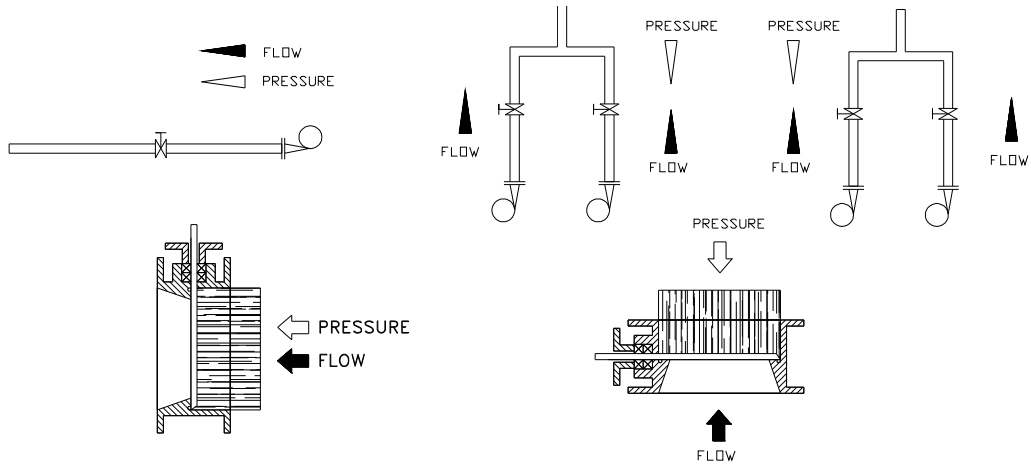


### b) Valve under silo

It is worth making a special mention of assemblies at the outlet of a hopper or silo where pressures are low and the valve is used as an isolation valve for solids. In these cases the cleanliness of the sliding guides takes priority, and the valve should be placed as shown in the following diagram.



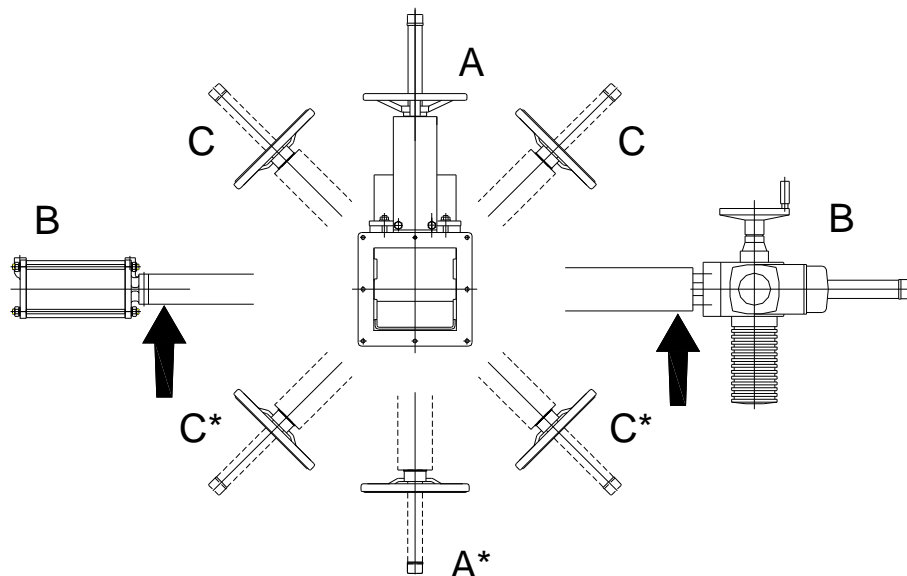
It should be noted that the direction of flow and differential pressure, do not always coincide.



Special care should be taken to maintain the correct distance between the flanges and to ensure that they are parallel to the valve body. Incorrect alignment of the valve can cause deformations, which can lead to difficulties in operation.

The valve can be mounted in any position with regard to the pipe. However, it is advisable to place it vertically in horizontal pipeline (A) if the installation allows it. (Please consult the technical department at Orbinox).

