

AVK SERIES 55 DN450 - DN600
RESILIENT SEATED GATE VALVE
FIELD MAINTENANCE AND
INSTRUCTION MANUAL

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AVK SERIES 55 WITHOUT BY-PASS RESILIENT SEATED GATE VALVE EXPLODED DRAWING

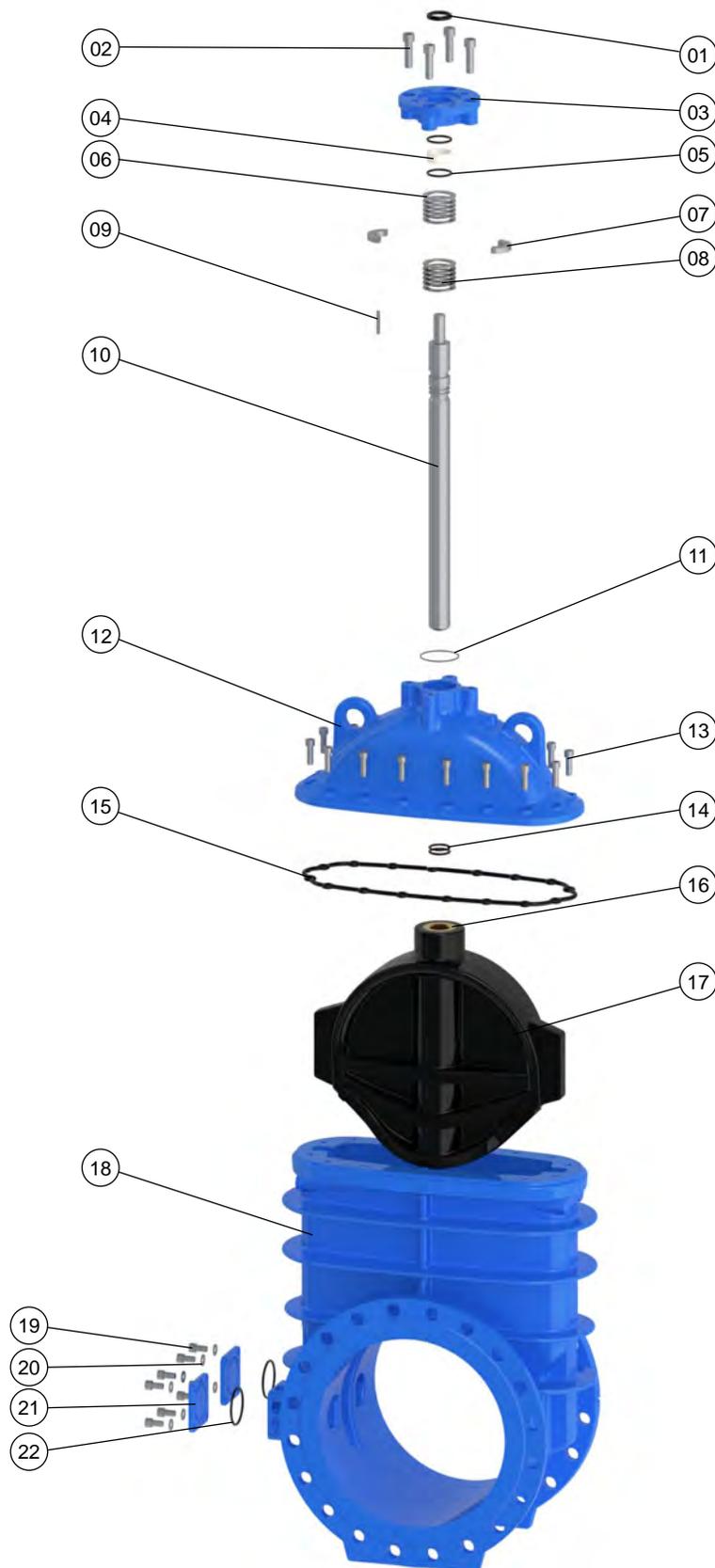


Fig. 1

AVK SERIES 55 WITH BY-PASS RESILIENT SEATED GATE VALVE EXPLODED DRAWING

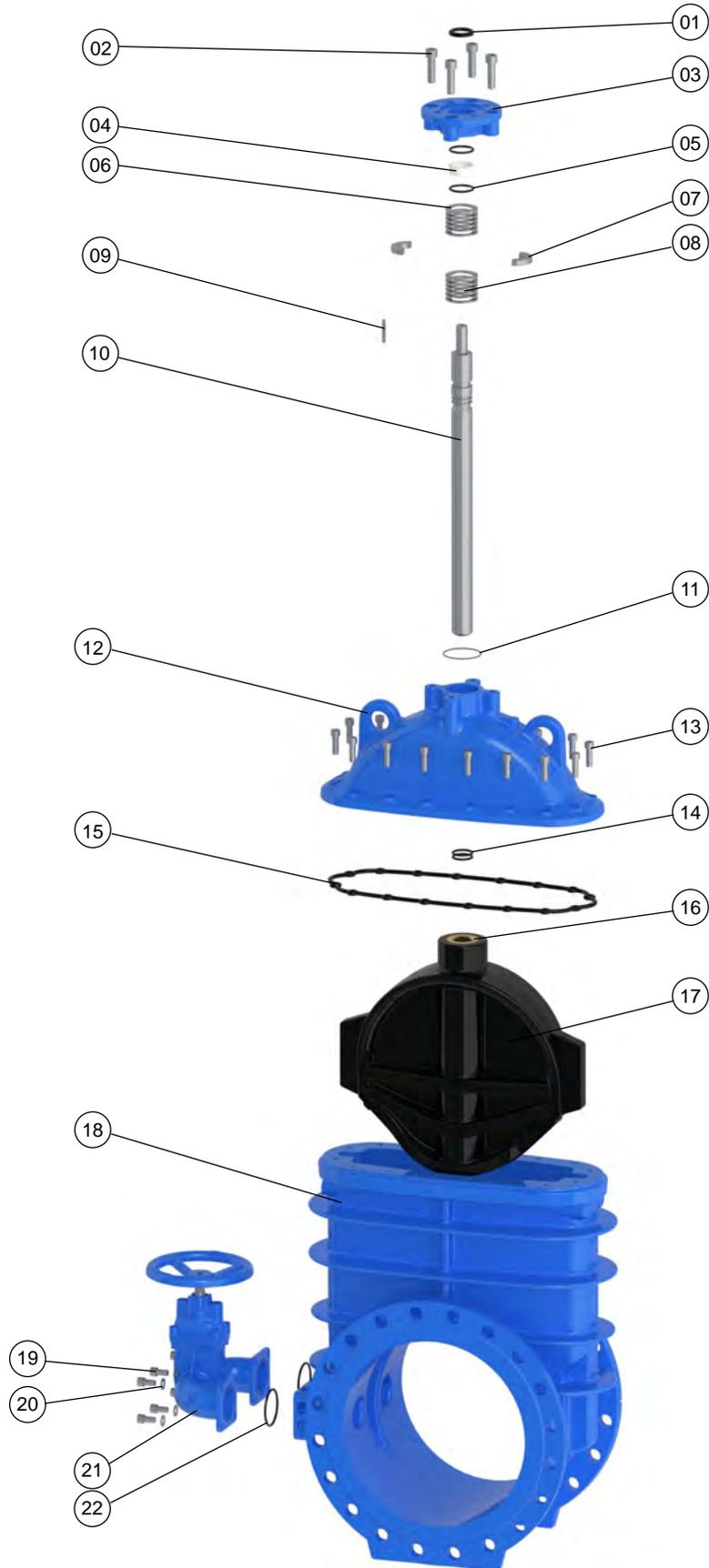


Fig. 2

**AVK SERIES 55 BS TYPE
RESILIENT SEATED GATE VALVE PARTS LIST**

| No. | Description | Material |
|-----|------------------------------------|---|
| 01 | Wiper Ring | NBR |
| 02 | Bolt | SS ISO 3506; Grade A2-70 |
| 03 | Gland Flange | EN 1563;EN- GJS-500-7 |
| 04 | Slide Bearing | PA 6.6 (Polyamide) |
| 05 | O-Ring | EPDM |
| 06 | Thrust Washer | SS EN 10088-1: (W1.4057) |
| 07 | Thrust Collar | SS EN 10088-1: (W1.4404) |
| 08 | Bearing | Stainless steel / PTFE coated |
| 09 | Key | SS EN 10088-1: (W1.4404) |
| 10 | Stem | SS EN 10088-1: (W1.4021) |
| 11 | O-Ring | EPDM |
| 12 | Bonnet | DI EN 1563; GJS-500-7 |
| 13 | Bolt | SS ISO 3506; Grade A2-70 |
| 14 | O-Ring | EPDM |
| 15 | Bonnet Gasket | EPDM (EUW) 70 |
| 16 | Wedge Nut | Dezn. res. brass EN 12165:CW626N |
| 17 | Wedge | DI EN 1563; GJS-500-7 (Rubber vulcanized) |
| 18 | Body | DI EN 1563; GJS-500-7 |
| 19 | Bolt | SS ISO 3506; Grade A2-70 |
| 20 | Washer | SS ISO 3506; Grade A2-70 |
| 21 | Blind flange (Without bypass type) | DI EN 1563; GJS-500-7 |
| | Bypass valve (With bypass type) | / |
| 22 | O-Ring | NBR |

2. INTRODUCTION

Series 55 gate valves are designed for full open and full closed service, which is used to isolate or sectionalize any piece of equipment or length of pipeline in water or sewage systems. They are suitable for use with potable water, waste water or neutral liquids up to 70°C. Minimum liquid temperature must be above freezing. Insulation is essential for external temperatures from 0° to -10°C. Direction of closing is on top of the ISO mounting gland flange and the gland flange of a By-pass valve if fitted.

3. HEALTH AND SAFETY AT WORK

