

# PART IX

## NEEDLE VALVES



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## **1. GENERAL INFORMATION**

This manual must be carefully observed and applied at all times for secure and trouble free operation of needle 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 needle 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, water or by means of unlimited power supplies. 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.

If a discharge needle valve or a valve located at the end of a pressurized pipeline is to be opened under pressure, necessary precautions must be taken in the surrounding area. Since needle valve will discharge water at a very high speed, it has to make sure that no one will be present in the discharge zone. Necessary warning labels and personnel should be located around the discharge zone. Precautions should be taken for equipment damage and loss in the discharge area.

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

ÖZ-KAN needle valves are designed for pressure and flow control. As in every control valve there are limits for this control function. Valve should be operated within regulation limits that were confirmed at order stage.

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!

ÖZ-KAN will not accept any responsibility for damages which occurred due to operation of needle valves with deviating conditions than what were confirmed at order stage.

## 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 piston must be kept slightly open during shipment and storage.



Some needle valves are delivered with electric actuators. If this is the case make sure actuators are protected from atmospheric conditions and mechanical damages. Pay special attention to the safety of the actuator, while lifting or moving the valve.

Needle valves do not have their center of gravity in the middle due to their gearbox. Therefore they might swing sideways during lifting operation. Lifting operations must be made with special care and nobody except the operator must enter the area during lifting operations.

Avoid sudden movements during lifting, moving and lowering the 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 exposure to 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.

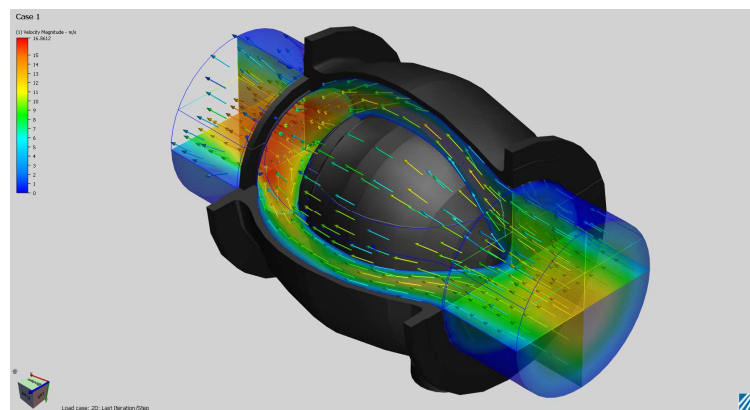
Valves are suitable for storage from 0° to 40° with adequate protection. In case valve is below 0°C before installation, it must be heated up to minimum +5° – +10° C before assembly to the pipeline.

## 2. PRODUCT INFORMATION



ÖZ-KAN needle valves are designed for flow control and regulation. Unlike gate valves and butterfly valves which are designed for on/off, isolation service only, needle valves are designed for continuous flow control operations.

Needle valves are equipped with ring shaped cross sections, where flow is guided steadily from inlet ring to the discharge port. Unlike butterfly valves and gate valves where asymmetrical cross section causes turbulence and disturbance in flow which leads to material damage, needle valves have this ring shaped cross section through the entire closing motion of the piston and this makes needle valves ideal for flow control.



Cavitation is the problem that is encountered in many control operations. Needle valves are equipped with special attachments that the outlet flow which is loaded with air bubbles, due to pressure changes, are guided into the center of the pipe. By doing so it is ensured that cavitation bubbles do not get anywhere near pipe walls or the valve itself. These cavitation bubbles disappear with increasing pressure before they can damage any vital components.

## 2.1 DESIGN LIMITS

Standard ÖZ-KAN needle valves are resilient seated. EPDM or NBR sealing rings are used depending on project specifications. Needle valves should only be used with mediums that do not have the risk of clogging.

Needle valves can be used with following mediums.

- Water
- Raw water (Filtered 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 INV type 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.

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

ÖZ-KAN needle valves are designed for flow regulation and control. Needle valves are tailor made items based on flow data that is supplied by the customer at order stage. Valve must be operated within these flow parameters at all times. 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 pressure of a needle valve must not exceed max. allowable pressure of the pressure rating (PN).

