

**MODEL**

**XC with bonnet**



## **INSTALLATION, OPERATION & MAINTENANCE MANUAL**

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## **Knife Gate Valve**

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### **XC with Bonnet Knife Gate Valve**

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## 0. INTRODUCTION

The XC model knife gate is a unidirectional wafer valve designed for industrial bulk handling service applications (i.e. powdered and granular products). The special design of the body allows for easy passage of the fluid and makes it ideal for use as a silo outlet valve. The bonnet assures a tight seal to atmosphere for use with hazardous gases or steam, and reduces packing maintenance. It also reduces the torque required for valve operation.

The XC valve complies with the following European directives:

- Machinery Directive

When applicable it can also comply with the following additional directives:

- Pressure Equipment Directive
- Potentially Explosive Atmospheres (ATEX)

It is the user's liability to verify the maximum working conditions (PS, TS), medium (gas or liquid) and dangerousness group (1 or 2) and if the fluid is unstable to properly classify the valve according the PED directive

ORBINOX offers, supplies and certifies valves according to the information received from the customer. The customer is liable to make sure this information is accurate and according to specific working conditions requirements where the valve will be installed.

**For EU Directives and other Certificates, please see the document:  
Directives & Certificates Compliance - Knife Gate Valves - IOM**

## 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 you 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 bolt holes 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.

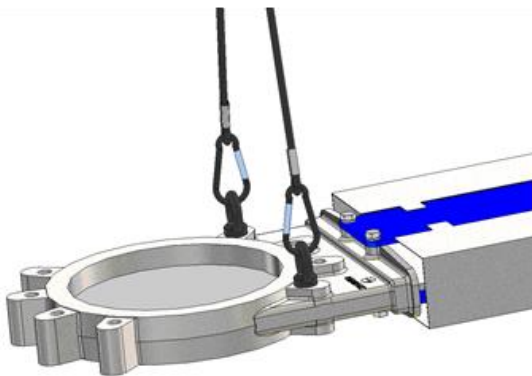


Fig. 1 Handling with eyebolts

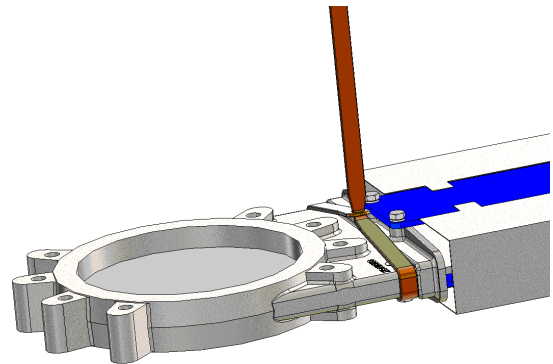


Fig. 2 Handling with soft straps

## 2. INSTALLATION

**For EU Directives and other Certificates, please see the document:  
Directives & Certificates Compliance - Knife Gate Valves - IOM**

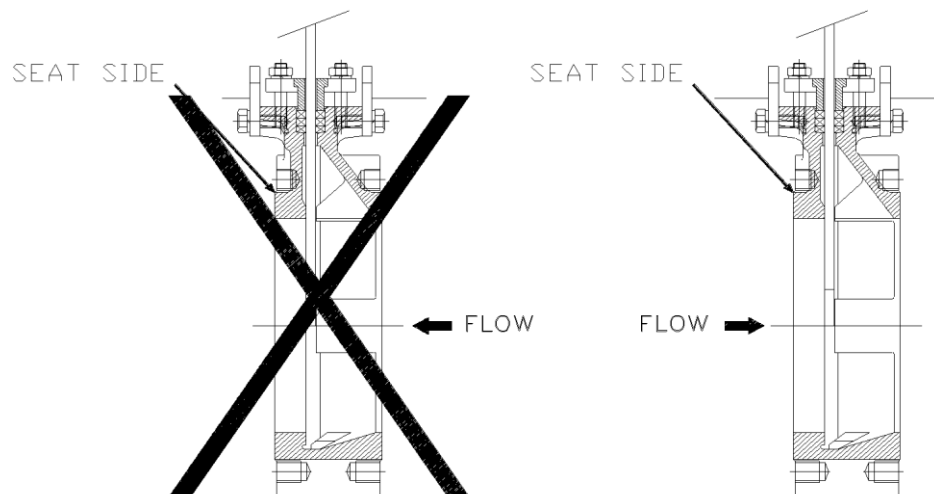


In order to avoid personal injury or damage to property when handling and installing the valve, it is important to observe the following warnings:

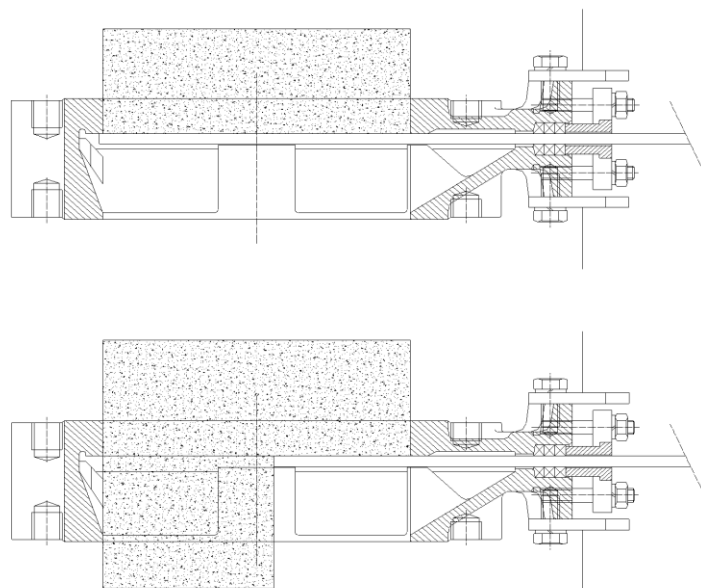
- It is the User's responsibility to verify compatibility of valve parts materials with the internal fluid
- Qualified and trained personnel must carry out the handling and maintenance of the valve
- Use suitable Individual Protection Equipment (IPE) (gloves, safety footwear...)
- Disconnect all lines affecting the valve and put up a notice notifying that work is being carried out on the valve
- Isolate the valve completely from the process
- Release process pressure
- Drain the fluid from the valve

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 designed for solid-loaded fluids. It is normally installed to back pressure to avoid product accumulation in the valve body. The inlet side is always on the seat side (see diagram).



For use at the outlet of a silo or hopper, the valve should be mounted in the following manner:



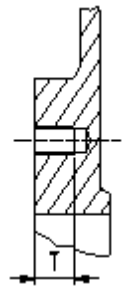
Installation and the correct orientation with respect to the direction of the flow is the responsibility of the user.

For the valve to operate correctly, it is essential to keep the gate guides clean. Depending on the process, this is done by injecting water or air into the valve body. To allow this, the valve body has two flush ports (16). The cleaning fluid must be supplied constantly and delivered at a pressure of 1 Kg/cm<sup>2</sup> above line pressure.

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 following table shows recommended torque values for the valve fixing bolts and the maximum depth (T) of blind tapped holes:

DN (mm)	T (mm)	PN-10 (EN 1092-1/2)	CL150 (ASME B16.5/B16.47 Series A)	Torque (N.m) <sup>(1)</sup>	Torque (N.m) <sup>(2)</sup>
50- 65	8	M16	5/8" - 11 UNC	35Nm	70Nm
80	9	M16	5/8" - 11 UNC	35Nm	70Nm
100	11	M16	5/8" - 11 UNC	35Nm	70Nm
125	11	M16	3/4" - 10 UNC	35Nm	70Nm
150-200	14	M20	3/4" - 10 UNC	70Nm	140Nm
250-300	18	M20	7/8" - 9 UNC	70Nm	140Nm
350	22	M20	1" - 8 UNC	70Nm	140Nm
400	21	M24	1" - 8 UNC	120Nm	235Nm
450-500	22	M24	1 1/8" - 7 UNC	120Nm	235Nm
600	24	M27	1 1/4" - 7 UNC	175Nm	350Nm



Select the recommended torque based on bolt size for other flange drilling patterns.