Please ensure that all relevant Health and Safety issues and regulations are strictly adhered to, prior to and during any installation or maintenance work carried out on these valves. It is essential that wherever work is being undertaken on a valve that may involve the release of any internal pressure, the valve is fully depressurised prior to any work being carried out, and the line drained.

It is also essential that the user handling the valve is aware of the weight of the components or assemblies to be handled and manipulated during installation and maintenance. It is the end users responsibility to ensure that safe working practices are followed at all times.

Whenever AVK products are installed, operated, or maintained, the inherent dangers of pressurised liquids and gasses, which can be severe, must be addressed. Therefore, it is essential that staff undertaking these operations are adequately trained and it is the responsibility of the end user to ensure that only trained and competent staff undertake these duties. This manual has been designed to assist, but it can never fully replace quality training in the workplace. However AVK technical staff are always available to answer any questions relating to problems that may not be covered by this manual.

AVK products are designed and manufactured to be fit for purpose, and to a high and reliable standard. This provides a safe product with minimum risk to health when used correctly for the purpose for which it was designed. However, this assumes that the equipment is used and maintained in accordance with this manual, and the user is advised to study this manual, and to make it available to all staff that may need to refer to it.

AVK cannot be held responsible for any incidents arising from incorrect installation, operation or maintenance. The responsibility for this must rest wholly with the end user.

4. RECEIVING AND STORAGE

4.1 UNLOADING:

All valves should be unloaded carefully. Each valve should be carefully lowered from the truck to the ground; it should not be dropped. In the case of larger valves, forklifts or slings around the body of the valve or under the skids should be used for unloading. Only hoists and slings with adequate load capacity to handle the weight of the valve or valves should be used. And the hoists should be hooked into the slings fastened through the lifting holes on the valve bonnet. Failure to carefully follow these recommendations is likely to result in damage to the valve or personal injury.

Handwheels, bypasses, actuators and gearboxes in particular, should not be used as lifting or rigging points for valves.

4.2 INSPECTION AFTER UNLOADING:

Resilient-seated gate valves should be inspected at the time of receipt for damage in shipment. The initial inspection should verify compliance with specifications, direction of opening, size and shape of the operating nut, number of turns to open or close, and type of end connections. A visual inspection of the seating surfaces should be performed to detect any damage in shipment or scoring of the seating surfaces. Inspection personnel should look for bent stems, cracked parts, loose bolts, missing parts and accessories, and any other evidence of mishandling during shipment. Each valve should be operated through one complete opening-and-closing cycle in the position in which it is to be installed.

4.3 STORAGE:

- (1). Resilient-seated gate valves should be stored in a manner that protects them from the environment, preferably indoors, with the actual valve temperature always higher than dew point, particularly for valves fitted with actuators.
- (2). The valves should be stored with the wedges in the nearly closed position to prevent unnecessary compression of the rubber compound.
- (3). The resilient wedges should also be protected from sunlight, ozone and chemical exposure.
- (4). The resilient-seated gate valve should not come into contact with any contaminative substances prior to installation.
- (5). In colder climates, valves should be drained and left slightly open before storage. Failure to do so may result in cracking the valve castings.
- (6). If outdoor storage is unavoidable the valves should then be supported off the ground and protected by a weatherproof cover, from dust-laden damp or saline conditions and at ambient temperature.

