

# **PART VII**

## **SLANTED SEAT CHECK VALVES**



## INDEX

1. GENERAL INFORMATION
  - 1.1 Tips for Long Term Operation
  - 1.2 Instructions for Shipment & Warehousing
  
2. PRODUCT INFORMATION
  - 2.1 Design Limits
  - 2.2 Valve Marking
  
3. ASSEMBLY GUIDE & START-UP INSTRUCTIONS
  - 3.1 Assembly Location
  - 3.2 Installation Position
  - 3.3 Items Located Around the Valve
  - 3.4 Valve Configurations
  - 3.5 Gearbox Installation Configurations
  - 3.6 Valve Installation Positions
  - 3.7 Assembly
  
4. OPERATION
  
5. ACTUATORS
  - 5.1 Electric Actuator Installation
  
6. MAINTENANCE & REPAIRS
  - 6.1 Inspection Frequency
  - 6.2 Removal of Main Seal
  
7. SHUT DOWN & DISASSEMBLY
  
8. SPARE PARTS
  
9. SERVICE STOPS
  
10. CHECKS THAT SHOULD BE MADE BEFORE CALLING SERVICE

## **1. GENERAL INFORMATION**

This manual must be carefully observed and applied at all times for secure and trouble free operation of butterfly valves.

It is not allowed to make any modifications or alteration on products that are supplied by ÖZ-KAN. ÖZ-KAN will not assume any liability for consequential damages due to unauthorized modifications or non-compliance with this manual.

Installation, operation and maintenance of slanted seat check valves must be made by professional, qualified staff. Although all ÖZ-KAN products are designed and manufactured according to international codes and standards, valves are potentially dangerous items in case they are not operated properly or outside their intended duty.

All workers who will be dealing with storage, assembly, operation, maintenance and disassembly of these products must read and understand this document. All international and local safety standards must be read and understood and all necessary precautions must be taken before doing any work on valves or pipeline they are installed on.

Pipeline must be depressurized in case any repairs will be made and warning labels should be placed around the area where repairs will take place. Remote control devices such as actuators must be kept in Local or Off position and precautions must be taken to prevent actuators to operate valves with stored energy such as pressurized air or water. Precautions must be taken against flooding in case a discharge valve is to be repaired.

Pipeline must be emptied, in case the valve is to be removed. Precautions must be taken because residue fluid will flow freely once the valve is removed.

### **1.1 TIPS FOR LONG TERM OPERATION**

ÖZ-KAN slanted seat check valves are designed for preventing back flow and water hammer effect in emergency situations without performing manual operation or using energy. These valves are used for isolating the water main in power failures without causing water hammer effect and preventing back-flow in pump stations.

Closing characteristics of slanted seat check valves with external end stage dampers can be adjusted by the help of the needle valve located on the end stage damper. Adjustment can be made in a single stage.

Max. operation pressure for standard slanted seat check valves is limited with pressure rating of the valve. Standard waterworks check valves can be operated at max. 40°C according to EN1074. Max. flow speeds are also in accordance with EN1074.

In case valves are to be used in deviating operation conditions and/or applications, details of intended applications must be sent to the manufacturer and written approval of manufacturer must be obtained!

Operation & Maintenance Manuals supplied with products contains vital information for safety and long term trouble free operation. Therefore it must be observed and applied at all times and kept for future reference.

1.2 INSTRUCTIONS FOR SHIPMENT & WAREHOUSING

Adequate packing must be used for shipment and storage depending on shipment type and stocking options. Valve must be protected from atmospheric conditions and external damages at all times. Special packing types must be used for overseas shipments.

Coating applied for corrosion protection must be protected against mechanical damages at all times.

Valve must be placed on flanges with bearing hubs facing upwards.

Some slanted seat check valves are delivered with end stage dampers. If this is the case make sure dampers are protected from atmospheric conditions and mechanical damages. Pay special attention to the safety of the damper, while lifting or moving the check valve.

Large size slanted seat check valves do not have their center of gravity in the middle due to their damper chassis. Therefore they might swing sideways during lifting operation. Lifting operations must be made by with special care and nobody except the operator must enter the area during lifting operations.

Avoid sudden movements during lifting, moving and lowering the check valve. Such sudden motions may damage the valve and/or lifting system.