ÖZ-KAN needle valves are equipped with worm or worm & spur gearbox combinations for easy operation. These gearboxes are equipped with travelling nut mechanisms for limiting travel of the piston in open and closed positions. This travelling nut reaches its end position when valve piston reaches full closed position. Therefore forcing the handwheel after valve reaches full closed position will not improve the tightness of the valve.

## 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 needle valve, make sure pipes are aligned and flanges are parallel. If pipes are not aligned, this problem must be corrected before assembly, otherwise 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 EN1074-5.

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

Valve must be protected from nearby construction work with adequate covers. 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 CONDITIONS**

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

If the 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.)

Valve must be equipped with a gearbox suitable for underground service, if the valve is to be buried.

Valve must be equipped with a submersible gearbox in case valve is to be installed under water permanently. Such installation will lead to increased operation forces and higher rate of wear and tear of corrosion protection and rotating parts. Such valves should be maintained with shorter intervals.

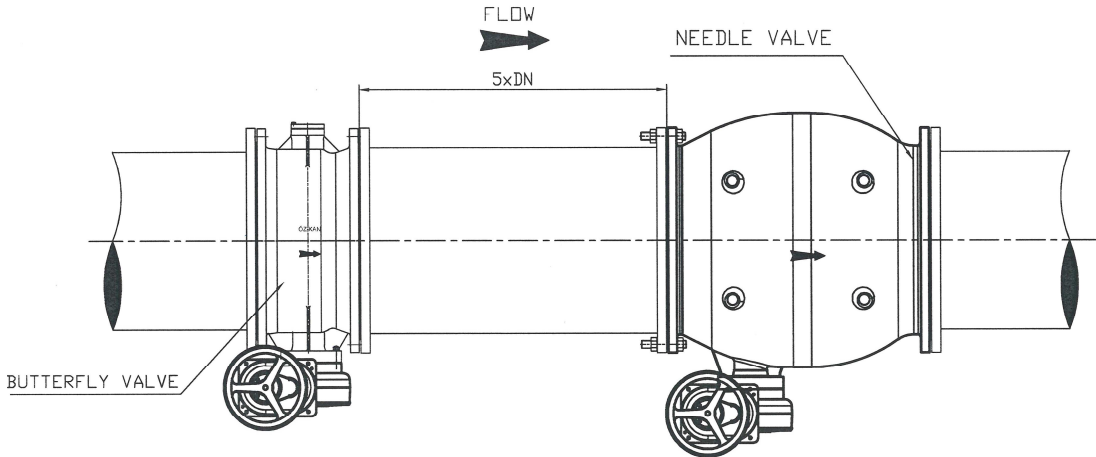
Pressure acting on the closed valve must not exceed its design pressure.

#### **3.3 ITEMS LOCATED AROUND THE VALVE**

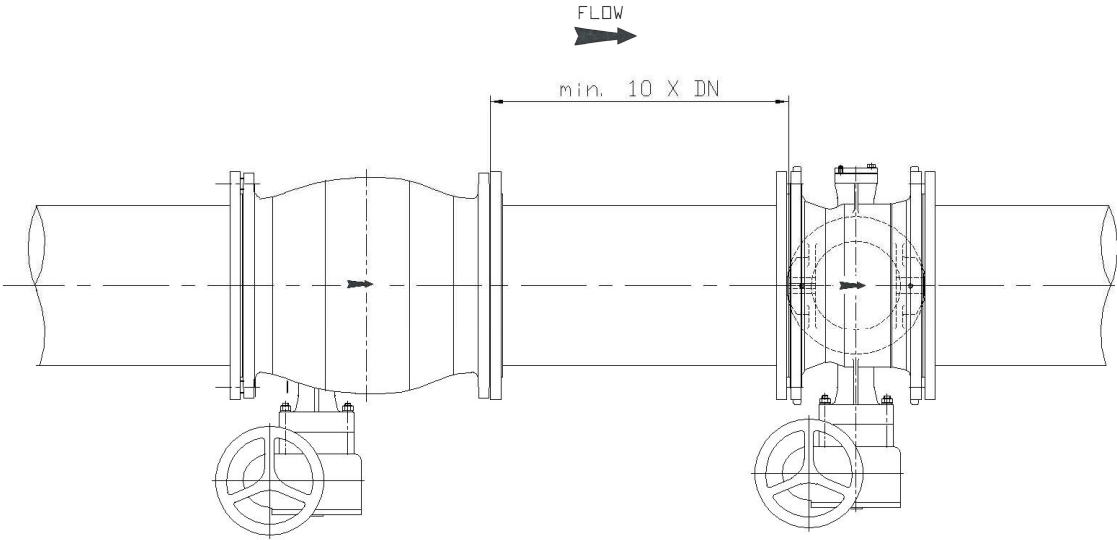
Suitable filters must be present on the upstream side of the valve, if the medium is contaminated with solid particles or foreign objects. Otherwise such foreign materials may prevent the valve from performing its duty or cause malfunction.