5. INSTALLATION AND COMMISSIONING

It is essential that the user of the valve is aware of the weight of the components and / or assemblies that must be handled and manipulated during installation and maintenance. It is the users responsibility to ensure that safe working practices are followed at all times.

5.1 BEFORE INSTALLING THE VALVE INTO THE PIPELINE:

- (1). Only suitably qualified and experienced engineers should install valves.
- (2). All special packing material must be removed.
- (3). When large valves are provided and lifting lugs, plates or eye nuts, these must be used to lift the valve.
- (4). Ensure that the pipeline is completely free of debris or foreign matter (the pipeline should be flushed out if possible).
- (5). Check direction of operation.
- (6). Check the function of the valve, by operating it two or three times to ensure freedom of spindle rotation and movement of wedge (gate).
- (7). Check the valve, clear any debris in water way directly under wedge.
- (8). To ensure adequate sealing it is important to select the correct type of gasket for the medium concerned.
- (9). Check the gasket material. For flange joints using low strength bolting, such as may be provided for iron flanges, metal gaskets (flat, grooved, jacketed, corrugated or spiral wound) should not be used.
- (10). Check the gaskets for freedom from injurious defects or damage.

5.2 INSTALLING:

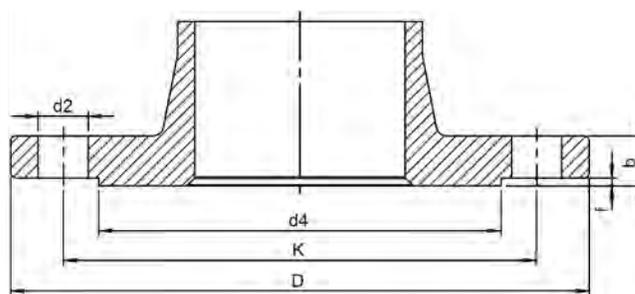
- (1). Use the correct bolt diameter, length and material for the particular pipeline system being used. For details refer to Flange Comparison Page 6.
- (2). When installing the gate valves, ensure that the seats and the flange faces are clean.
- (3). When valves are provided with lifting lugs, plates or eye nuts, these must be used to lift the valve.

- (4). Place valve between pipe flanges, and insert the bolts.
- (5). Tighten bolts loosely.
- (6). Tighten bolts in a diagonal sequence to ensure flanges are pulled parallel.
- (7). Finally tighten bolts to correct torque levels.

5.3 ONCE THE VALVE HAS BEEN INSTALLED (COMMISSIONING):

- (1). Check that the valve still functions correctly by operating it for a minimum of five turns.
- (2). Direct mounted electric actuator open and close positions are pre-set at the works, and should not need adjustment but torque settings may need adjustment by a suitably qualified engineer.
- (3). Pedestal mounted actuators must be set on site.
- (4). Where pedestals are fitted with open / close indicators, attention must be made during connection to ensure that they correctly reflect the position of the valve.
- (5). Where a venting plug or valve is fitted, this should be used to remove the air from the valve. Alternatively, where this is not provided, air can be removed by loosening the gland bolts(See Page 9, Fig 3, Item 2).
- (6). When all the air has been safely vented, the cap, valve or gland bolts must be re-tightened ensuring that any gaskets or washers are correctly seated.
- (7). When the pipeline has been charged, inspect the valve for any leaks and adjust as necessary in accordance with maintenance instructions.
- (8). All external debris and foreign matter should be cleaned off from the external surfaces of the valve.
- (9). Any paint / coating which has been damaged during installation should be appropriately touched up.

