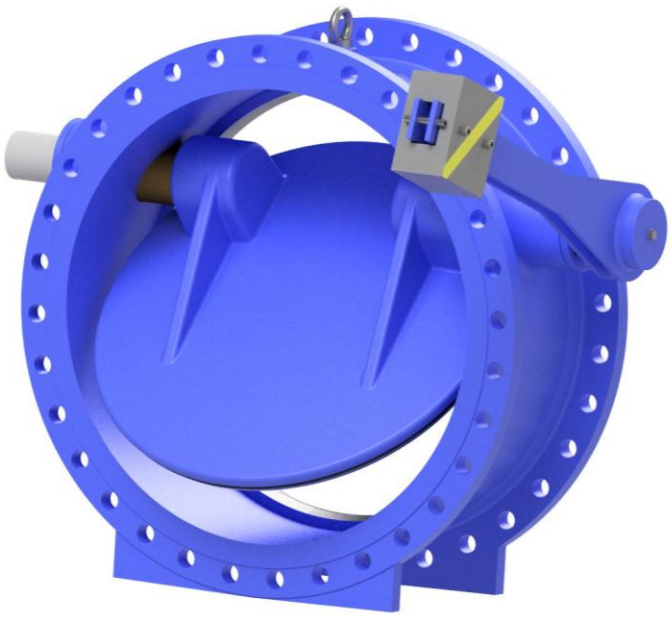
DVD VALVES

OPERATION MANUAL

TCV
TILTING CHECK VALVES



GENERAL SAFETY INSTRUCTIONS

This Operation Manual is created for you to use DVD Check Valves effectively and to reduce potential risks regarding faulty use of the mentioned valves. With this Manual, potential accidents and damages can be prevented and life time of the valve can be increased.

The product you will be using is designed and manufactured according to highest quality standards and has passed DVD quality procedures 100%. However, Valves hold potential risks and can cause danger in case of faulty use or faulty assembly. Therefore, **everyone, who somehow gets in contact with the valve, is responsible for reading and fully understanding this Operation Manual.**

Unauthorized revision, change or application on the product or any of its parts shall be prevented at all times. In case of incompliance to this Operation Manual, DVD Valves cannot be hold directly or indirectly responsible or liable.

During the use of the Valves, general regulations and standards shall be followed. Some of these regulations are defined in EN Standards. Installation of the Valves shall be done by qualified and experienced technical personnel. For detailed information regarding the Valves, DVD Documentation (Catalogs, if appropriate Special Specifications and Technical Drawings, related DVD Order Confirmation etc.) shall be used and followed.

Before disassembling the Valve from the pipeline or any of its parts from the valve, make sure that the pipeline is de-pressurized and necessary safety cautions are taken. **If the line (water or air) is pressurized, any part of the Valve can move unintentionally, without any control.**

After commissioning, consequently the Valves are working under pressure; the Valves shall be monitored at all times and should be inspected regularly. Furthermore; laws, regulations and standards about Occupational Health and Safety should be taken into consideration.

If the Valve is installed at the end of the pipeline, operation of the valve shall be done with extreme caution. In such an installation, any movement can result in pressurized water discharge. Moreover, since the Valve disc mechanism is reachable, precaution must be taken for trapping or squeezing.

During dismantling of the Valve from the pipeline, medium can flow out from the pipe or the valve in a fast and uncontrolled way. Before dismantling, the pipeline must be emptied to prevent such an incident. Along with the medium; foreign objects (stone, sand, debris etc.) can be flowing out that can cause damage to personnel. Necessary precautions shall be taken to prevent such damage.

DVD Check Valves are designed to be installed on pipelines and to prevent back flow (reverse flow).

Operating limits such as Nominal Size, Pressure, and Temperature of the Valve can be found in DVD Documentation. Furthermore; Operating Size, Operating Pressure, Valve Body Material and Production Date can be found on the marking of the Valve Body. Any operating condition that is incompliant with these operating limits shall be approved by the Manufacturer in written. Pipeline Operating Pressure can be fluctuating (due to surge, water hammer, air regulation

problems etc.). Therefore, such fluctuations should be considered, and the Valve should never be faced with a higher pressure than the defined Nominal Pressure.