With larger valves ( $\geq 400 \times 400$ ), heavy actuators (pneumatic, electric, etc.), or with the valve installed horizontally (B) or at an angle (C) on a horizontal pipeline, the installation will require the construction of suitable supports. (See the following diagram and consult the technical department at Orbinox).



*\* For these positions please consult Orbinox.*

In vertical pipelines, the construction of suitable supports is always required (for further information please consult the technical department at Orbinox).

Once the valve is installed, test that the flanges have been fastened correctly and that all electrical and/or pneumatic connections have been properly made.



These instructions must be observed when installing an Orbinox knife gate valve in an ATEX zone:

- Make sure the valve is ATEX marked according to the requested zone and it includes all anti-static devices.
- Check continuity between the body of the valve and the pipe (test in accordance with EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1).
- This check must be done every time the valve has been removed from the line, serviced, and put back to the line.



The operation of automated valves is limited only with fitted gate covers.

First, operate the valve with no flow in the pipeline. Then test operation and valve seal with flow. It should be noted that the packing material might settle in shipping/storage, which can cause minor leakage. This can be remedied by tightening the gland follower (5) during installation. The nuts shall be tightened gradually and crosswise until the leakage stops (see the next figure). Check that there is no metal contact between the glandfollower (5) and the gate (2).



If the glandfollower nuts are pulled to hard, the force needed to operate the valve will increase, the valve function will be affected and the box packing lifetime will be shortened.

The table below shows the maximum torque value for tightening the glandfollower nuts.

| DN         | Torque (N.m) |
|------------|--------------|
| 50 - 100   | 20           |
| 125 - 200  | 30           |
| 250 - 1000 | 35           |

Once performance has been tested, the valve can be put into operation.

Approximate weight of the handwheel-operated valve (rising stem):

| Size        | 200x200 | 250x250 | 300x300 | 350x350 | 400x400 | 450x450 | 500x500 | 600x600 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Weight (Kg) | 27      | 32      | 38      | 58      | 66      | 75      | 85      | 110     |

### 3.- ACTUATORS

#### 3.1.- Handwheel

To open the valve turn the handwheel (11) anticlockwise. To close turn the handwheel clockwise.

#### 3.2.- Lever

To operate the valve with this device, first loosen the locking clamp located on the top of the yoke (8). Then either open or close the valve by moving the lever in the desired direction. Finally, fix the position of the lever with the locking clamp.

#### 3.3.- Pneumatic

Valves are usually supplied with a double acting pneumatic actuator although, upon request, we can supply single-acting actuators. In both cases, the inlet air pressure should be, between 3,5 to 10 Kg/cm<sup>2</sup>. However, the size of the actuator for each valve has been designed for a feed pressure of 6 Kg/cm<sup>2</sup>.

It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated.

It is recommended to actuate the cylinder 3-4 times before the start up, once it is installed in the pipeline.

#### 3.4.- Electric actuator

Depending on the type or make of the electric actuator, specific instructions (i.e. a manufacturer's manual) will be supplied.



- Allowed actuators for ATEX zones: Hand wheel, Chain Wheel, Bevel Gear, Lever, Pneumatic Actuator (double acting **ONLY**) and Electric Motor
- Make sure these actuators are ATEX marked according to the requested zone.
- Maximum travel speed of the gate must equal or below 0,05 m/s

### 4.- MAINTENANCE

The valve must not undergo any modifications without a previous agreement with ORBINOX. ORBINOX shall not be liable for any damages that may arise due to the use of non original parts or components.



To avoid personal injury or damage to property from the release of process fluid:

- Those in charge of handling and maintenance of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (gloves, safety shoes, etc).
- Shut off all operating lines to the valve and place a warning sign.
- Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve.
- According to **EN 13463-1 (15)**, during installation and maintenance operations, use hand tools (**non electric**) with Working Allowance.

The only maintenance required is to change the gland packing (4) or the seal (3) if the valve is a resilient seated type.