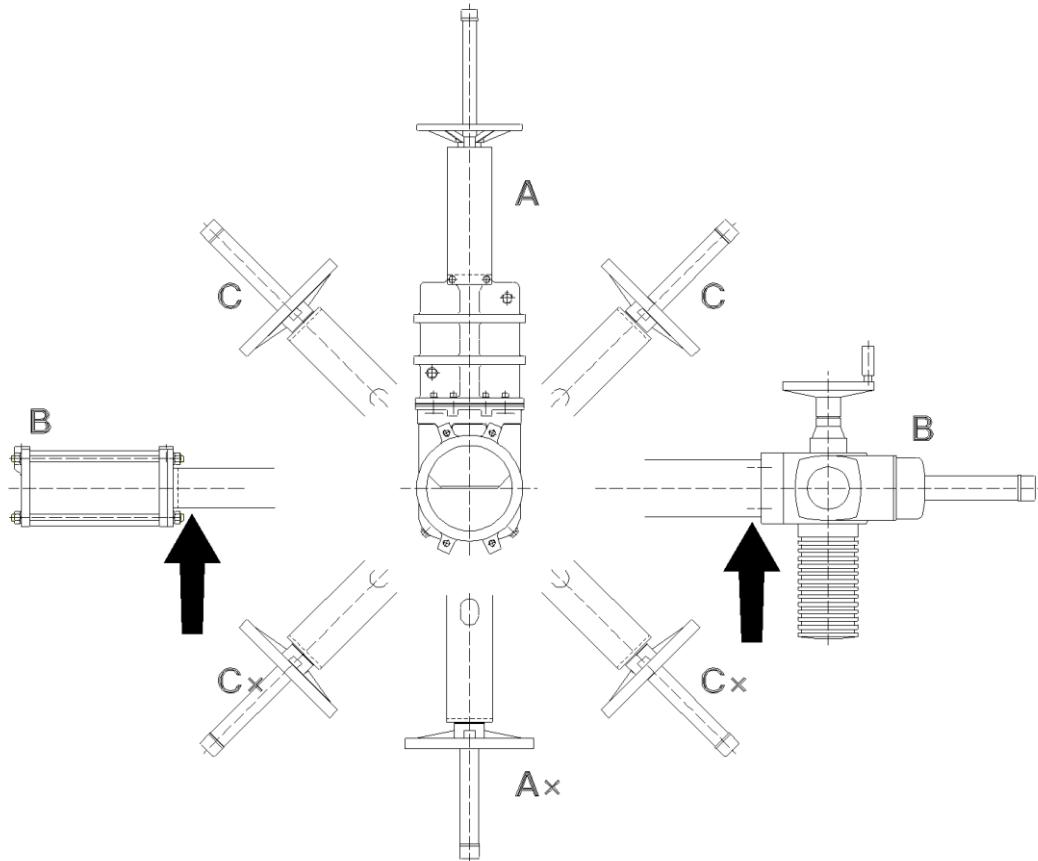
Make sure that cross-pattern tightening sequence is always followed.

(1) GJL-250 body material. According to EN 1092-2

(2) other body materials. According to EN 1092-1

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 diameters (> 300 mm), 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*

The installation of suitable supports is advised when significant vibrations coming from the piping are present.

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.

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.

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

### 3. ACTUATORS

**For EU Directives and other Certificates, please see the document:  
Directives & Certificates Compliance - Knife Gate Valves - IOM**

#### 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 either case the feed pressure can vary between 3,5 and 10 bar. However, the size of the actuator for each valve has been designed for a feed pressure of 6 bar.

It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated. Air quality shall fulfil the following requirements:

- ISO 8573-1 Grade 5:4:3 for regular process (ON / OFF services).
- ISO 8573-1 Grade 5:3:3 for regular process at low temperature (-20 °C).
- ISO 8573-1 Grade 3:4:3 for cylinders with positioners.
- ISO 8573-1 Grade 3:3:3 for cylinders with positioners at low temperature (-20 °C)

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.



## 4. MAINTENANCE

### **For EU Directives and other Certificates, please see the document: Directives & Certificates Compliance - Knife Gate Valves - IOM**

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.

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):**



Although the design of the valve bonnet allows the stuffing box of the bonnet to be sealed from below, we advise that the valve is depressurised prior to beginning any maintenance.