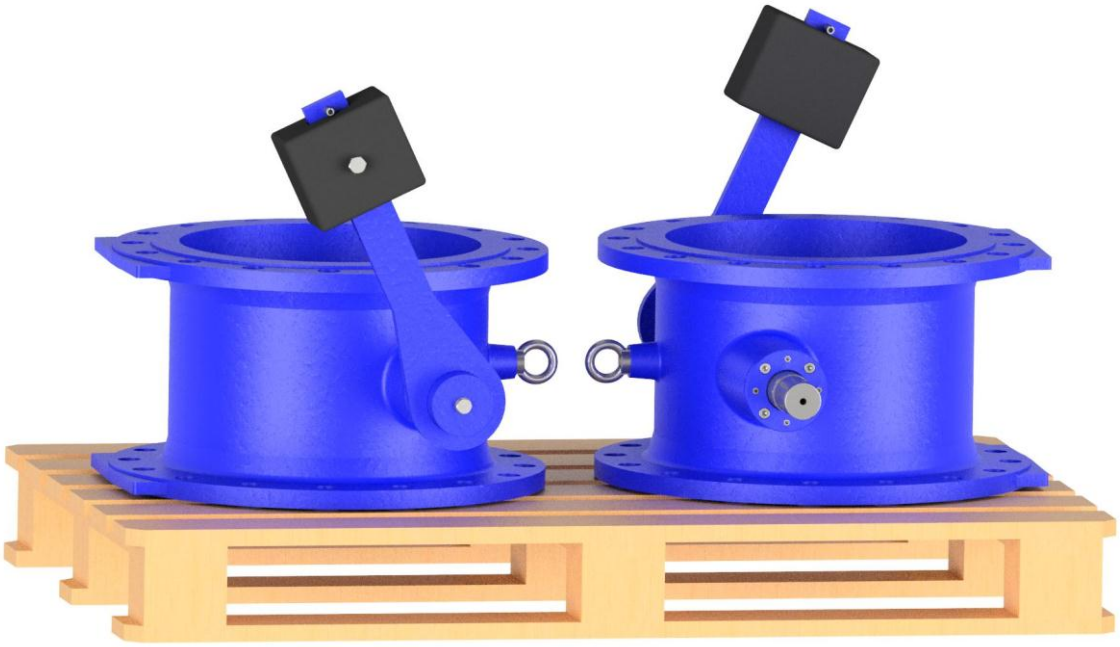
Valves should be protected from frosting at all times. Especially in locations that have high risk, protective measures should be taken such as; burying of pipelines in more depth, protecting the valve chambers by isolation material, or fully draining of pipelines before freezing conditions occur. If no precaution is taken, due to expansion of water, Valve body or other parts of the Valve can be permanently damaged. DVD Valves cannot be held liable from such damages.

TRANSPORTATION AND STORAGE

During transportation and storage, Valves shall be packed with material that can withstand to its size and weight, and should be fully fixed on a pallet. If the Valves are not fully fixed on the pallet, the Valve can move during transportation and can cause severe damage. The Valve should be protected from environmental conditions and physical impacts from outside. Any part of the Valve body should not exceed the pallet dimension and shall be wrapped by protective cover (stretch film, insulation material etc).

Valve coating and Valve accessories shall be protected at all times during transportation and assembly.

Positioning of the Valve on the pallet is done by positioning the Valve on its inlet flange. Lever & counterweight accessory has to be fixed. Otherwise, it can damage the Valve or the people around it.



PICTURE 1: Positioning the Valve on the Pallet & Securing the Accessory

Center of Gravity of the Valve can be away from the Valve Center. Therefore, during lifting the Valve, it can swing around. Such incidents can cause damage on the lifting device, the Valve itself, and to personnel around the Valve. **Lifting operation should be done with extreme care and Center of Gravity of the Valve should be determined before lifting operation.**

Lifting Belts and Lugs which are according to safety norms shall be used. They have to be suitable for the Valve weight. Valve should be lifted only from the Lifting Bores. **Lifting from the Counter Weight, Lever, Spring, Protection Cover, Dashpot, Limit Switch Bracket or the Shaft should not be done at all times.** These parts are not designed to carry the weight of the Valve and lifting from these parts can cause breaking, tumbling or dropping. If a lifting device will be used on small sized valves (DN250>), Flange Connecting Holes can be used as a lifting point.