Lifting cables and belts must only be attached to the body. There are lifting eyes on valve bodies for easy installation of lifting cables and belts. Length, capacity and positioning of cables must be arranged to keep the valve in horizontal position during lifting, moving and lowering.

Make sure the capacity of lifting equipment is adequate to lift the valve you are working with. Make sure general regulation regarding lifting heavy equipment is applied during the lifting process.



Some valves are packed in wooden crates or boxes depending on shipment methods. Make sure instructions on crate are applied during off loading and loading. While working with such crates/boxes, center of gravity for the whole crate/box must be taken into consideration.

Valves must be kept in slightly open position during storage in order to protect sealing ring. Sealing rings must be protected from atmospheric affects and direct sunlight. Valves must be kept in dry, clean and well ventilated areas and they must be kept away from direct sunlight otherwise long term sealing performance cannot be guaranteed.

Valve must be protected from dust and other type of dirt during storage. Special care must be given to protect sealing ring and body seat from mechanical damages.

Try to keep the valve in its factory package until the assembly date. Factory packing will provide protection to the valve up to a level.

Valves are suitable for storage from 0° to 40° with adequate protection. In case valve is below 0°C before installation, it must be heated up to minimum +5° – +10° C before assembly to the pipeline.

## 2. PRODUCT INFORMATION



ÖZ-KAN slanted seat check valves are designed for preventing back flow and water hammer effect in emergency situations without performing manual operation or using energy. These valves are used for isolating the water main in power failures without causing water hammer effect and preventing back-flow in pump stations.

Slanted seat check valves can be delivered in three different formats.

- Type 1 : Slanted Seat Check Valves without Dampers



- Type 2 : Slanted Seat Check Valves Ready for Future Damper Assembly



- Type 3 : Slanted Seat Check Valves c/w External End Stage Dampers



Slanted Seat Check Valve opens with the flow. Check valve closes;

- with the help of back flow and free swinging disc in Type 1. There is no need for a lever & counter weight in this type. It is not possible to install a damper to this type at later stage.
- with the help of back flow and free swinging disc in Type 2. This type is equipped with a protruding shaft for later damper assembly.
- with the help of back flow, lever & counter weight and end stage damper in Type 3. End stage damper is designed for dampening the closing at the final 10-15° of the closing stroke.



Closing characteristics of slanted seat check valves with external end stage dampers can be adjusted by the help of the needle valve located on the end stage damper. Adjustment can be made in a single stage.



Adjustment Valve

In resilient seated check valves resilient sealing ring on the periphery of the disc and an integral stainless steel seat on body provide sealing. Resilient sealing ring is attached to the disc by means of retaining ring. In closed position this resilient seal is pressed on the cone shaped integral body seat therefore providing drop-tight sealing in either direction of flow.

Metal seated check valves are equipped with stainless steel welded integral body and disc seats. In metal seated check valves, sealing is achieved by means of pressing two stainless steel seat sections on each other.

Resilient seat on disc can be easily changed without uninstalling any major component of the valve.

Valve body has an integral stainless steel welded and microfinished body seat. AISI309LSi, AISI316L and Ni welding is applied depending on project specification in order to prevent corrosion and mechanical damages, especially cavitation.

## 2.1 DESIGN LIMITS

Standard ÖZ-KAN slanted seat check valves are resilient seated. EPDM or NBR sealing rings are used depending on project specifications. Slanted seat check valves with metal to metal sealing are also available. Slanted seat check valves should only be used with mediums that do not have the risk of clogging.

Slanted seat check valves can be used with following mediums.

- Water
- Raw water (Water coming from wells, rivers, dams etc.)
- Cooling water (With certain limits and as long as adequate corrosion protection is applied.)

ÖZ-KAN products are not suitable for oil and gas applications. Our products are strictly designed for water applications.

Max. allowable temperature for slanted seat check valves is 40°C. ÖZ-KAN range covers valves for higher temperatures with special material configuration and corrosion protection. Please contact ÖZ-KAN head office for additional information.

NBR sealing rings should be used for mediums contaminated with metallic oils.

Check valves with metal to metal sealing should be used for mediums containing foreign particles.

ÖZ-KAN head office must be contacted, in case valves are to be used with differing operation conditions.