1. Open the valve fully, to tighten the stem against the stuffing box.
2. Remove gate guards (if the valve has them).
3. Loosen the nuts of the gland follower (5) and remove it. (Photo 1)
4. Remove the old packing (4) and clean the stuffing box.
5. Insert the new packing rings (4), making sure that the ring joints alternate. (Photo 2)



Photo 1

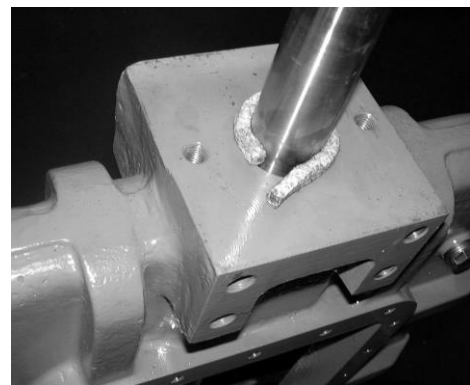


Photo 2

6. Once the necessary packing rings (4) have been inserted, proceed with a steady initial tightening, of the gland follower (5). (Photo 1)
7. Remount the gate guards (if the valve has them).
8. Carry out some operations with a loaded circuit and then re-tighten the gland follower (5) to prevent leakage.

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

1. Remove the valve from the pipeline.
2. Loosen the nuts between the body (1) and the bonnet (14). (Photo 3)
3. Lift the bonnet (14), until the gate (2) is free. (Photo 4)

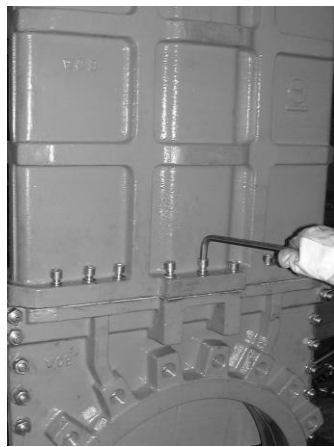


Photo 3

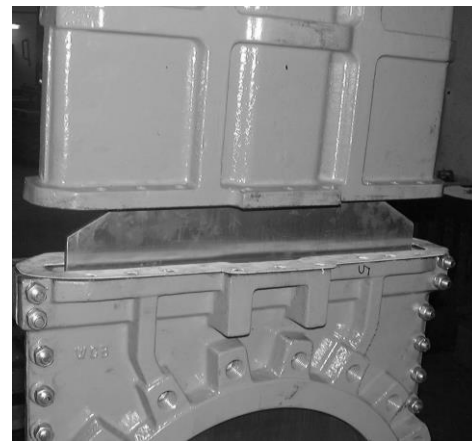


Photo 4

4. Remove the seal retainer ring (10), which supports the seals (3).
5. Remove the worn out seals (3) and clean the seal housing.
6. Once the new seal (3) has been cut according to size, insert it into the seat housing (making sure that the union of the seal is at the top). (Photos 5 and 6).

If the valve has PTFE seal (3), follow the point 4.3.

#### Seal lengths (L)

DN (mm) : L (mm)			
DN 50: 240	DN 125: 485	DN 300: 1040	DN 500: 1670
DN 65: 290	DN 150: 565	DN 350: 1200	DN 600: 1970
DN 80: 340	DN 200: 720	DN 400: 1355	
DN 100: 410	DN 250: 880	DN 450: 1510	

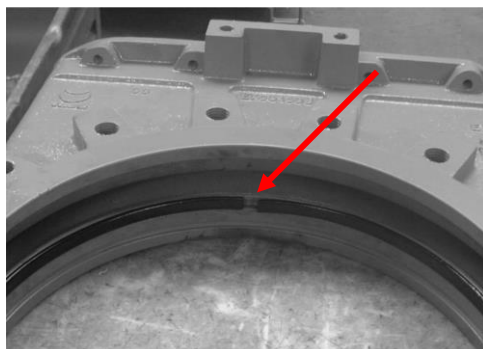


Photo 4

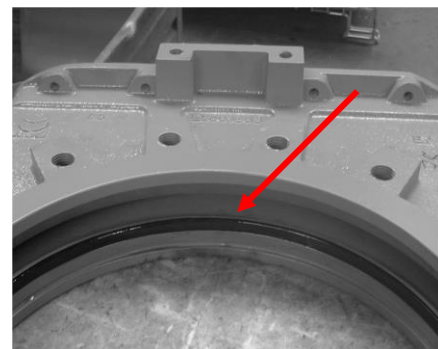


Photo 5

7. Insert the seal retainer ring (10) by hammering gently around the edge. (Photos 7 and 8).



Photo 9



Photo 10

8. Remount the bonnet onto the valve (with the gate cleaned), and bolt it onto the body (1) (Photos 4 and 3) changing the gasket (15), between body (1) and bonnet (14). (Photo 9)