The life of these elements will depend on the working conditions of the valve such as: pressure, temperature, abrasion, chemical action, number of operations, etc.

#### 4.1. - Replacement of the gland packing (4):

- 1) Depressurise the circuit and place the valve in close position.
- 2) Remove the gate guards (for automatically actuated valves only).
- 3) Release the spindle or stem (9) from the gate (2). Photo 1

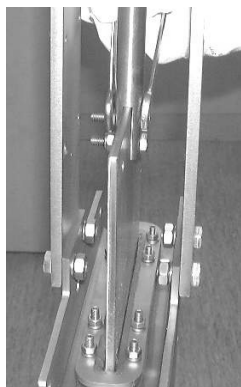


Photo 1

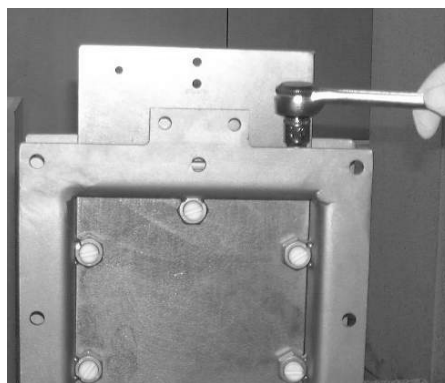


Photo 2

- 4) Loosen the screws of the yoke (8) and remove it (without loosening the actuator).
- 5) Loosen the nuts of the gland follower (5) and remove it. (Photo 2)
- 6) Remove the old packing rings (4) and clean the stuffing box.
- 7) Insert the new packing rings (4), making sure that the ring joints alternate (the first on one side of the gate, the next on the other and so on). (Photo 3)
- 8) Once the necessary packing rings (4) have been inserted, proceed with a steady initial tightening of the gland follower (5). (Photo 2)
- 9) Place the yoke (8) (with the actuator) and screw it.
- 10) Fix the stem (9) to the gate (2). (Photo 1)
- 11) Remount the gate guards.
- 12) Carry out some operations with a loaded circuit and then re-tighten the gland follower (5) to prevent leakage.

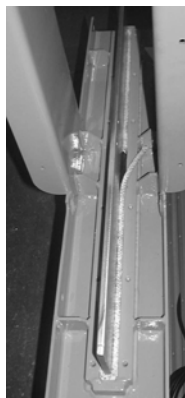


Photo 3

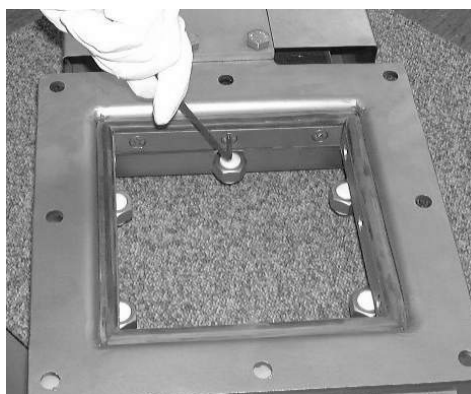


Photo 4

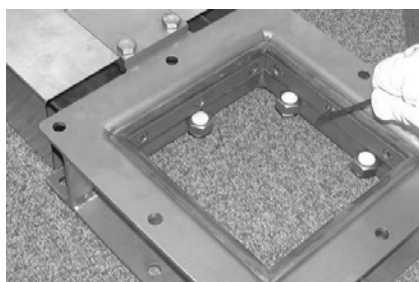


Photo 5



#### 4.2.- Replacement of the seal (3) (only applicable to resilient seated valves):

- 1) Remove the valve from the pipeline.
- 2) Set the gate (2) in open position.
- 3) Take off the plates (6), which retain the seals (3).
- 4) Remove the old seals (3) from the valve and clean the seats.
- 5) Once the correct length is known, cut the new sets of seals (3).
- 6) Place the new seal (3) on the top of the body (packing gland side) and secure the top plate (6). (Photo 4)
- 7) Place the next seal (3) on the bottom and secure the bottom plate (6). Finally secure the side plates (6) and side seal (3). (Photo 5)
- 8) Set the gate (2) in closed position.
- 9) Check that the seal (3) and the gate (2) are in contact and then retighten all the plates(6).
- 10) Open and close the valve two or three times prior to reinstallation.