During Storage and Transportation, Valves should never be faced with direct sunlight. Under direct sunlight; seals or valve coating can get damaged. Valves should be protected and stored in a dry and aerated environment and should be protected from environmental effects. Storage should be done @ -20°C/+50°C temperature range. If the temperature is below 0°C, before assembling the Valve; the Valve should be heated up to 5°C.

Valves should never be in direct contact with the ground, and should be protected by a pallet. Valve internal surface and moving parts should be protected from foreign particles, sand, dirt, debris etc. Debris collected on moving parts can cause these parts to get stuck and prevent valve operation. Flange Protection Covers should only be dismantled right before assembly to the pipeline.

USE AND APPLICATION

DVD Check Valves in standard configuration are designed to be used in clean potable water systems. Operation in medium containing gas, oil etc. is only possible with written manufacturer approval and with special material selections suitable to the medium.

In systems that contain foreign particles (dirt, sand, debris etc.), the Valve can be clogged or sealing problems can occur. Check Valves should not be used in such applications. For special applications other than clean water systems, please get in contact with the manufacturer and request a written approval.

High Water Velocity can cause damage to the Valve. To prevent such damage, please check the Water Velocity. Maximum operating velocity for DVD Check Valves is as follows:

Nominal Pressure	Max Water Velocity
10 bar	3 m/s
16 bar	4 m/s
25 bar	5 m/s
40 bar	6 m/s

If Check Valves are used in water with some small particles, water velocity should not drop below 2m/sec. Otherwise, particles can sink down to the bottom of the Valve where they can clog it.

Check Valves should be protected from pressure surges. Especially in case of water hammer conditions, if the pump station has no water hammer protection Check Valve might slam shut. This working condition is not sustainable where mechanical damages can occur on the valve.

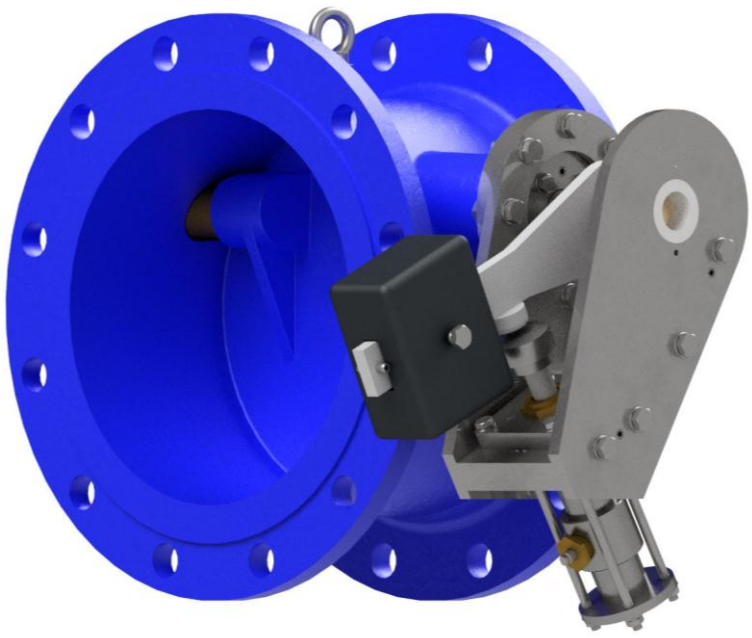
If such a situation is observed, hydraulic values of the pumping station should immediately be checked, and water hammer analysis should be done. As a result of the analysis, one or few of the below precautions can be considered to solve the problem:

- Changing the Check Valve Type
- Surge Anticipating Control Valve Application
- Pump Control Valves Application
- Air Vessel Application

Lever & Counterweight is one side mounted in standard configuration. If it is required to have two lever % counterweights positioned on the shaft, this requirement should be mentioned in the Order Confirmation and should be approved in written by the manufacturer. Furthermore, the manufacturer should be informed in the order about the required positioning side of the lever & counterweight.

