

MODEL

TK



INSTALLATION, OPERATION & MAINTENANCE MANUAL

TK Knife Gate Valve



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0. INTRODUCTION

The TK model knife gate is a through-conduit bi-directional wafer valve designed for high consistency fluids. The double seat design assures a non-clogging shut off on either normal or reverse flow.

The TK 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 clearly inform 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 to 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 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 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.

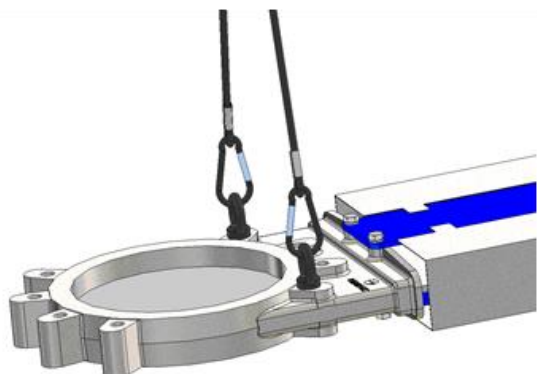


Fig. 1 Handling with eyebolts

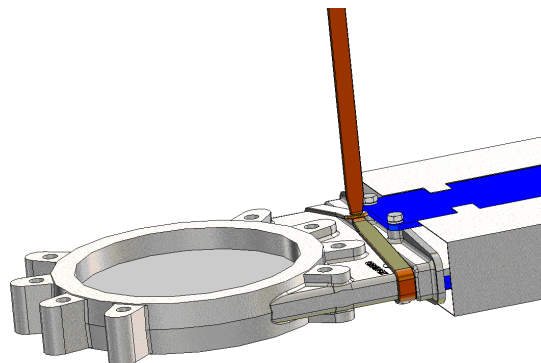
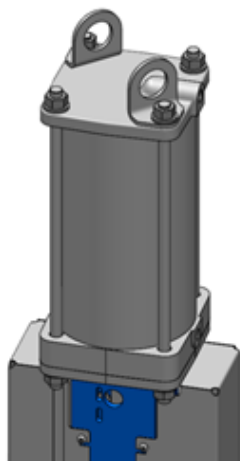


Fig. 2 Handling with soft straps

PNEUMATIC ACTUATED VALVES (Non-standard valves shall be checked case by case)

ORBINOX pneumatic valves (with Ø125 cylinder and above) are supplied with 2 lifting lugs for a safe handling of the valve for vertical movements

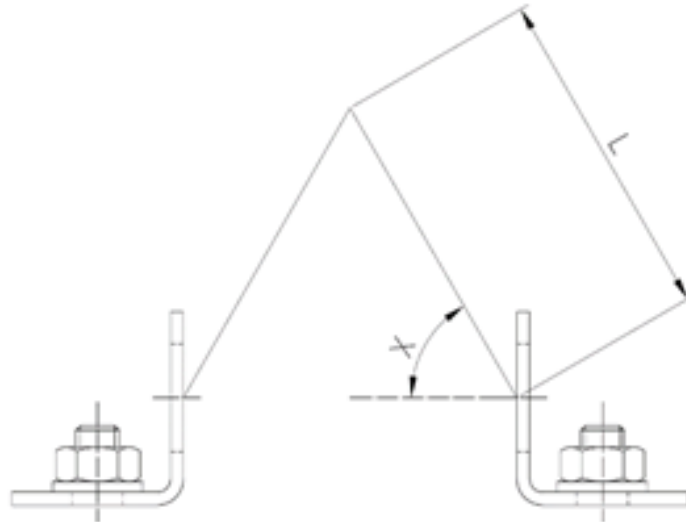


Handling WARNING:



Lifting lugs are not machined so they could have sharp corners; soft straps or slings are forbidden to be used with these lifting lugs

Below table shows the maximum weight of valve + pneumatic cylinder that 2 lifting lugs can hold depending on lifting chain angle (X):