Operation pressure of a butterfly valve must not exceed max. allowable pressure of the pressure rating (PN).

## 2.2 VALVE MARKING

All valves carry information on their bodies for easy identification. While information on a valve changes according to the project specifications, below information can be found on every valve supplied by ÖZ-KAN

ÖZ-KAN	Valve Brand
DN	Nominal Diameter in mm
PN	Nominal Pressure in Bar
	Valve Body Number
	Valve Body Material Code

### **3. ASSEMBLY GUIDE & START UP INSTRUCTIONS**

#### **3.1 ASSEMBLY LOCATION**

When installing a check valve in location, make sure pipes are aligned and flanges are parallel. If pipes are not aligned, this problem must be corrected before assembly, otherwise check valve body will be loaded with impermissible high loads due to the misalignment. These loads may lead to fracture of the body.

Installation to the pipeline must be tension free as much as possible. Pipeline forces transmitted to the valve must not exceed forces indicated in EN1074-3.

There should be sufficient space left around the check valve for easy inspection and maintenance.

Space left between flanges must be large enough to install the check valve without damaging coating on raised faces. However flanges of pipeline must not be pulled towards the check valve due an installation gap larger than what is needed. Use of dismantling joints is strongly recommended.

Check valve must be protected from nearby construction work with adequate covers. Check valve must not be subject to hazardous effects of excavation, painting, concrete works, etc.

Suitable flange gaskets and sealing materials should be used for installation to potable water pipelines.

Pipeline sections both on upstream and downstream sides of the valve should be cleaned before the valve is put into operation.

#### **3.2 INSTALLATION POSITION**

There must be sufficient space left in installation position for easy operation, maintenance, dismantling and cleaning of the valve.

If the check valve is not located in a valve chamber and installed in the open, it must be protected from extreme atmospheric conditions with adequate covers. (Exposure to sunlight, ice formation, exposure to sand, etc.)

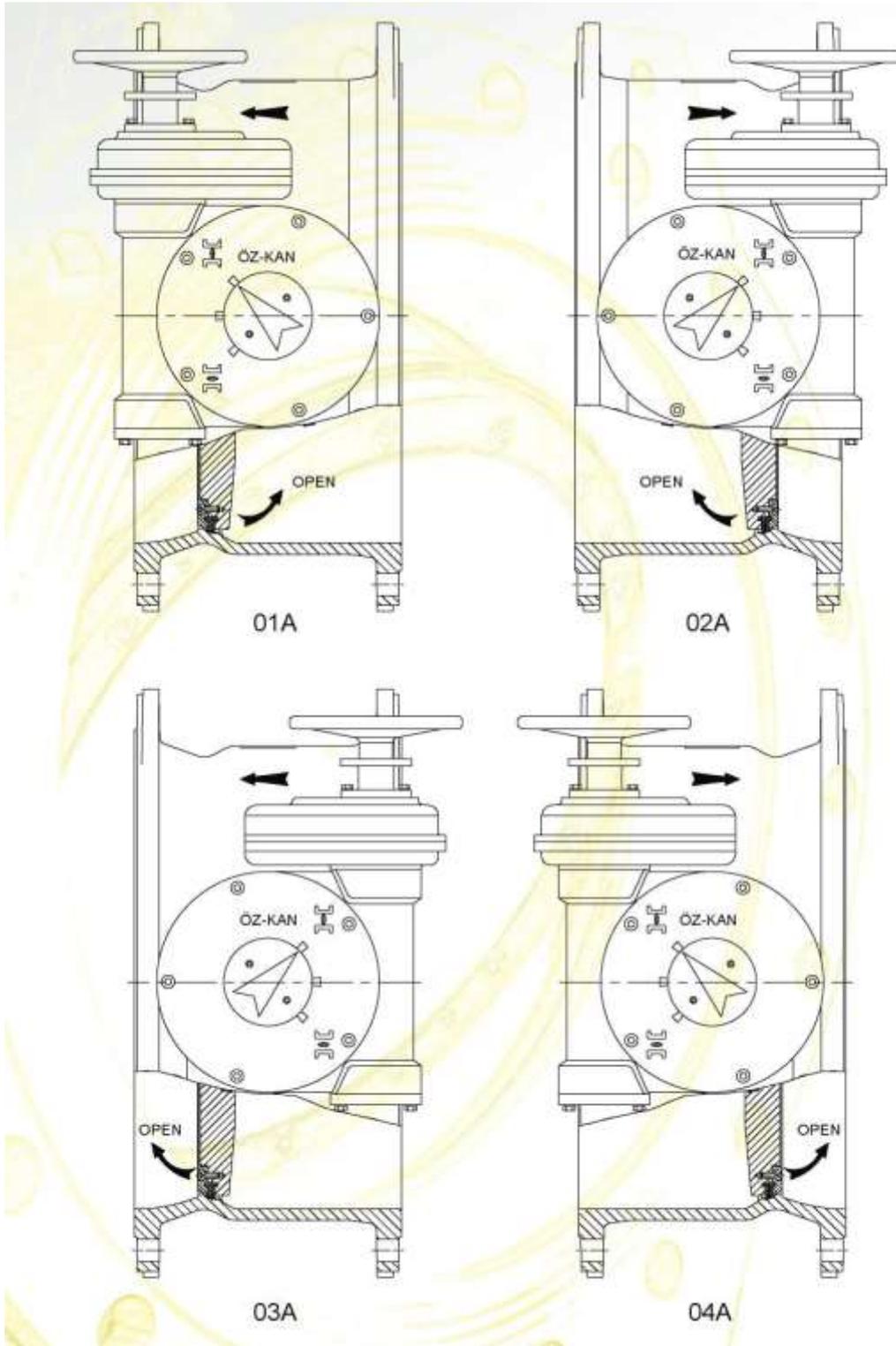
Pressure acting on the closed valve must not exceed its design pressure.

