DVD VALVES

OPERATION MANUAL

FSC – FDK NOZZLE (SILENT) CHECK VALVES & FOOT VALES

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 as a drainage valve, 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.

PICTURE 1: Positioning the Valve on the Pallet - In order to prevent damage to the seat and seal during transportation ***the disc of check valve should be positioned to be at the bottom***

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.**

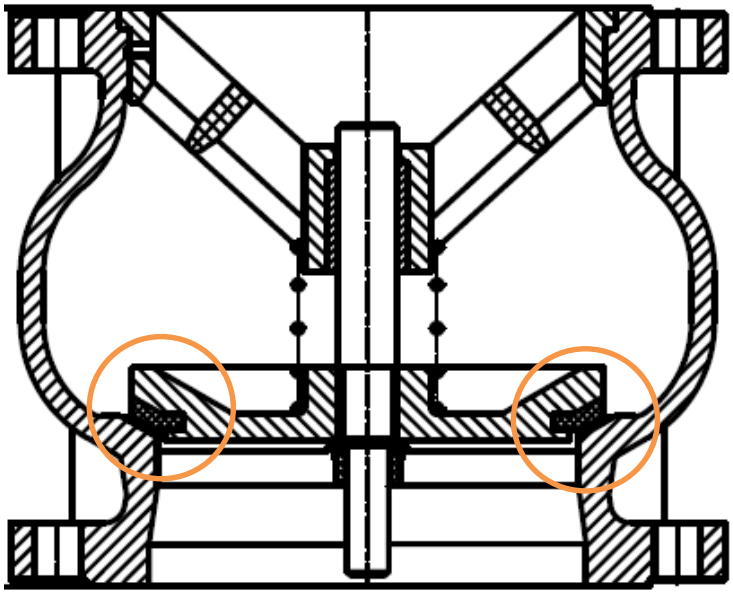
Lifting Belts and Lugs which are according to safety norms shall be used. They have to be suitable for the Valve weight. Valve should be lifted only from the Lifting Bores.

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.

Check Valve seats and seals are extremely sensitive and should be cautiously protected at all times.

This cautious protection should be done at all times, including but not limited to storage, transportation, installation and operation stages. In case of a small scratch or debris collection on the seats and seals, the seats and seals can lose their function and the Valve can face leakage problems. In such a situation, the whole Valve should be replaced. DVD Valves cannot be held liable from such ring damages.



PICTURE 2: Location of the Body seat and seals

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 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

DVD Nozzle Check Valves can be used as Foot Valves in the suction pipes of the pumps. DVD Foot Valves are FDK model. These models include a Filter in the inlet of the Valve in order to prevent debris from entering the system. **DVD FSC Nozzle Check Valves cannot be converted to DVD FDK Foot Valves or visa versa.** These items have different machining and customer request should be mentioned together with the order.

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 ring 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.

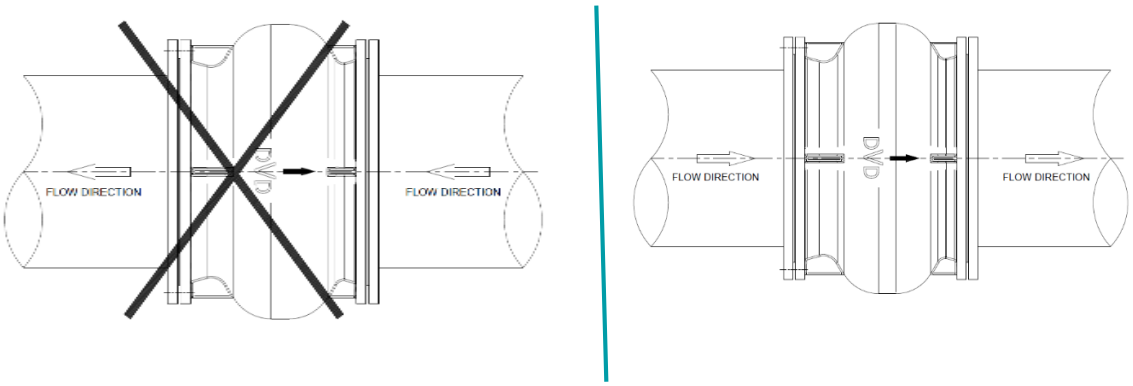
VALVE POSITIONING

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. Using them in turbulent flow may cause a mechanical damage. As a result of turbulent flow, there will be an excessive pressure to the cushioning items which causes wearing out. If the valve works vibrating and loudly, immediately check the working conditions of the valve.