**British Metric
Flange Comparison**



| | | D | K | | d2 | b | d4 | f | |
|-------------|---------------|-----------------|-----------------------|-----------------------|---------------------|------------------|----------------------|--------------------|---------------|
| | Nom Pipe Dia. | Flange Diameter | Pitch Circle Diameter | No. and dia. Of Bolts | Dia. Of Bolts Holes | Flange Thickness | Raised Face Diameter | Raised Face Height | Nom Pipe Dia. |
| PN10 | 450 | 615 | 565 | 20 X M24 | 29.5 | 25.5 | 534 | 4 | 450 |
| | 500 | 670 | 620 | 20 X M24 | 29.5 | 26.5 | 582 | 4 | 500 |
| | 600 | 780 | 725 | 20 X M27 | 31 | 30 | 682 | 5 | 600 |
| PN16 | 450 | 640 | 585 | 20 X M27 | 32.5 | 30 | 544 | 4 | 450 |
| | 500 | 715 | 650 | 20 X M30 | 35.5 | 31.5 | 609 | 4 | 500 |
| | 600 | 840 | 770 | 20 X M33 | 38.5 | 36 | 720 | 5 | 600 |

6. APPLICATION HAZARDS:

- (1). Resilient-seated gate valves should not be installed in lines where service pressure will exceed the rated working pressure of the valve.
- (2). Resilient-seated gate valves should not be used for throttling service unless the design is specifically recommended for that purpose or approved in advance by the manufacturer.
- (3). Resilient-seated gate valves should not be used in applications that are exposed to freezing temperatures unless sufficient flow is maintained through the valve or other protection is provided to prevent freezing.
- (4). Pipe, fittings, and valves installed in underground pipelines are generally joined with push-on or mechanical joints. These joints are considered unrestrained-type joints since no considerable restraint against longitudinal separation is provided.
- (5). Gate valves should not be installed in a dead end or near a bend in a pipeline without proper and adequate restraint to support the valve and prevent it from blowing off the end of the line.
- (6). It is good engineering practice to consider during the design whether or not thrust blocks, restrained joints, or other means of restraint are needed on or adjacent to valves on pipelines and/or where unusual conditions exist, such as high internal pressures, adjacent fittings, or unsuitable soils.
- (7). To prevent damage, actuator/gearbox for resilient-seated gate valve should be set up according to the torque in table1. Use the lowest torque as much as possible, as long as actuator/gearbox can operated valve freely during whole travel. Max. actuator/gearbox output torque set can't exceed 25% of rated torque. If reach 125% of rated torque, you still can't operate the valve, please contact AVK service people.

7. OPERATION AND MAINTENANCE

7.1 OPERATION:

Each valve should be operated through a full cycle and returned to it's normal position on a time schedule designed to prevent a buildup of tuberculation or other deposits that could render the valve inoperable or prevent a tight shutoff. The interval of time between operations of valves in critical locations, or valves subjected to severe operating conditions, should be shorter than that for less important installations, but can be whatever time period is found to be satisfactory based on local experience. The number of turns required to complete the operation cycle should be recorded and compared with permanent installation records to ensure full gate travel.

Table 1

| Valve size | Max. closing torque Nm | Turns to open | Free running torque Nm | Rupture torque Nm |
|------------|---------------------------|---------------|---------------------------|----------------------|
| DN450 | 500 | 39 | 25 | 2550 |
| DN500 | 500 | 43 | 25 | 2800 |
| DN600 | 700 | 53 | 25 | 3300 |

7.2 MAINTENANCE PROCEDURES:

Maintenance should be performed at the time a malfunction is discovered. To avoid a return trip to the same valve and to prevent forgetting about it altogether, a recording system should be adopted that provides a written record of valve location, condition, maintenance, and each subsequent inspection of the valve.

7.2.1 INSPECTION:

Each valve should be operated through one complete cycle. If the stem action is tight as a result of "hard water" buildup on the stem threads, the operation should be repeated several times until the opening and closing actions are smooth and free. With the gate in the partially open position, a visual inspection should be performed, where practical, to check for leakage at all joints, connections, and areas of packing or seals. If leakage is observed, all defective O-rings, seals, gaskets, or end-connection sealing members should be replaced. If the leakage can not be corrected immediately, the nature of the leakage should be reported promptly to those who are responsible for repairs. If the valve is inoperable or irreparable, its location should be clearly established to save time for repair crews. The condition of the valve, and if possible, the gate position, should be reported to personnel responsible for repairs. In addition, fire departments and other municipal departments should be informed that the valve is out of service.

7.2.2 RECORD KEEPING:

In order to carry out a meaningful inspection and maintenance program, it is essential that the location, make, type, size, and date of installation of each valve be recorded. Depending on the type of record system used, other information may be entered in the permanent record. When a resilient-seated gate valve is inspected, an entry should be entered in the permanent record indicating the date of inspection and condition of the valve. If repair work is necessary, it should be indicated. On completion of the work, the nature of the repairs and date completed should be recorded.