Standard slanted seat check valves are manufactured for horizontal pipelines and they can be manufactured for vertical pipelines on request. Valve shafts must be in horizontal plane at all installation positions.

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### 3.4 VALVE CONFIGURATIONS

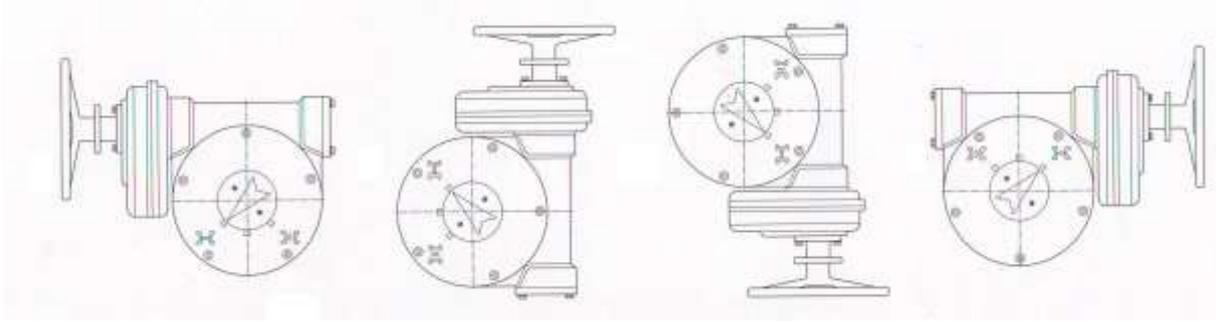
Disc opening direction and gearbox side can be arranged according to the four configurations given below.



Please consult ÖZ-KAN for valve configurations with anti-clockwise closing gearboxes.

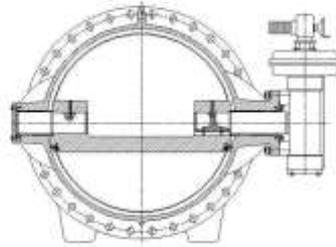
### 3.5 GEARBOX INSTALLATION CONFIGURATIONS

It is possible to install gearboxes in different positions.



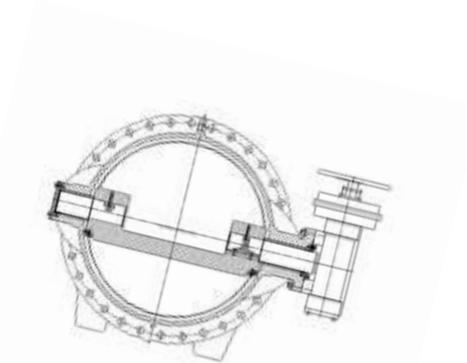
### 3.6 VALVE INSTALLATION POSITIONS

All ÖZ-KAN butterfly valves can be installed in horizontal position.