In TCV model, it should be mentioned in the order whether the valve will be installed in vertical or horizontal piping. If not mentioned in the order, counter weight will be installed according to horizontal piping assembly.

In order to prevent slam shutting of TCV Tilting Check Valves, Hydraulic Dashpot accessory can be used. Dashpot mechanism acts like a cushion for the disc and enables non-slam closure.



PICTURE 2: Optional Dashpot Mechanism of Tilting Check Valves

Dashpot mechanism consists of a Hydraulic Piston and a Hydraulic Chamber. The closing time of Check Valve can be adjusted by the needle valve on the control circuit. Control circuit should be protected all the times and precautions against external impacts should be taken.

DVD Dashpot mechanism allows control of closing speed only. If dual stage closure is required, it should be mentioned on DVD Order Confirmation and should be confirmed by the manufacturer in written.

If it is required to have full opening & closing control on the Check Valve, then optional Hydraulic Actuator can be used together with the valve. Standard DVD configuration for

dampening requirements is as in Picture 2. If full control is required, it should be mentioned on DVD Order Confirmation and should be confirmed by the manufacturer in written.

If Check Valves are to be used in an automation system such as a SCADA; the valves can be ordered with Limit Switch.

Limit Switch accessory is a switch that sends an alarm signal to the user when the valve is in fully open or closed position. If it is not mentioned in the order, the limit switch will be shipped as to send a signal only in the closed position. However, upon request in the order, it is possible to produce it with both open and closed switches. Limit Switch is designed to be installed to one side of the Valve. However if double side assembly is requested, it should be mentioned in the Order Confirmation to have the limit switch installed to both sides of the Valve and written approval of the manufacturer should be received.

INSTALLATION TO THE PIPELINE

Pipeline flanges, which the valve will be installed to should be in the same axis and flange surfaces should be parallel to each other. Sealing problems can be seen if this is not obtained, and/or the Valve can face high load forces that can cause failures in long time. Load forces transmitted to the Valve from the pipeline should not go beyond what is defined in EN 1074-2 standard. Not to do so can cause Valve failure.

For Valve installation, enough distance should be provided between two connecting pipeline flanges. Shorter distance than needed can damage the Valve flange or the Valve coating. If there is longer distance than needed, do not try to pull the pipeline flanges and Valve flanges towards each other. During installation, make sure that flange surfaces are clean and smooth.

Valve flange to pipeline flange connection should be done by bolts and nuts; and washers must be used to protect the Valve coating. Opposing bolts should be screwed equally, preventing high load forces, strain and failure. Steel reinforced gaskets should be used between the flanges. Make sure that the gaskets are correctly positioned on the sealing surface of the flanges. Flange bolting should be selected according to EN 1591 Standard requirements. Excessive screwing of the bolts can cause permanent damage on the Valve.

Valve should be protected from outside effects (construction work, coating, concrete work etc.) at all times. Welding work should be concluded before Valve installation, and welding burrs should be cleaned beforehand.

Pipeline should be flushed and cleaned from all foreign particles, before Valve installation. Even though the pipeline can seem to be clean around the Valve installation area, during filling the line, particles from long distances can be carried to the installation area and can cause permanent damage on the Valve.

Especially at steel pipeline applications, make sure to have full cathodic protection. In the absence of cathodic protection or non-active protection, Galvanic Corrosion can occur very fast. DVD Valves cannot be held liable from such damages.