8. REPAIR PROCEDURES

Leakage, broken parts, hard operation, and other major defects should be corrected by a repair crew as soon as possible after the defect has been reported. If repairs are to be performed in the field, the repair crews should take a full complement of spare parts to the jobsite. Provisions should be made to isolate the defective valve from water pressure and relieve internal trapped pressure prior to performing any corrective maintenance. Disassembly of the valve should be accomplished in accordance with the procedure supplied in the following sections. After repairing the valve, the operating mechanism should be cycled through one complete operating cycle. With full line pressure applied to the valve in the open position, an inspection should be made to detect leakage in the areas around the seal plate, bonnet, packing gland, and body-end connections. A record should be made to indicate that the valve has been repaired and is in working condition. Any marking that the valve is inoperable should be removed. In addition, fire department and other appropriate municipal departments should be informed of satisfactory repair of the valve.

8.1 UPPER AREA REPLACEMENT (GLAND FLANGE(03)/ WIPER RING(01), GLAND FLANGE O-RING(11), SLIDE BEARING(04), UPPER AND LOWER STEM SEALING O-RINGS(05 AND 14), THRUST WASHER(06), ROLLER BEARING(08), THRUST COLLAR(07) AND STEM(10)) :

WARNING: To perform the following steps, be sure the Water Main Supply Line has been shut off, and that the pressure has been bled off! Also provide sufficient clearing around the valve so that no soil or debris may fall into it.

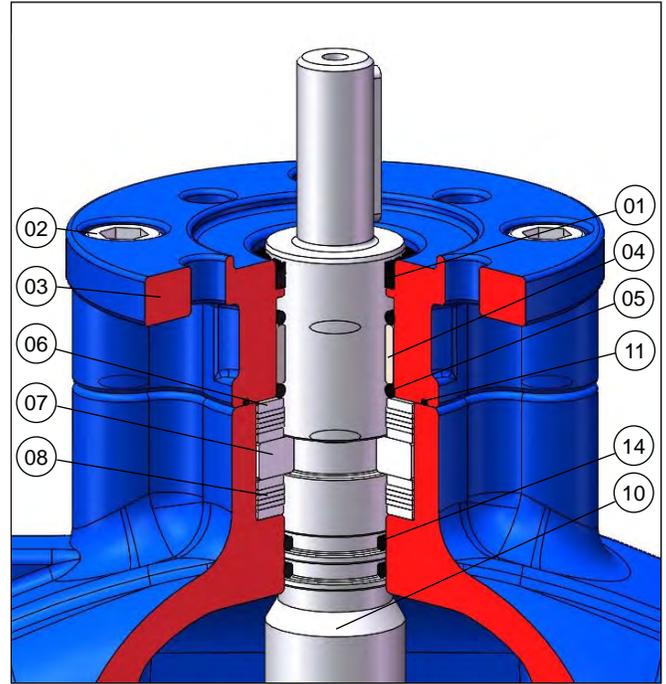


Fig. 3

(1). Remove the four Gland flange bolts(02).

(2). Remove the Gland flange(03) with Wiper ring(01) attached. (The Wiper ring is a "Factory Installed" press fit and therefore must be reordered as an assembly along with the Gland flange)(See Fig. 3).

(3). When performing step 2, verify the location of the Upper Stem Seal O-rings(04) and the Stem Seal slide bearing(05). They may be located on the Stem(10), or in the counterbore of the Gland flange(03).

(4). Turn the Stem(10) in a closing direction until it disengages from the Wedge(17), and remove from valve.

(5). Inspect and repalce any damaged parts. Use a food grade grease that contains no acetate or silicone, on the O-rings. Re-assemble in reverse order.

NOTE(See Fig. 4):

There is a groove in the bottom of the Gland flange(03), for the Gland O-ring(11).

Thrust collar(07) is a two-piece part, be located in the upper first groove of stem(10).

Two sets CSB washer(08) be located below and above thrust collar(07).