Standard ÖZ-KAN butterfly valves are not suitable for vertical installation. However this can be achieved if it is requested at order stage.

Valves should not be installed as shown below.



### 3.7 ASSEMBLY

Valves should be thoroughly checked before installation to the pipeline. Although all valves are tested and inspected before leaving the manufacturing area, this control should be made to check if valves are damaged due to faulty transport, faulty warehousing or rough handling. Make sure valve is thoroughly cleaned to remove any dirt or foreign materials. Make sure pipeline on both sides of the valve are cleaned to remove foreign materials that might be left in the pipeline during construction stage. ÖZ-KAN does not assume any responsibility for consequential damages caused by dirt or foreign particles that were not removed before operation.

If the valve has to be recoated, make sure essential parts such as body seat and sealing ring are not coated. If any section of the valve is sand blasted, these sections should be protected with adequate corrosion protection. Elastomer parts must be protected, in case solvent based paint removers are used. Metal plates for identification must not be coated or sand blasted.

Resilient sealing ring on the disc should be controlled before installation. Especially in hot climates and dry storage conditions, EPDM seal ring gets harder in time and does not perform its function. If the seal ring is damaged and there are cracks on it, seal ring should be changed with a new one. Changing method will be described in MAINTENANCE & REPAIRS section.

Some lubrication material such as food grade grease or silicone should be applied on resilient seal ring and body seat in order to provide easy operation on a dry pipeline before installation.

Make sure lifting device of necessary capacity is available at installation site.

Valve should not be completely open during assembly. In full open position valve disc protrudes from flange surfaces and installation will not be possible. Valve must never be lifted from its disc at all times. This will damage the valve and its operating parts.

Valve should be installed to the pipeline by hexagonal bolts, nuts and washers in through bolting. Bolts should be tightened crosswise in order to prevent any strain that might damage the valve. Pipeline should not be pulled towards the valve. This will load the valve with tension that might crack the housing in time. The gap between flanges should be filled with thicker seals or by means of adjusting the dismantling joint.

Valves are equipped with lifting eyes for easy lifting. These lifting eyes and flange holes should be used to lift the valves.



There shouldn't be any obstacles on the upstream and downstream sides of the butterfly valve that may prevent the valve disc from reaching its full open position.

ÖZ-KAN recommends use of steel reinforced flange gaskets for easy installation.

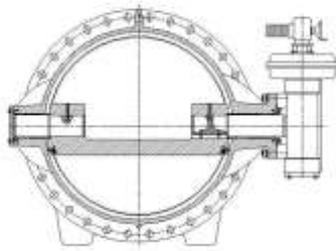
ÖZ-KAN recommends use of 8.8 quality bolts for installation. However selection of bolting material is left to the end user. Bolt selection must be made according to operation loads and flange gasket selection. Bolt tightening torque should be selected correctly depending on the gasket type that is selected. Bolts should not be over-tightened. This will load the valve with unnecessary tension and bolts may get loose during operation.

Pipeline flanges must be well aligned. All construction and welding works must be completed before the assembly of the valve. Valve must be protected with adequate covers in case construction and welding work has to be made after installation of the valve. Elastomer sealing element must be protected from the heat and flames generated by welding. All welding and grinding residue must be removed at the end of welding works.

Pipeline must be supported in order to prevent harmful pipeline forces to be transmitted to the valve. Valve must be covered if construction and erection works will continue around the valve.

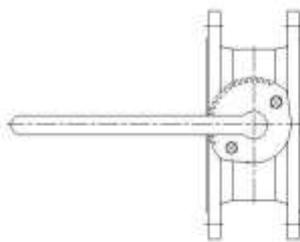
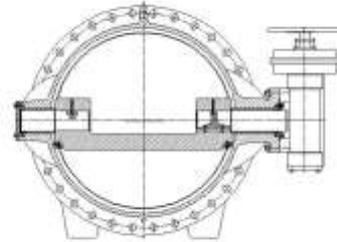
#### **4. OPERATION**

Double Flanged butterfly valves can be operated manually by handwheels or hand levers and electrically by electric actuators.