CYLINDER	With 2 lifting lugs: max. weight valve + cylinder (kg.)			
	L: minimum lifting chain length			
	X: 60°		X: 75°	
	Kg.	Lmin (mm)	Kg.	Lmin (mm)
125	170	130	310	220
160	270	170	500	280
200	390	220	710	380
250	740	300	1335	500
300	1140	360	2030	600
350	1615	440	2835	720
400	2105	500	3660	830

- For horizontal movement, the valve shall be lifted mainly from the body and the yoke. See above instructions for further instructions
- Cylinder's lifting lugs can only be used during horizontal movement of the valve to help balance the valve given the weight is hold at the body lifting point (center of gravity is approx. centered on the body)
- The valve can be lowered from vertical to horizontal position when it is hanging from the cylinder's lifting lugs

Below table shows approximate weight of standard TK pneumatic valves (kg):

DN (mm)	CYL.	Kg.
DN 50	CYL 100	14
DN 65		16
DN 80		19
DN 100		25
DN 125	CYL 125	36
DN 150		43
DN 200	CYL 160	86
DN 250	CYL 200	116
DN 300		188
DN 350	CYL 250	233
DN 400		324
DN 450	CYL 300	378
DN 500		780
DN 600		960

2. INSTALLATION

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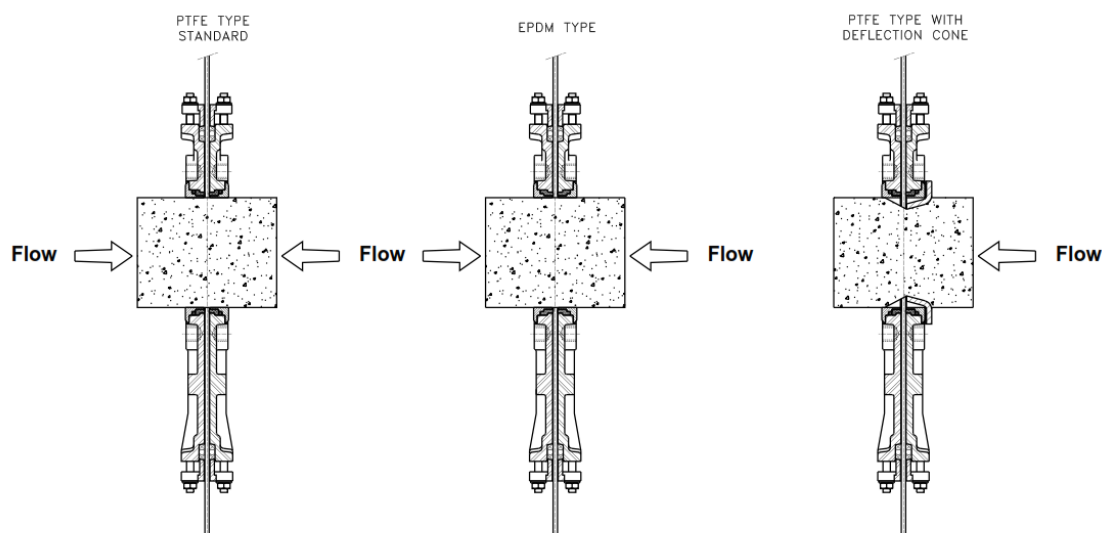
In order to avoid personal injury or damage to property when handling and installing the valve, it is important to observe the following warnings:

- 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.

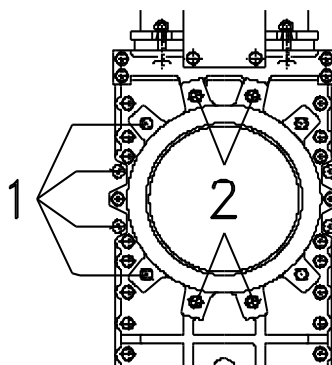
The TK valve is bi-directional. The standard PTFE seat and EPDM seat can be installed without taking the direction of fluid into consideration.

However, valves provided with a deflection cone (Type C) are unidirectional. It is vital that they be installed correctly with respect to the direction of the flow. Correct installation is the responsibility of the user.