9. Open and close the valve two or three times before returning it to the installation.

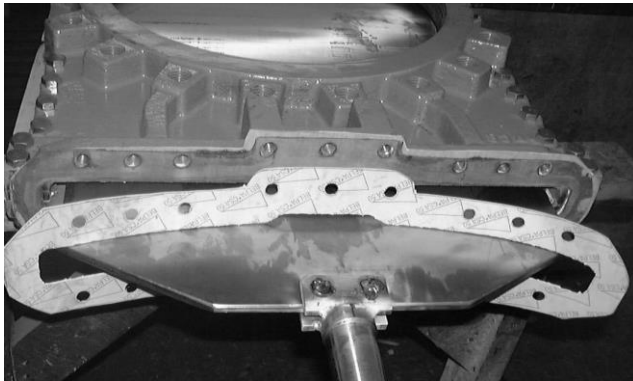


Photo 9



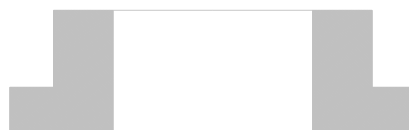
Photo 10

### 4.3. Replacement of the PTFE seal (3):

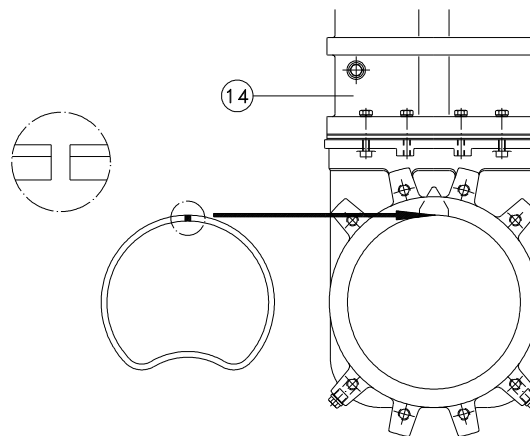
Follow the same procedure as point 4.2 but with following notes:

1. To obtain a tighter shut off in stainless steel valves, the machined housing of the seat is sealed with plastic glue. This is not necessary in cast iron valves.

With the seal in this position:



2. Make a circle; joining the ends and making a heart-shaped form (see the following diagram).
3. Insert both ends of the seal in the upper side of the machined housing of the seat (adjacent to the bonnet (14)), and pushing the arched part with a finger, insert the seal into the housing. If the diameter of the valve is small ( $DN \leq 150$ ), a vice can be used.



#### 4.4.- Replacement of the gland packing (7), in valves with “intermediate packing” (see detail C in Parts List & Drawing):

1. Remove the valve from the pipeline.
2. Loosen the nuts between body (1) and bonnet (14). (Photo 3)
3. Lift the bonnet (14) of the valve until the gate (2) is free. (Photo 4)
4. Remove the retaining plate (17) and gaskets (15).
5. Remove the old packing (7) and clean the stuffing box.
6. Insert new packing (7), making sure that the packing joints alternate (first one side of the gate, the next on the other side and so on). (Photo 10)
7. Once the necessary packing (7) has been inserted, change the upper and lower gaskets (15) and remount the retaining plate. (Photo 9)
8. Remount the bonnet onto the valve, and bolt it into the body (1) (Photo 4 and 3).

#### 4.5. Lubrication:

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

## 5. FLUSH-PORTS

For the valve to operate correctly, it is essential to keep the gate guides clean. Depending on the process, this is done by injecting water or air into the valve body. To allow this, the valve body has two flush ports (16). The cleaning fluid must be supplied constantly and delivered at a pressure of 1 Kg/cm<sup>2</sup> above line pressure.

The valves come fitted with flush-ports (16) to allow connection to a cleaning system to flush the bonnet with water or air. The ports are plugged with threaded metal plugs. These can be removed for connection to a cleaning system, or for flushing the bonnet in the event of a blockage.