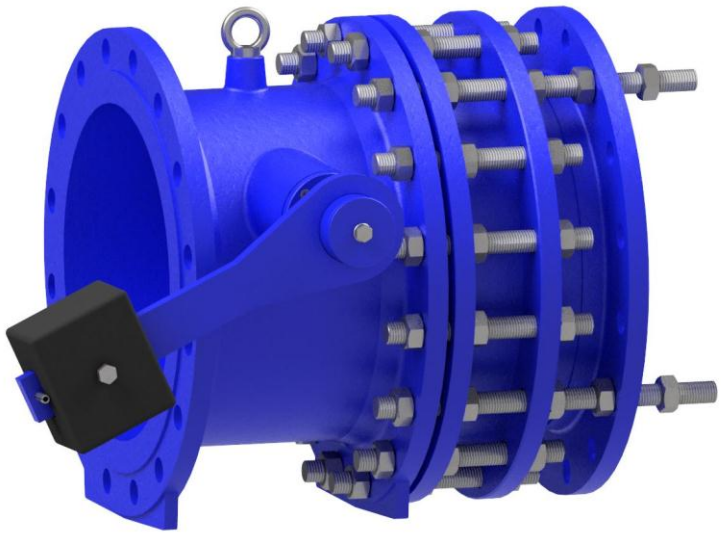
Inspect the Valve before installation and make sure that there are no foreign particles inside the Valve. Check the sealing surfaces of the Valve and confirm that they are clean. Open and close the Valve at least one time and check the functionality of the Valve before installation. For

Valves that are stored for a long period of time, please check the sealing gasket for any deformation and please contact the manufacturer if you see any problems.

If the Valve needs to be re-coated on site, for maintenance purposes, be sure to protect the sealing surfaces (gaskets, o-rings, stainless steel surfaces etc.) If these surfaces are coated, sealing problems can occur.

VALVE POSITIONING

During installation, take into consideration possible inspection and maintenance circumstances and provide enough space for such intervention. Quick Couplings such as Dismantling Pieces should be used together with large size valves (DN250<) for ease of dismantling the Valve. Dismantling Pieces are recommended to be installed in the upstream of the Valve. Furthermore, a Lifting Device should be available on the site that is in line with the weight of the Valve. Otherwise, dismantling and re-installing of the Valve for maintenance purposes will not be possible.



PICTURE 3: Check Valve + Dismantling Piece Connection

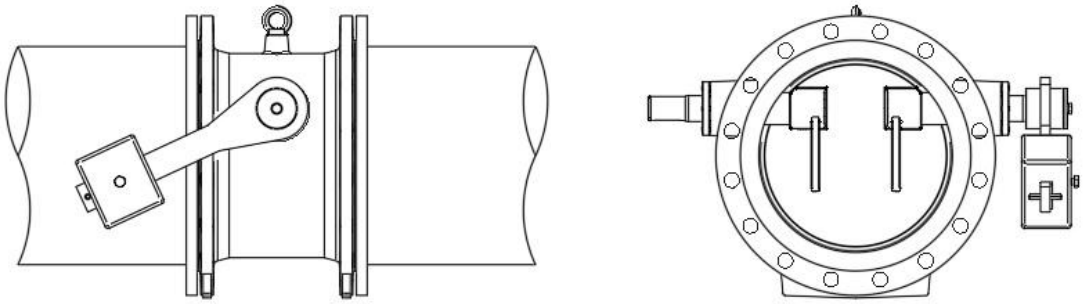
DVD Check Valves are designed to be used in laminar flow. Operation in turbulent flow may cause a mechanical damage. As a result of turbulent flow, there can be an in balanced force acting on the shaft bearings which causes them to wear out. If the valve works in vibration or loudly, check the working conditions of the valve immediately.

TCV Check Valve Disc rotation can go beyond the Valve Body; and Disc may need more space than the Body. Therefore, if there is a restriction for not installing a straight pipeline in the upstream and downstream of the Valve; make sure that equipment around the Valve is not preventing the Valve Disc Rotation.