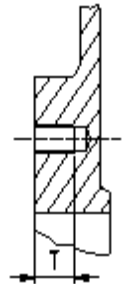
Special care should be taken to maintain the correct distance between the flanges and to ensure that they are parallel to the valve body. Incorrect alignment of the valve can cause deformations, which can lead to difficulties in operation.

Place the valve between flanges. First tighten the side bolts (1) and then the upper and lower bolts (2).



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

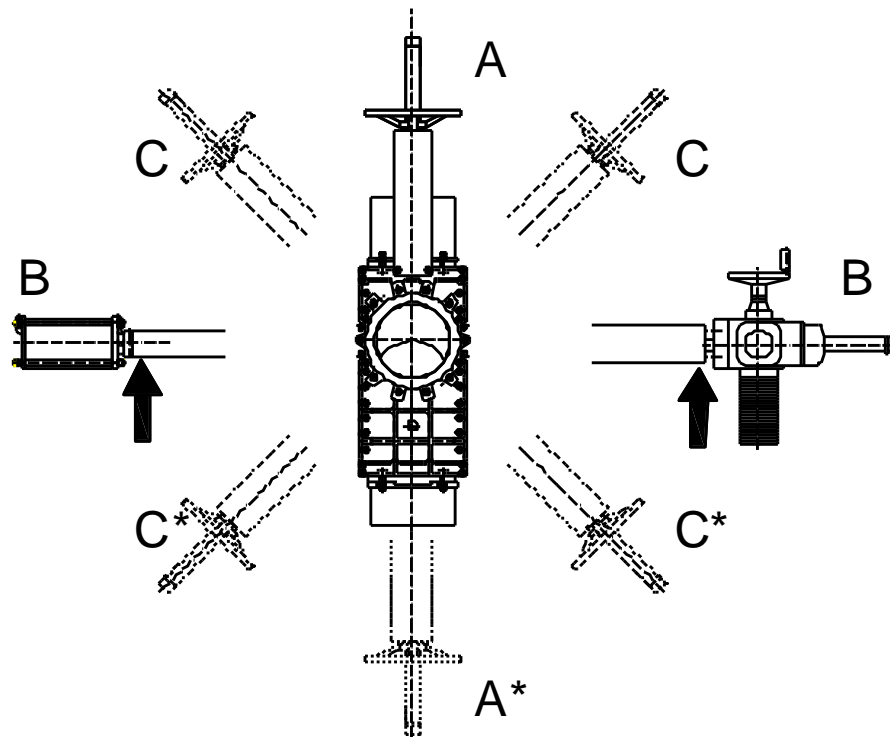
DN (mm)	T (mm)	PN-10 (EN 1092-1)	CL150 (ASME B16.5/B16.47 Series A)	Torque (N.m)
50-65	11	M16	5/8" - 11 UNC	70Nm
80	15	M16	5/8" - 11 UNC	70Nm
100	16	M16	5/8" - 11 UNC	70Nm
125	18	M16	3/4" - 10 UNC	70Nm
150	19	M20	3/4" - 10 UNC	140Nm
200	18	M20	3/4" - 10 UNC	140Nm
250	21	M20	7/8" - 9 UNC	140Nm
300	18	M20	7/8" - 9 UNC	140Nm
350	23	M20	1" - 8 UNC	140Nm
400	23	M24	1" - 8 UNC	235Nm
450	22	M24	1 1/8" - 7 UNC	235Nm
500	32	M24	1 1/8" - 7 UNC	235Nm
600	32	M27	1 1/4" - 7 UNC	350Nm
700	32	M27	1 1/4" - 7 UNC	350Nm
800	29	M30	1 1/2" - 6 UNC	470Nm
900	32	M30	1 1/2" - 6 UNC	470Nm



Select the recommended torque based on bolt size for other flange drilling patterns.
Make sure that cross-pattern tightening sequence is always followed.

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).