Double Flanged Butterfly Valve with Electric Actuator.

Double Flanged Butterfly Valve with Handwheel.



Double Flanged Butterfly valve with Handlever.

Operational parts, such as gearbox should be thoroughly checked before installation. Any loose fixings should be tightened before operation.

Valve should be opened and closed at least once before the installation. Motion of parts must be checked for any signs of problem.

Valve pressure rating must not be exceeded during site trials or pipeline tests. If the pipeline test pressure exceeds valve pressure rating in closing direction, pressure must be compensated by using a by-pass arrangement.

Valve torque value can be expected to be higher when the valve is operated in dry condition after long term storage

New pipelines must be thoroughly checked and cleaned from foreign objects before they are operated. It must be ensured that any detergents, solvents, etc. that will be used while cleaning the pipeline must not attack materials used for valve construction.

## **5. ACTUATORS**

Butterfly valves can be operated with electric, pneumatic or hydraulic actuators depending on the application. These actuators must be selected according to the operational limits described above. In case valves are to be used with deviating conditions, supplier must be informed before valves are put into operation.

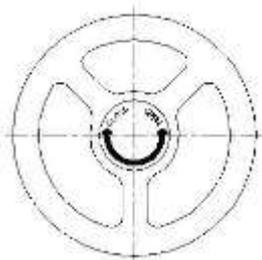
Electrical connections for butterfly valves that are going to be operated by electric actuators should be made according to the wiring diagrams that are supplied with the actuators. Limit & torque setting of these actuators must not be altered without informing the manufacturer. These settings should be made while the pipeline is depressurized if the valve is not equipped with a gearbox.

Electrical connections should be made before connecting the valve to the pipeline. Before making the electrical connections the valve should be opened halfway with the emergency hand wheel. After the completion of electrical connections, valve should be operated to open and the disc motion should be controlled. If the valve disc is closing while the open button is pressed or if the valve disc is opening while the close button is pressed than the phase connection is wrong and it should be corrected. Actuators with reversing contactors will correct the phase connections even if they are connected wrongly.

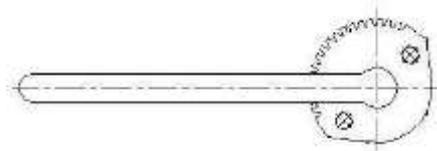
Actuator must not be transferred between different diameter and different pressure class valves under any circumstances. Torque and limit settings differ from one diameter valve to the other. Transferring of actuators between different size and different pressure class valves can cause serious damage both to the actuator and to the valve.

Catalogues and manuals of actuator suppliers must be consulted in case detailed information is required.

Manual operated valves can be operated by handwheels and for small diameters by levers.



**Hand Wheel**



**Hand Lever**

Manual operated valves can be opened by anti-clockwise operation of the hand wheel and can be closed by clockwise operation of the hand wheel. (The opposite applies for valves with anti-clockwise closing gearboxes.)

**WARNING : Unlike gate valves, sealing can not be provided by forcing the hand wheel on butterfly valves. When the valve reaches its full closed position, adjustment nut inside the gearbox reaches its end position. Further force applied on the handwheel will not achieve better sealing and it may damage the gearbox.**

Valve disc position can easily be checked from the mechanical position indicator on the valve gearbox. If the valve reaches its full closed position and there is still leakage from valve, than the sealing ring on disc should be checked and replaced if necessary.

There shouldn't be any solid particles in the medium. Solid particles in the medium can cause serious damage to the resilient sealing ring on the disc. Filters must be used, in case there is a risk for foreign material contamination for the medium.

Failure to comply with these regulations may cause serious damage to the valve and nearby equipment and it might lead to personal injury or loss of limbs. Safety instructions regarding operating mechanisms must be thoroughly checked before taking any action with them.

Manufacturer must be consulted for operation torque value and top flange information, in case a manual valve is to be operated with an actuator at a later stage. Settings of this actuator must be made in accordance with actuator suppliers recommendation.

### 5.1 ELECTRIC ACTUATOR INSTALLATION

All ÖZ-KAN butterfly valves are equipped with ISO top flanges that are suitable for electric actuator installation. Actuator sizing should be made in accordance with max. torque requirements of the butterfly valve. Please consult ÖZ-KAN for torque and gearbox information before selecting an actuator.