There should be DNx5 plain tube gap inlet of the check valve to ensure laminar flow. If securing a gap is not possible and there is turbulent flow, it is recommended to reduce water velocity to maximum 2m/s.

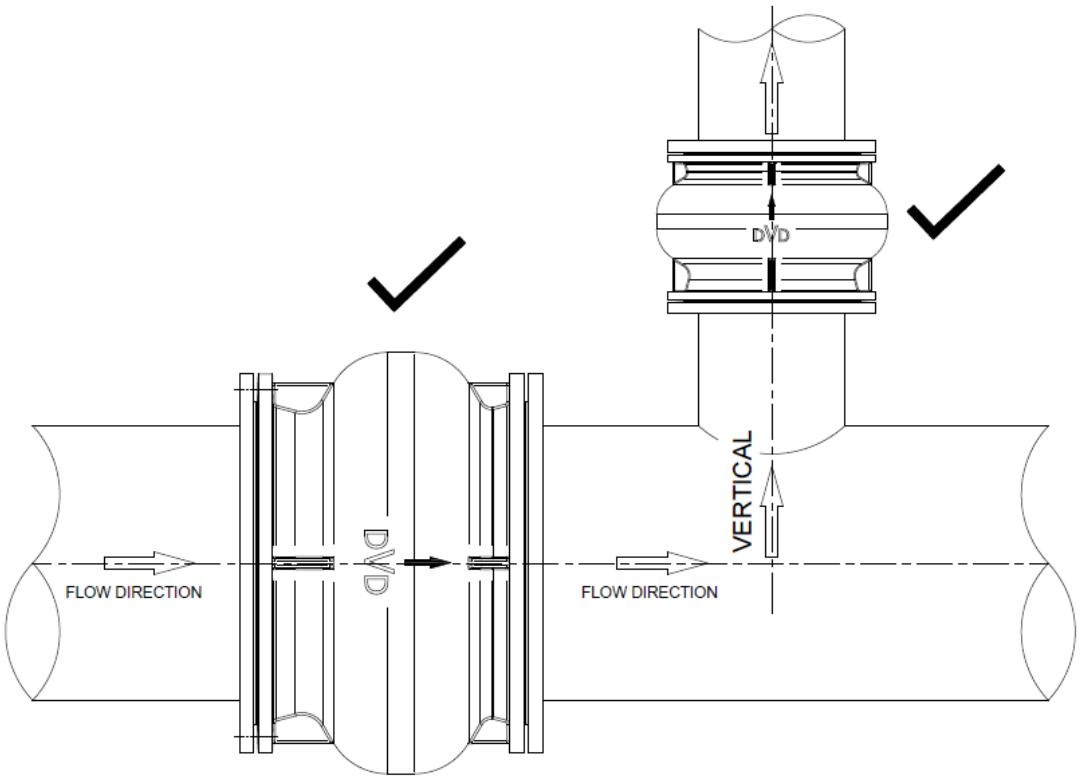


Wrong Installation

Correct Installation

PICTURE 4 – Installation – Valve should not be installed backwards or as tilted.

DVD Check Valves can be installed on horizontal and 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/s velocity on the vertical pipelines.