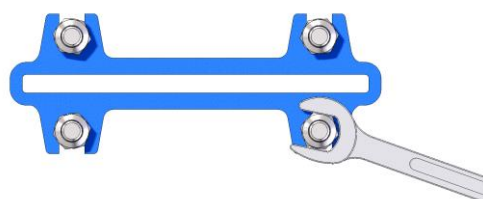
** For these positions please consult ORBINOX.*

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

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.

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 (6) 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 (6) 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 - 200	15
250 - 300	25
350 - 600	30
700 - 900	35

The following table shows the required tightening torque for the connecting bolts of the 2 half bodies:

DN	Metric	Minimum torque Nm	Maximum torque Nm
80 - 200	M10	40	65
250 - 350	M12	65	110
400	M16	160	290
500 - 900	M20	250	570

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

Approximate weight of the pneumatically operated valves:

DN (mm) : kg			
DN 50: 14 kg	DN 150: 43 kg	DN 400: 324 kg	DN 800: 2600 kg
DN 65: 16 kg	DN 200: 86 kg	DN 450: 378 kg	DN 900: 3200 kg
DN 80: 19 kg	DN 250: 116 kg	DN 500: 780 kg	
DN 100: 25 kg	DN 300: 188 kg	DN 600: 960 kg	
DN 125: 36 kg	DN 350: 233 kg	DN 700: 2000 kg	

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 (14) 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 (9). 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 (5) or the seal (3). 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 (6):

1. Depressurise the circuit and place the valve in close position.
2. Remove the gate guards (for automatically actuated valves only).
3. Non rising stem. Photo 1: Release the stem nut (7) from the gate (2).
Rising stem valves. Photo 2: Release the spindle or stem (8) from the gate (2).
4. Loosen the screws of the yoke (9) and remove it (without loosening the actuator).
5. Loosen the nuts of the gland followers (6) and remove them. (Photo 3)
6. Remove the old packing rings (5) and clean the stuffing boxes.
7. Insert the new packing rings (5), making sure that the ring joints alternate (the first on one side of the gate, the next on the other and so on).
8. Once the necessary packing rings (5) have been inserted, proceed with a steady initial tightening of the gland followers (6). (Photo 3)
9. Place the yoke (9) (with the actuator) and screw it.
10. Fix the stem nut (7) to the gate. (Non rising stem. Photo 1) or fix the stem (8) or the spindle to the gate (2) (Rising stem valves. Photo 2).
11. Remount the gate guards.
12. Carry out some operations with a loaded circuit and then re-tighten the gland followers (6) to prevent leakage.



Photo 1



Photo2

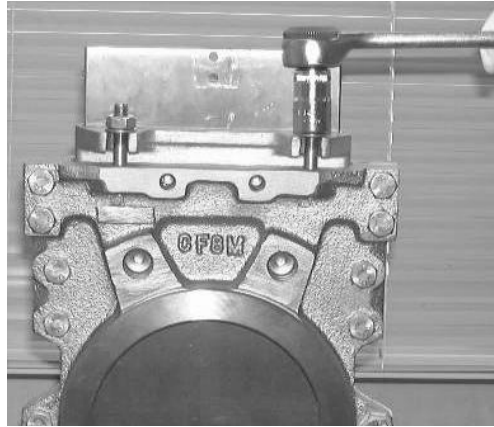
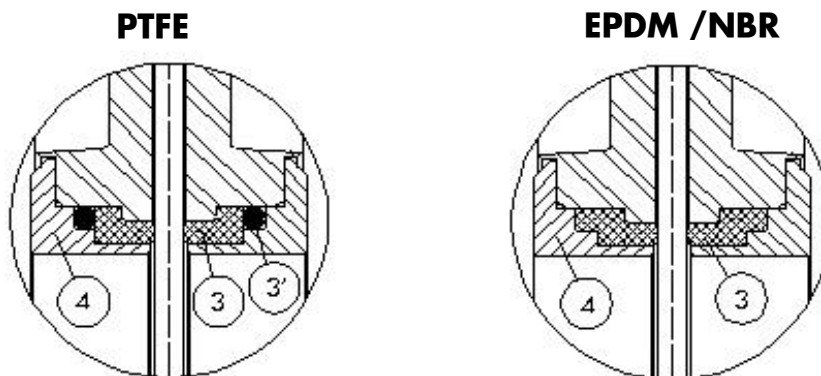