It is not recommended to install elbows, T-pieces, filters or inspection valves directly on the upstream of the needle valves. Such valves may create turbulence and disturbance in flow which may affect control characteristics of the needle valve. Minimum 5 x DN distance should be left between the needle valves and such equipment on upstream side, as described above.



If the needle valve is to be installed in a closed pipeline where it will be used as a control valve, it must be made sure that a straight outlet pipeline of minimum 10 x DN must be left on the discharge side of the pipeline.



There must not be any valves, reducers, strainers, flow meters or non-return valves within 10x DN distance on the discharge side of the needle valve. This pipe section is required for the disturbed turbulent flow coming from the needle valve to calm. If this requirement can not be respected, it is expected to have more noise and cavitation after the needle valve.

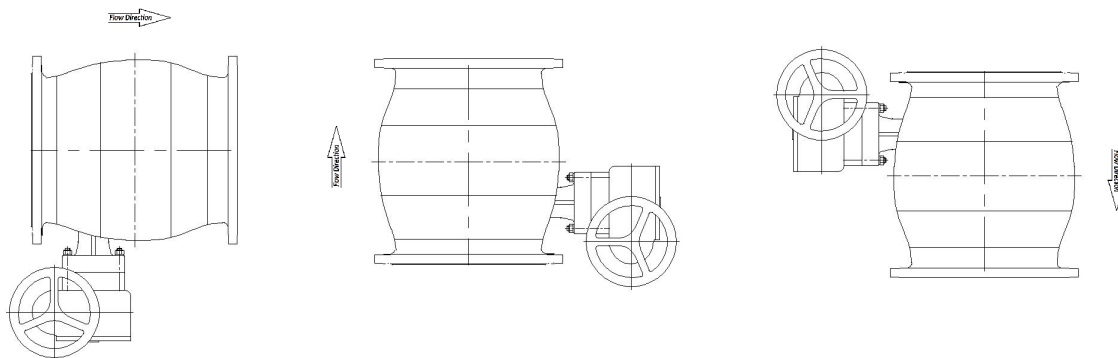
Temperature limits for the medium must not be exceeded.

Valves must only be operated by the standard handwheel supplied by the valve or the actuator supplier. Extending of operating elements is not allowed.

### 3.4 INSTALLATION POSITION

ÖZ-KAN needle valves can be installed on horizontal and vertical pipelines. They are not designed for operation in any other way.

Flow through the needle valve must be in accordance with the flow direction arrow cast on the body. This arrow must be kept in consideration during valve chamber design and assembly.



### 3.5 ASSEMBLY

Valves should be thoroughly checked before installation to the pipeline. Although all valves are tested and inspected before leaving the manufacturing plant, 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 and 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.

Valve should be fully opened and closed, in order to observe the functionality of moving parts.

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.