PICTURE 5 – Installation on Horizontal and Vertical Pipelines

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

MAINTANANCE

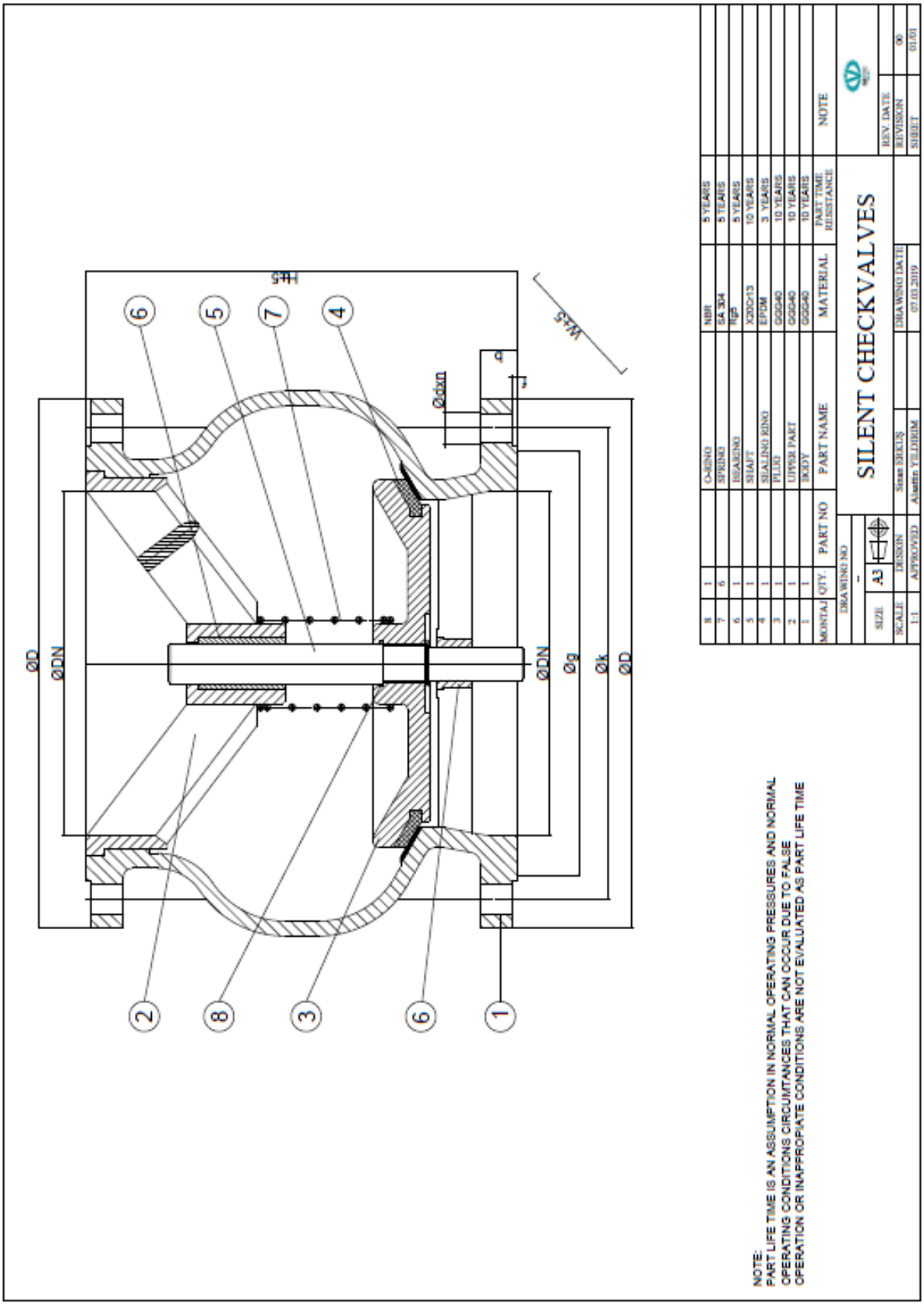
Before starting the maintenance, make sure that the Valve is isolated; upstream and downstream pipelines of the Valve are drained and de-pressurized. In case pipeline is not de-pressurized fully; potential dangers such as sudden disc movement, part movement or pressurized water outflow etc. can occur.

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 FSC-FDK Check Valve Spare Part lists and predicted life time of these parts are indicated as below:



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

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

FSC-FDK Check Valves include a compressed Spring inside. Therefore please take all necessary precautions in order to prevent the Spring from becoming loose.

FSC-FDK Check Valve Sealing Gasket (4) can be replaced after the valve is removed from pipeline.

Please follow the below steps to renew the Sealing Gasket (4):

1. Position the Valve so that the Disc (3) of the check valve is looking to the bottom.
2. Loosen the bolts fixing the Guiding Body (2) crosswise. Note that the Guiding Body is holding the Spring (7). **Before removal of bolts, the Guiding Body (2) should be pressed down in order to prevent sudden come out.**
3. Take out the Guiding Body (2) and remove the Spring (7).
4. Take the Shaft (5) and Disc (3) assembly as a single unit.
5. Remove the Sealing Gasket (4) from the channel on the Disc (3) and clean the channel. Please note that in some sizes, a Retaining Ring is provided to grip the Sealing Gasket (4) to the Disc (3). In such design, please untighten the bolting of the Retaining Ring to take out the Sealing Gasket (4)
6. Clean the Body Seat.
7. Insert a new Sealing Gasket (4) into the channel. Make sure that the sealing ring is correctly fit and check all surfaces. In designs with Retaining Ring, tighten the bolting of the Retaining Ring for gripping the Sealing Gasket (4).
8. Install the Disc – Shaft assembly back to the Body (1).
9. Locate the Spring (7) onto the Disc (3).
10. Replace the O-ring on the Guiding Body (2) with a new one and install the Guiding Body (2).
11. Fix the bolts by pressing the Guiding Body (2) into the Body (1).
12. Tighten the bolts crosswise.
13. Check the functionality of the Valve.
14. After installing the Valve, check the Disc (3) for good sealing.

CONTACT INFORMATION

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