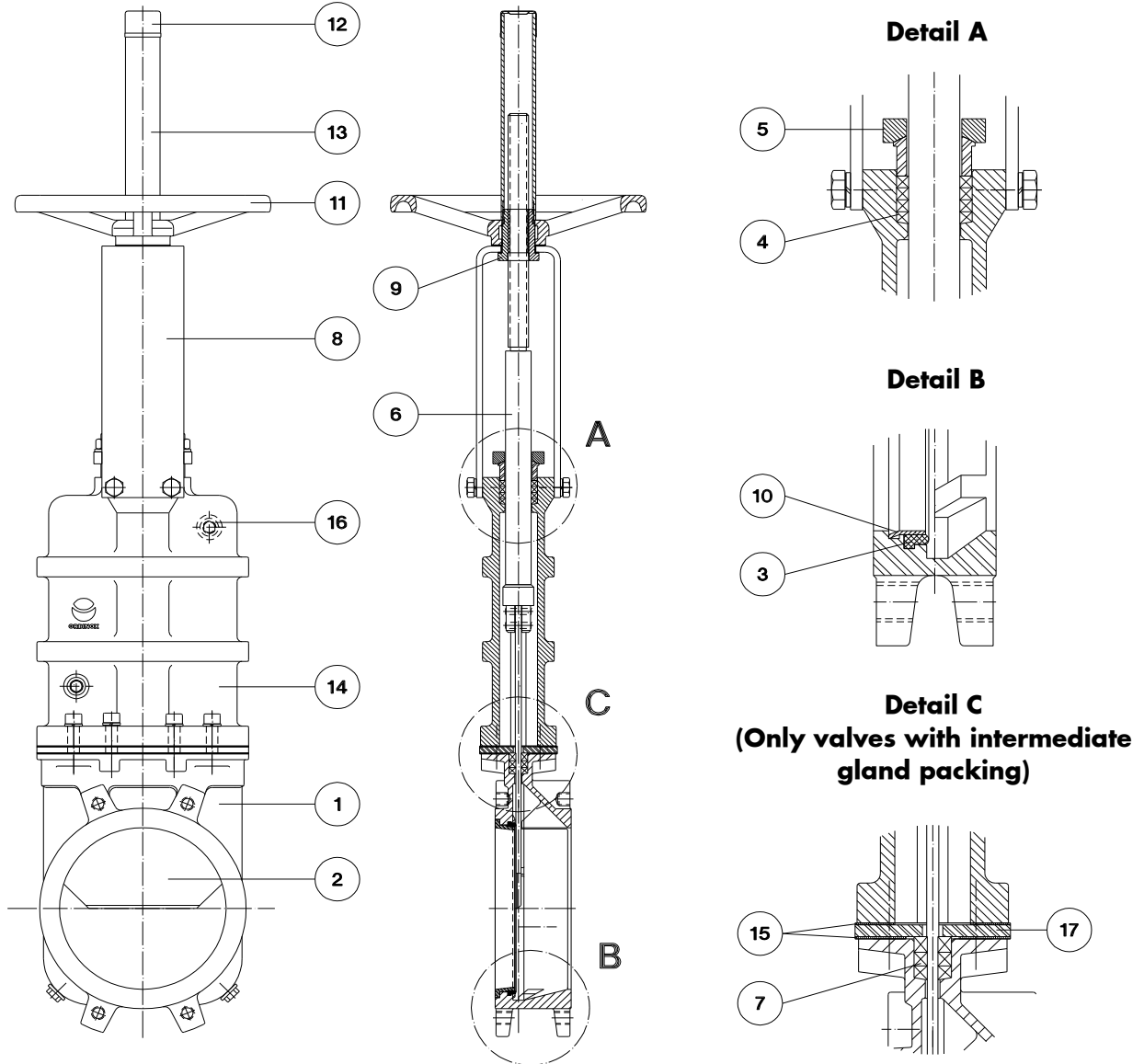
## 6. STORAGE

- 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

## 7. ENVIRONMENTAL CONSIDERATIONS

- The packaging is made from environmentally friendly materials. Dispose of the packaging through the available recycling channels
- The valve is designed and manufactured with materials that can be recycled by specialised recycling firms. Once the life of the product is expired, you have to consider a proper disposal of the product in order to prevent any negative impact on the environment and allows for the recycling of valuable commodities
- Please follow the local environmental rules in your country for proper disposal

**8. PARTS LIST & DRAWINGS**



1. BODY	10. SEAL RETAINER RING
2. GATE	11. HANDWHEEL
3. SEAL	12. CAP
4. PACKING	13. STEM PROTECTOR
5. GLAND FOLLOWER	14. BONNET
6. SEAL RETAINER RING	15. GASKET
7. INTERMEDIATE PACKING	16. FLUSH -PORTS
8. YOKE	17. RETAINING PLATE
9. STEM NUT	