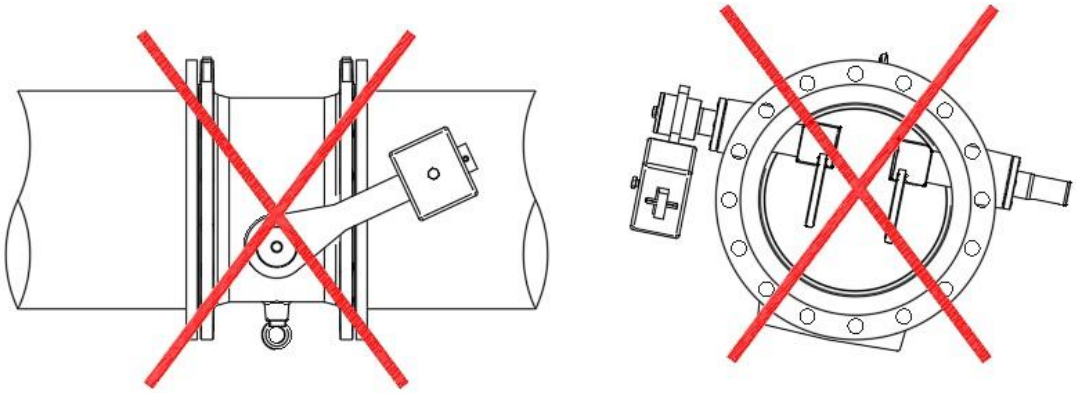
There should be DNx5 straight pipeline gap in the upstream of the Check Valve to ensure laminar flow. If installing a straight pipeline is not possible and if there is turbulent flow, it is recommended to reduce water velocity to maximum 2 m/sec.

In TCV models, lever & counterweight moves with the disc. Thus, there should not be any objects which might limit the movement of the lever & counterweight around the Valve. Besides, lever & counterweight can move suddenly due to the disc movement, without any notice. Thus, security should be provided for people around the valve. In accordance with this purpose, it is possible to order the valve with a Protection Cover accessory.

DVD Check Valves cannot be installed upside-down, one side-down or as tilted. Installing the Valve upside-down, one side-down or as tilted can cause sealing problems or cause permanent damage on the Valve.



Correct Installation

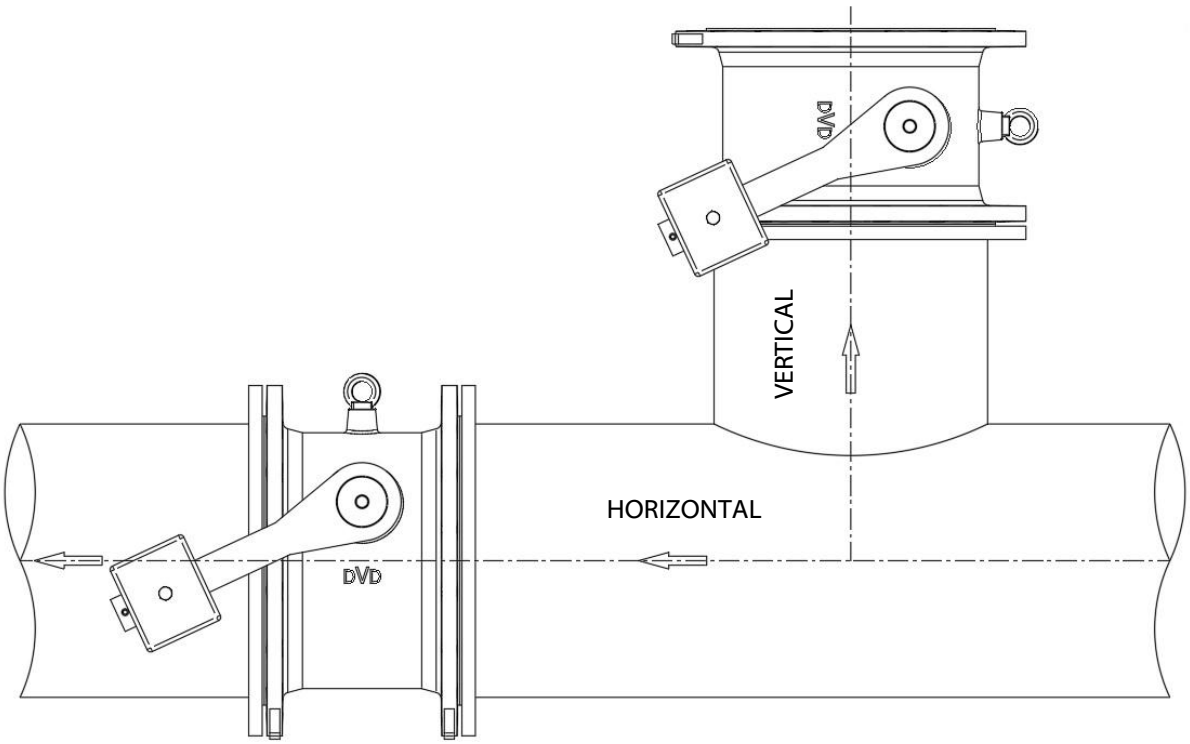


Wrong Installation

PICTURE 4 – Installation – Valve should not be installed upside-down, one-side down or as tilted.