End stop adjustment of the actuator should be made through limit switches. Torque switches should be used for over-torque protection only.

Actuator settings should be made in accordance with actuator suppliers recommendations. Limit settings of the actuator must be made only after the actuator is installed on the valve. Safety regulations of the actuator must be observed before setting the actuator. Electrical connections of the actuator should only be made by an authorized electrician.

## **6. MAINTENANCE & REPAIRS**

ÖZ-KAN Butterfly Valves are manufactured for minimum maintenance requirements.

Butterfly Valve gearboxes are greased for lifetime. Gearboxes are completely maintenance free. Gearboxes should be handled with care and mechanical position indicators should be controlled while opening and closing the valve. Valve should never be forced after reaching full open or full closed positions. This may seriously damage the gearbox because of high gear ratios.

### **WARNING**

**Pipeline must be shut off, depressurized and secured for inadvertent operation during any kind of inspection, maintenance or repair work. Pipeline must be discharged if necessary. All necessary precautions should be taken based on application and fluid conveyed.**

**Valve gearboxes and covers must never be uninstalled while the pipeline is pressurized.**

**Maintenance and repair works should only be made by experienced staff. Necessary precautions must be taken and warning labels should be placed around the working area.**

**Site management must be informed about planned maintenance and repair works and necessary permissions must be obtained.**

**All necessary safety devices such as safety boots, helmets, belts, goggles, gloves, insulators, etc. must be used.**

### **6.1 INSPECTION FREQUENCY**

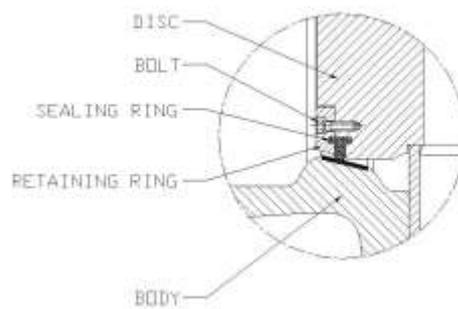
Valves should be checked for general appearance, sealing performance and corrosion protection at least once in every year. Number of maintenance inspections must be increased in case valves are being operated in extreme operation conditions.

### **6.2 REPLACEMENT OF MAIN SEAL & BEARING O-RINGS**

If the butterfly valve disc is in full closed position and the valve is not tight, than sealing ring on valve disc should be changed. If the valve is big enough for a worker to work inside, sealing ring can be changed without uninstalling the valve from the pipeline. If the valve is a smaller sized one, than valve should be uninstalled from the pipeline for sealing ring replacement.

**WARNING : Nobody should enter pipeline unless all pumps are stopped and at least two upstream valves are closed tightly. Part of the pipeline where the repairs will take place must be discharged completely and should be well ventilated for the workers safety. There shouldn't be pressure on both sides of the valve that is going to be repaired.**

To change the sealing ring the valve should be completely closed. All retaining ring bolts & setscrews should be loosened.



When all retaining ring bolts are loosened the retaining ring can be taken out. After this it is possible to take out the T-Shaped Sealing Ring from its groove.



After uninstalling the old sealing ring, care should be taken to see if any remaining parts of the old sealing ring are left on the sealing ring groove. If there are some pieces these should be removed and the sealing ring grooves both on the disc and the retaining ring should be cleaned thoroughly.



After cleaning the sealing ring grooves, new sealing ring should be carefully installed to the groove on the valve disc. After placing the sealing ring on the valve disc, retaining ring can be installed back to its place. Care should be taken while re-installing the retaining ring back to its place. T-Shaped Sealing Ring should be placed in to the groove on the retaining ring.



After placing the retaining ring back to its place, retaining ring bolts can be fastened. Retaining ring bolts should be fastened cross-wise.



Sealing rings can be replaced without disassembling the valve disc. A sample disc has been used for taking photos given above for clear shots and easy reference.

In case of a leakage from the drive shaft or short shaft area, bearing covers must be removed and o-rings on bearing covers must be replaced with new ones. In order to remove the drive shaft cover, operator must remove the gearbox.