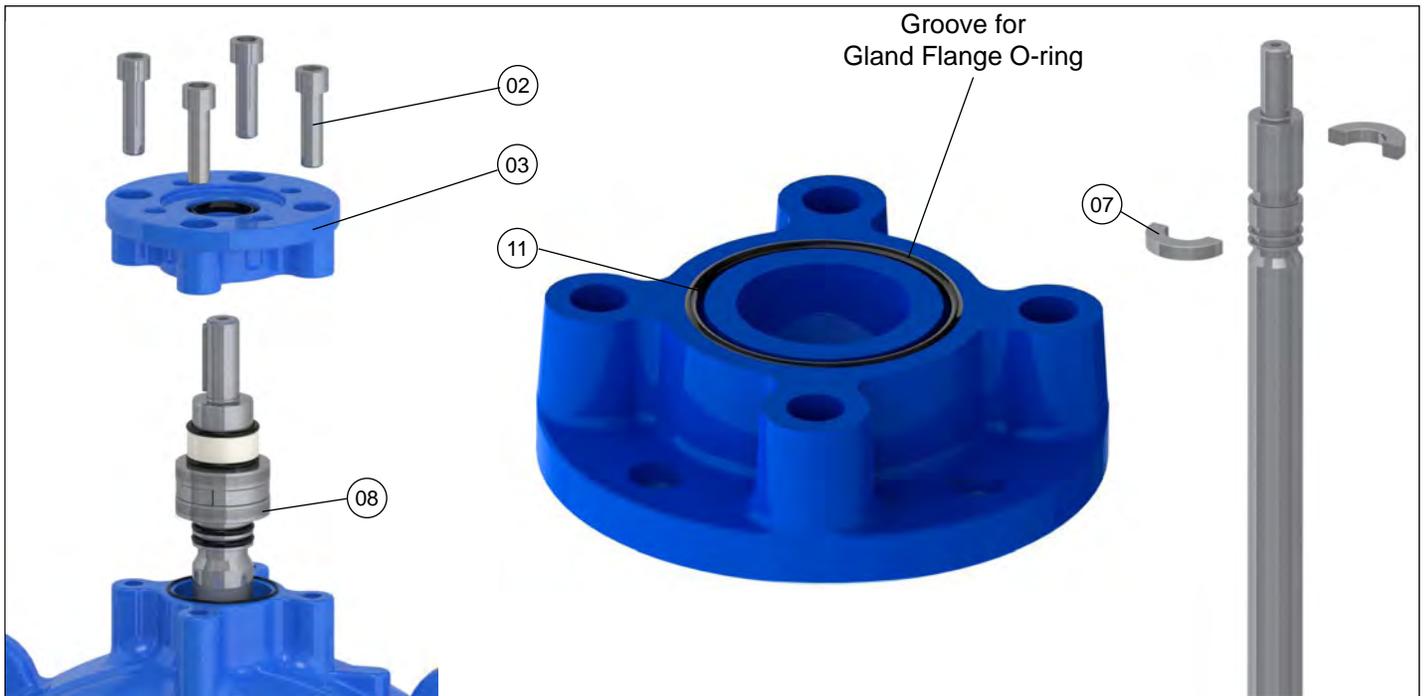


Fig. 4

8.2 MIDDLE AREA REPLACEMENT (BONNET GASKET (15) AND WEDGE(17)):

WARNING: To perform the following steps, be sure the Water Main Supply Line has been shut off, and that the pressure has been bled off! Also provide sufficient clearing around the valve so that no soil or debris may fall into it.

- (1). Close the valve, stopped when torque increase dramatically (Wedge loosely sit at body sealing surface).
- (2). Complete steps 1 through 5 in the **UPPER AREA REPLACEMENT** section.
- (3). Using a small, flat bladed screwdriver, remove the hot melt glue that covers the Bonnet Bolts(13).
- (4). Once the hot melt glue has been removed, use a wrench to remove the Bonnet Bolts(13). Remove the Bonnet(12), Bonnet Gasket(15) and set aside.
- (5). To remove the Wedge(17) it is helpful to thread the Stem(10) back into the wedge and use the stem as a handle or lever to extract the Wedge.
- (6). Carefully inspect the interior of the valve body and remove any debris.
- (7). Inspect and replace any damaged parts and re-assemble in reverse order, torquing the Bonnet Bolts(13) in a diametrically opposed (180 degrees apart) pattern.
- (8). Using hot melt glue to seal the Bonnet Bolts(13).