DVD Check Valves can be installed on horizontal or vertical pipelines, following the above requirements. For installations on vertical pipelines, residuals can be collected on the disc and sediments can occur. Such sediments can cause malfunctioning. Thus, it should be prevented of working under 2 m/sec velocity on the vertical pipelines.

For installations on vertical pipelines, lever & counter weight position should be adjusted, unless it was previously mentioned in the order. Please contact the manufacturer for such an adjustment.



PICTURE 5 – Installation on Horizontal and Vertical Pipelines

DVD TCV Check Valves are manufactured and tested to have one-directional sealing. The sealing side can be checked from the arrow direction on the body. Installation on the pipeline should be done taking into consideration the arrow direction.

MAINTANANCE

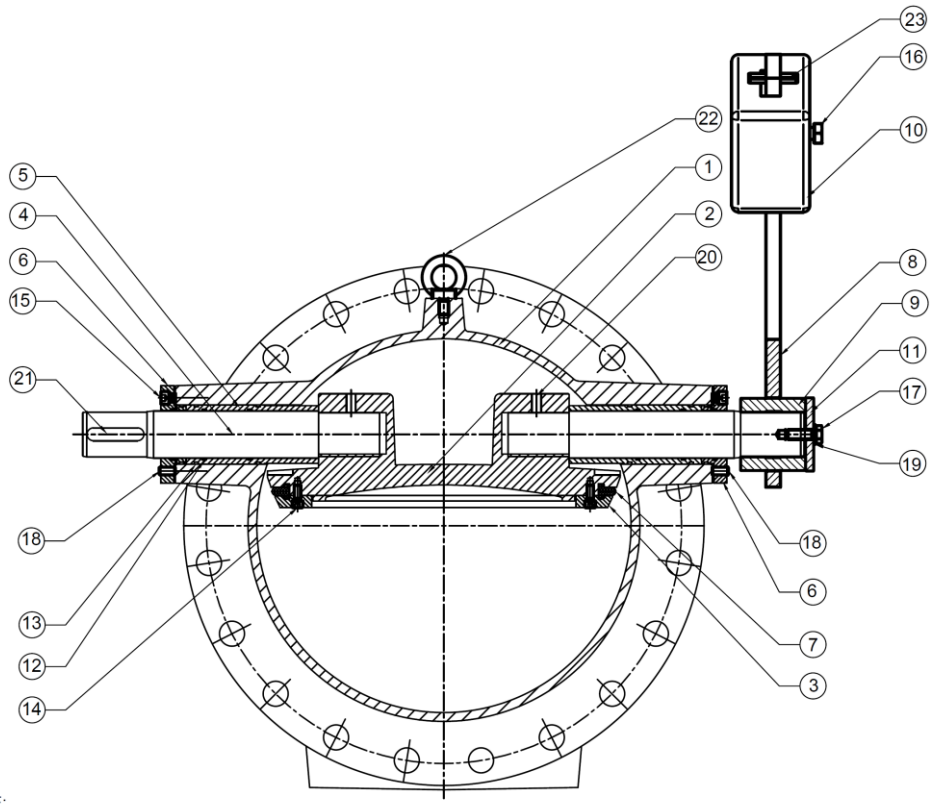
Before starting the maintenance, make sure that the Valve is isolated; upstream and downstream pipelines of the Valve are drained and de-pressurized. In case pipeline is not de-pressurized fully; potential dangers such as sudden disc movement, part movement or pressurized water outflow etc. can occur.

After maintenance is done, please re-install the Valve to the pipeline according to the related section in this Operation Manual.

Maintenance work should be done by experienced and skilled personnel. If there is no such personnel, please get in contact with DVD Valves and request your maintenance need. All personnel who will do the maintenance work should read and fully understand this Operation Manual.