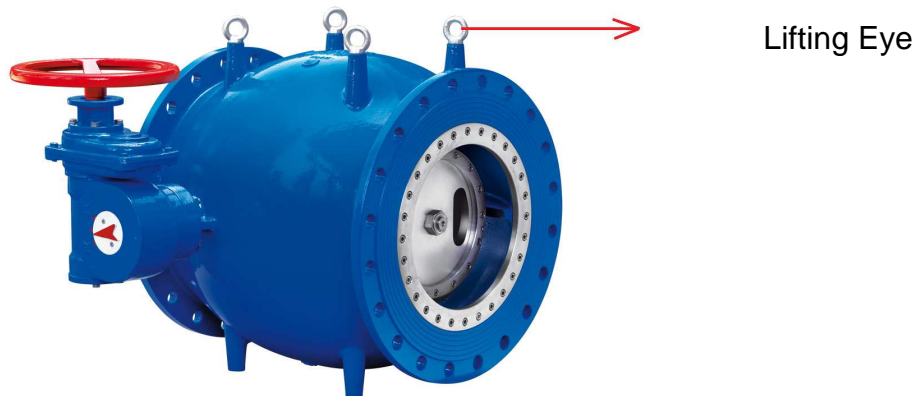
Resilient sealing ring on the piston should be controlled before installation. Especially in hot climates and dry storage conditions, EPDM seal ring gets harder in time and does not perform its function. If the seal ring is damaged and there are cracks on it,

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 devise of necessary capacity is available at installation site.

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



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.

Some needle valves are equipped with slotted cylinders due to the control requirements. Slotted cylinders extend beyond face to face dimension during full closed position. Such valves must be brought to full open position before assembly works. There shouldn't be any obstacles on the pipeline that might prevent valve from reaching full closed 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**

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**

Needle 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 needle 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 piston motion should be controlled. If the valve piston is closing while the open button is pressed or if the valve piston 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 automatically through reversing contactors.

Actuators 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 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.)

Valve opening level 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 piston 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 piston. 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 recommendations.

### 5.1 ELECTRIC ACTUATOR INSTALLATION

All ÖZ-KAN needle 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 needle 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 Needle Valves are manufactured for minimum maintenance requirements.

Gearboxes are greased for lifetime. They 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/unplanned 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**

If the needle valve piston is in full closed position and the valve is not tight, than sealing ring on valve piston should be changed. Valve should be uninstalled from the pipeline for sealing ring replacement.

**WARNING : 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.**

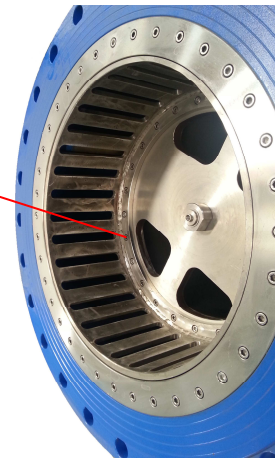
To change the sealing ring the valve should be completely closed. All retaining ring bolts & setscrews should be loosened.





Without Slotted Cylinder

Retaining Ring Bolts



With Slotted Cylinder

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 piston 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 piston. After placing the sealing ring on the piston, 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 into 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.

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

In case the valve should be removed from service, valve should be fully opened. 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.

**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 piston in a slightly open position. If the valve is left in full closed position, sealing ring will loose its profile in closed position in dry atmosphere.

Make sure that the valve is stored standing on its feet, located 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 bend, etc.)	Change installation position.
Valve fails to operate	Problem with electric actuator	Check actuator power connection Check actuator settings
	Undesired flow through the valve, piston/slotted cylinder can not reach open position.	Change installation position, remove the obstacle that is blocking the piston movement.
	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.
Desired flow volume or pressure can not be reached.	Operational conditions do not match valve selection conditions supplied at order stage.	Check operational data and adjust the valve according to new conditions or by using slotted cylinders.
	Slotted cylinder is required or a different version slotted cylinder is needed than the one that is installed.	
	Slotted cylinder is clogged.	Flush the valve or disassemble the valve from pipeline and manually remove the foreign object.
Too high flow volume	Operational conditions do not match valve selection conditions supplied at order stage.	Check operational data and adjust the valve according to new conditions or by using slotted cylinders.
	A different version slotted cylinder is needed than the one that is installed.	

Problem	Probable Cause	Corrective Action
Cavitation in valve parts	Valve being operated beyond design limits.	Check operational data and adjust the valve according to new conditions or by using slotted cylinders.
	Operational conditions do not match valve selection conditions supplied at order stage.	