#### 4.3. - Lubrication:

Twice a year, it is recommended to remove the protection cap (13) and fill up the stem protector (12) halfway with a calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.



#### Special requirements for ATEX valves:

- The maintenance personnel must be made fully aware of the risks of explosion, and it is advisable that they receive specific training regarding ATEX.
- Periodicity of check and evaluation of graphite packing status and valve electrical conductivity must be determined by end user according to valve working conditions. In any case, once the valve is put into operation, the packing area must be revised after the valve has been stroked 100 times or after 3 months of operation, whatever happens first. After this preliminary check, new checking periods must be determined by end user based on the results of this first check.
- Clean the valve periodically to prevent dust accumulation. Do not sweep or dump the dust. Always use a vacuum cleaner system
- Dead en service is not allowed.
- Do not apply any new coating to the valve. Should it require new coating, please contact our closest representative.
- Allowed seals: EPDM, VITON, NITRILE, GRAPHITE and METAL (no seal)
- Allowed packing: ST and GRAPHITE packing
- Any other materials but those above are not allowed to be used in ATEX zones.
- In order to keep the ATEX approval, always use original spares from Orbinox.
  - Washer → DIN 6798A (This washer guarantees continuity among carbon steel parts, coated in epoxy, yoke and body and stainless steel guards for coating thicknesses up to 200 microns)
  - ST and GR packing →
    - ORBINOX ST: Synthetic packing impregnated with PTFE
    - GR: Graphite packing → MONTERO Ecograflex 780R
- After any maintenance of ATEX valves, it is mandatory to check that the valve is earthed through the pipe, and there is continuity among the different valve components, such as the body, the gate, the supports, and guards (test in accordance with EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1).

### MAXIMUM FLUID TEMPERATURES

| Atmosphere  |   |
|---|---|
| Gas/air, steam/air, and mist/air                      | Dust/air  |
| 80% of minimum fluid ignition temperature, minus 10°K | 2/3 of minimum dust cloud ignition temperature minus 85°K |

*Note: these maximum fluid temperatures apply to all categories. The differences between categories are the consideration of foreseeable malfunction cases and rare malfunctions cases.*

### MAXIMUM SEAL AND PACKING TEMPERATURES

| Max Temperature (°C) | SEAL |       |         |          |
|----------------------|------|-------|---------|----------|
|                      | EPDM | VITON | NITRILE | GRAPHITE |
|                      | 120  | 200   | 120     | 600      |