Maintenance personnel should follow Occupational Health and Safety requirements and should use the necessary protective accessories (Work shoes, glasses, helmet, gloves etc.).

DVD TCV Check Valve Spare Part lists and predicted life time of these parts are indicated as below:



NOTE:
PART LIFE TIME IS AN ASSUMPTION IN NORMAL OPERATING PRESSURES AND NORMAL OPERATING CONDITIONS CIRCUMTANCES THAT CAN OCCUR DUE TO FALSE OPERATION OR INAPPROPIATE CONDITIONS ARE NOT EVALUATED AS PART LIFE TIME

Mon. No	QTY	PART CODE	PART NAME	MATERIAL	PART LIFE TIME	NOTE
23			PIN	AISI 304	5 YEARS	
22			EYEBOLT	AISI 304	5 YEARS	
21			KEY	C45	5 YEARS	
20			SETSCREW	AISI 304	5 YEARS	
19			WASHER	AISI 304	5 YEARS	
18			SETSCREW	AISI 304	5 YEARS	
17			BOLT	AISI 304	5 YEARS	
16			BOLT	AISI 304	5 YEARS	
15			BOLT	AISI 304	5 YEARS	
14			BOLT	AISI 304	5 YEARS	
13			O-RİNG	EPDM	3 YEARS	
12			O-RİNG	EPDM	3 YEARS	
11			COVER	St 37	5 YEARS	
10			WEIGHT	GGG40	10 YEARS	
9			LEVER HUB	C45	5 YEARS	
8			LEVER	St 37	5 YEARS	
7			SEALING GASKET	EPDM	3 YEARS	
6			COVER	GGG40	10 YEARS	
5			BEARING	BRONZE	5 YEARS	
4			SHAFT	X20Cr23	5 YEARS	
3			RETAINING RING	AISI 304	5 YEARS	
2			DISC	GGG40	10 YEARS	
1			BODY	GGG40	10 YEARS	

			Product Name: TILTING CHECKVALVE				DVD DOĞUS VANA SANAYİ
Date	19-02-2018	Signature					
Design	Bülent CANBAY						DRAWING NO
Approved	Alaattin YILDIRIM		SIZE A3	SCALE		WEIGHT	
GENERAL TOLERANCE ISO 2768-M			0-6	6-30	30-120	120-400	400-1000	1000-2000	2000-4000
			±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2

This table is to provide a general idea to users, and life times can vary according to site conditions, application and operational conditions. Sealings should be changed when they are worn out or damaged.

All gaskets and o-rings should be lubricated after renewal (w/ de-mineralized lubricant). If the Valve is potable water approved, potable water approved lubricants should be used.

DVD TCV Check Valve Cover Sealing Gasket (7) can be removed without removing the body from the pipeline. However, valve body should be fully isolated and de-pressurized before dismantling. **Do not dismantle the Sealing Gasket (7) of the Valve without de-pressurizing and draining the body fully.**

The lever & weight of the Valve can rotate or change the center of weight of the Valve. Precautions must be taken before any maintenance process.

Please follow the below steps to renew the Sealing Gasket (7):

1. Remove the Valve from the line, in line with the above mentioned requirements.
2. Remove the bolts on the Retaining Ring (3).
3. Remove the Retaining Ring (3).
4. Bring the Valve Disc (2) to slightly open position to be able to remove the Sealing Gasket (7) and remove the Sealing Gasket (7).
5. Clean the Disc (2) gasket channel, gasket facing surface and Retaining Ring (3) facing surface.
6. Clean the Retaining Ring (3) and Body (1) Weld Overlay surface.
7. Install the new Sealing Gasket (7) on the Disc (2). Make sure that T shaped gasket is correctly fit to the gasket channel.
8. Install the Retaining Ring (3) on the Sealing Gasket (7). Make sure that the gasket is correctly fit with the Retaining Ring (3).
9. Screw the Retaining Ring (3) bolts in opposing order.
10. Check the functionality of the Valve.
11. After installing the Valve, check the Disc (2) for good sealing.

CONTACT INFORMATION

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