Photo 3

4.2. Replacement of the seal (3):

1. Remove the valve from the pipeline.
2. Remove the seal retainer K ring (4) which support the seal (3/3') loosening the screws that hold the K ring
3. Remove the worn seal (3/3') and clean the seal housing.
4. First, place the O-ring (3') in the retainer ring (4) and later place the PTFE seal (3).

In case of EPDM/NBR seal: insert the new seal (3) in the retainer ring (4)



5. Insert the seal retainer ring (4) and the seal (3/3') altogether by hammering gently around the edge. Once inserted, fix the screws back again

4.3. Lubrication:

Lubricate the stem every 30 days with a calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.

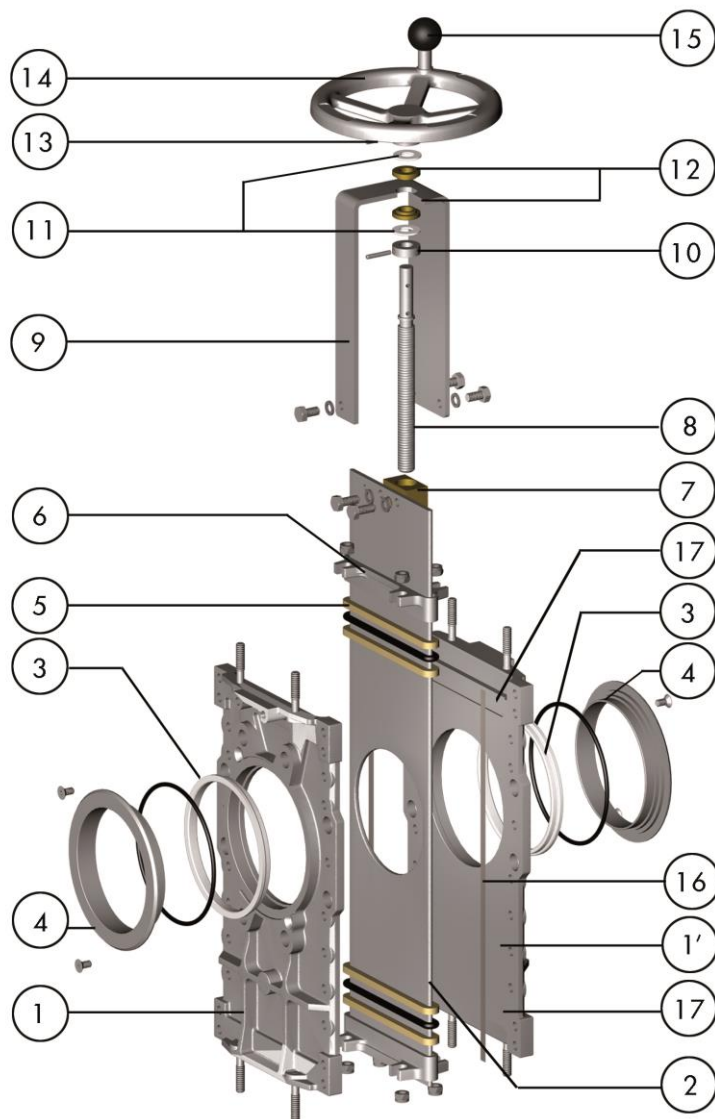
5. STORAGE

- 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. 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

7. PARTS LIST & DRAWINGS



1. BODY	10. AXIAL FIXING BUSH
2. GATE	11. FRICTION WASHER
3. SEAT	12. BUSHING
4. "K" RING	13. SPRING PIN
5. PACKING	14. HANDWHEEL
6. GLAND FOLLOWER	15. KNOB
7. STEM NUT	16. GASKET
8. STEM	17. SLIDERS
9. YOKE	