Valve must be de-pressurized for this kind of repair work. In order to proceed with this repairs;

1. Bring the valve to full closed position
2. Remove gearbox. (If drive shaft bearing is maintained.)
3. Unfasten setscrews and bolts on bearing cover.
4. Remove bearing cover.
5. Remove o-rings on bearing cover.
6. Clean o-ring channels on bearing cover. Clean bearing cover slot from foreign materials.
7. Place new o-rings in their slots. (Only use correct size & type o-rings.)
8. Apply some food grade greased liquid soap on o-rings.
9. Place the bearing cover back to its slot. Make sure o-rings are not damaged during installation.
10. Tighten hexagonal bolts and setscrews crosswise.

## **7. SHUT DOWN & DISASSEMBLY**

In case the valve should be removed from service, valve should be fully closed. If the valve is operated by an electric actuator electrical connections should be disassembled by an electrician.

Pump and the valve on the upstream side of the valve that is to be replaced should be closed. Pipeline around the valve that is to be replaced should be de-pressurized and discharged completely.

Valve should be securely connected to a crane or lifting equipment that is strong enough to lift the valve. Flange connection bolts and nuts should be loosened and removed.

If the valve is stuck between the pipeline flanges flange adaptors/dismantling joints on the pipeline should be adjusted to provide enough space to remove the valve from the pipeline.

**WARNING : Never lift a valve from hand wheel or gearbox. This may cause serious damage to the valve and it is extremely dangerous for the workers. Always check the weight of the valve and the crane capacity before lifting a valve. Never lift a valve that's weight is over the crane capacity.**

Lift and remove the valve from the pipeline. Be sure not to hit the valve to the pipeline.

If the valve is going to be kept in stock for a time, leave the valve disc in a slightly open position. If the valve is left in full closed position, sealing ring will loose its profile under pressure in dry atmosphere. If the valve is left in full open position, something may strike the disc and damage the valve.

If the valve will be stored lying on its pipe connection flange, make sure that the valve is stored on a wooden pallet. Flange faces should be protected against mechanical damages.

## **8. SPARE PARTS**

All necessary spare parts can be supplied from ÖZ-KAN Head office.

We need following information to help you with correct spare parts.

- Valve type (Butterfly valve, check valve, air valve, etc.)
- Valve size and pressure class (DN, PN)
- Valve metal plate information. (Production year, order number, etc.)
- Valve body number (Number that can be seen on the body near name plate)

## **9. SERVICE STOPS**

In case maintenance personnel is required for maintenance and repairs please contact ÖZ-KAN Head Office in Turkey. You will be directed to our nearest service point. Contact details are given below.

ÖZ-KAN MAKİNA ELEMANLARI SAN. ve Tic. A.Ş.  
10008 Sok. No.15 Atatürk Organize Sanayi Bölgesi  
Çiğli – İZMİR – TURKEY  
Tel. 00 90 232 3280600 (Pbx) Fax. 00 90 232 3280609  
Web Site : [www.oz-kan.com.tr](http://www.oz-kan.com.tr) E-mail : [info@oz-kan.com.tr](mailto:info@oz-kan.com.tr)

## **10. CHECKS THAT SHOULD BE MADE BEFORE CALLING SERVICE**

Problem	Probable Cause	Corrective Action
Noise coming from the valve	Valve being operated beyond design limits.	Check operation conditions and valve design data. Change operation conditions or replace the valve with correct type.
	Wrong installation position. (Valve too close to a reducer or a flow control valve, etc.)	Change installation position.
Valve fails to operate	Problem with electric actuator	Check actuator power connection Check actuator settings
	Gearbox Blocked	Check short shaft lock, remove it if it in locked position.
	Foreign material jammed inside the valve.	Remove the foreign object by means of flushing the valve or dismantle the valve and remove the object manually.
Valve is not tight.	Valve is not closed completely.	Bring the valve to full closed position by checking position indicator.
	Main seal is worn or damaged.	Replace seal ring.
Leaks though bearing covers.	Bearing o-rings are worn or damaged.	Replace bearing o-rings.
High operation torques	Body seat covered with deposits.	Flush the valve or remove the deposit manually.
	Dry pipeline, dry main seal	Apply a food grade lubricant on valve main seal. Valve will operate easily when sealing ring is wetted.