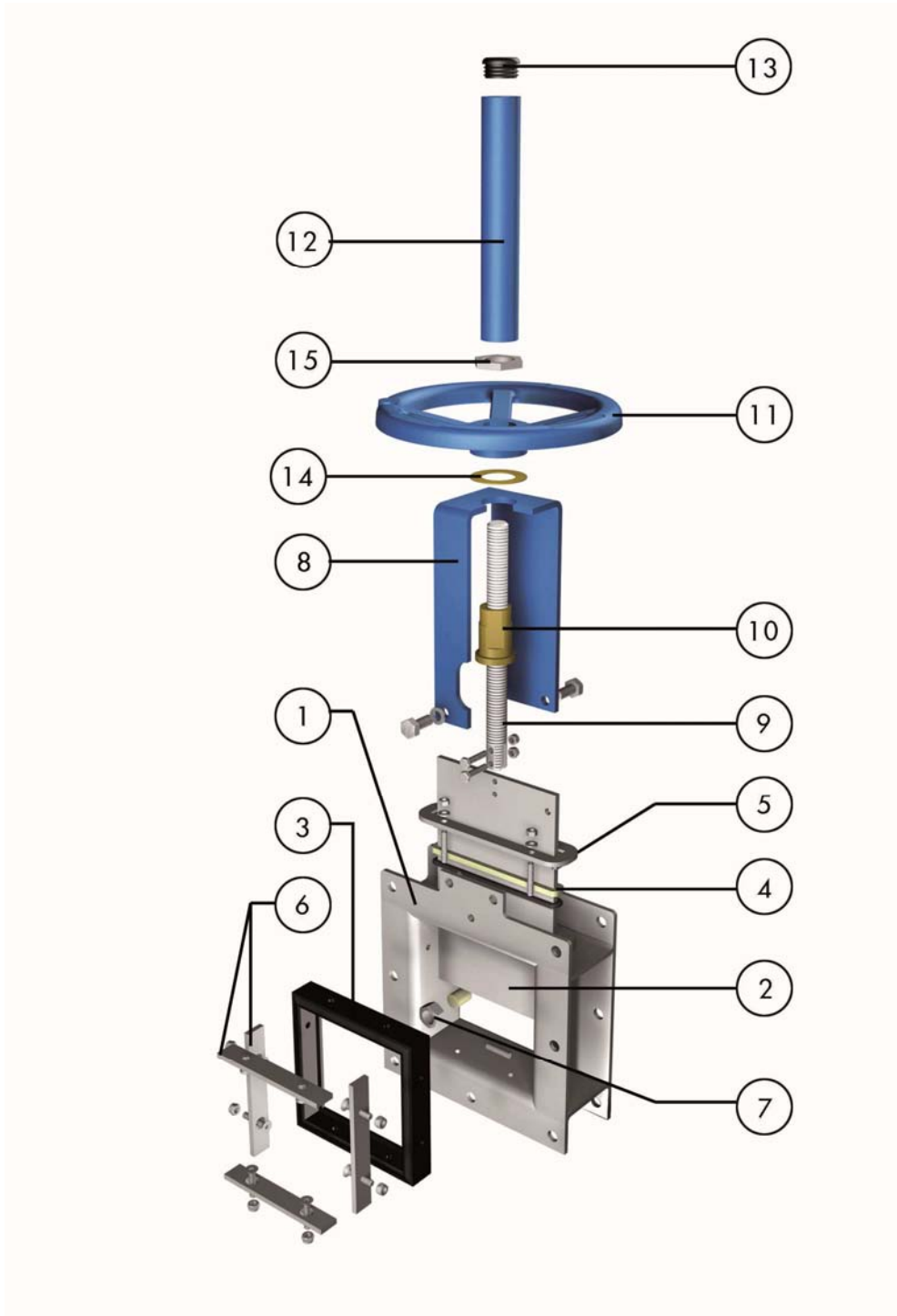
| Max Temperature (°C) | PACKING |          |
|----------------------|---------|----------|
|                      | ST      | GRAPHITE |
|                      | 240     | 600      |

*Note: Most of the times seals maximum temperature capacity is the key limitation factor when evaluating valve maximum working temperatures. In ATEX zones these temperatures must be compared to those above related to limitation of fluids temperatures. Always consider the most restrictive as maximum valve working temperature.*

## 5.- STORAGE

- For long storage periods keep the valves indoors in a safe and dry place and protect it from any impact and or vibrations.
- Storing temperatures: -10°C to +40°C.
- Valves must be stored in either full open or full closed position.
- For any component installed in the valves, electric motors, solenoid valves, etc, please refer to their own instructions manuals.

## 6.- PARTS LIST & DRAWINGS



- |                         |                      |
|-------------------------|----------------------|
| 1.- BODY                | 8.- YOKE             |
| 2.- GATE                | 9.- STEM             |
| 3.- SEAL                | 10.- STEM NUT        |
| 4.- PACKING RING        | 11.- HANDWHEEL       |
| 5.- GLAND FOLLOWER      | 12.- STEM PROTECTOR  |
| 6.- SEAL RETAINER PLATE | 13.- CAP             |
| 7.- SLIDER SUPPORT      | 14.- FRICTION WASHER |
|                         | 15.- NUT             |