Fig. 5

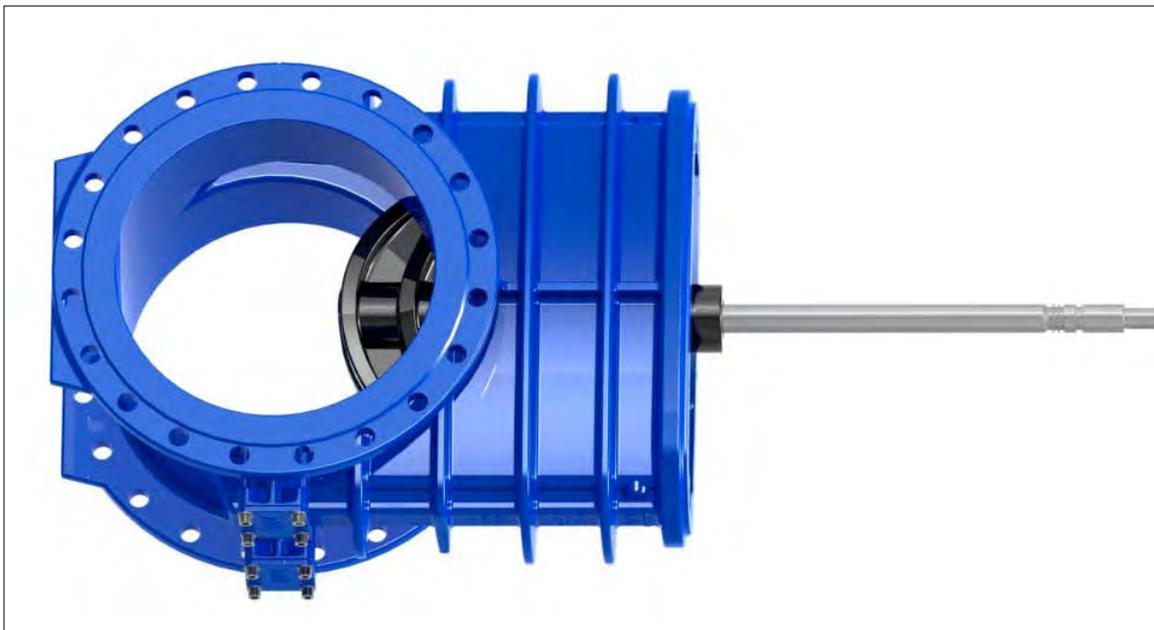


Fig. 6

8.3 BOTTOM AREA REPLACEMENT (BLIND FLANGE (21), O-RING(22) AND BYPASS VALVE(21)):

WARNING: To perform the following steps, be sure the Water Main Supply Line has been shut off, and that the pressure has been bleed off! Also provide sufficient clearing around the valve so that no soil or debris may fall into it.

Without bypass type (See Fig.7):

Remove bypass bolts(19) with a wrench, take down the blind flange(21) and O-ring(22), inspect and replace damaged parts. re-assemble in reverse order.

With bypass type (See Fig.8):

- (1). Remove the bolts(19) between bypass elbow and main valve with a wrench, take down bypass valve(21) and O-ring(22).
- (2). Inspect and replace damaged parts and mount bypass valve to main valve.



Fig. 7



Fig. 8

9. SPARE PARTS

The use of inferior materials or parts in a valve can have serious consequences. Therefore it is absolutely essential that in order to guarantee the highest level of safety and performance, only genuine AVK spare parts are be used. AVK cannot accept any responsibility whatsoever for the fitting and subsequent failure of any non-AVK or non-approved parts.

10. TROUBLESHOOTING GUIDE

WARNING: The valve must be isolated before performing any maintenance. Failure to do so may cause pressure to be released resulting in severe injury or death.

Several problems and solutions are presented below to assist you in troubleshooting the valve.

PROBLEM: Valve leaking around stem/ gland flange.

Probable Cause: Damaged or worn o-rings, bearing or stem seal.

Corrective action: Replace damaged or worn parts.

PROBLEM: Valve leaking around Bonnet and Body.

Probable Cause: Bonnet Bolts loose.

Corrective action: Tighten Bonnet Bolts.

Probable Cause: Damaged Bonnet Gasket.

Corrective action: Replace Bonnet Gasket.

PROBLEM: Valve leaking around pipe connections.

Corrective action: Tighten flange bolts.

Corrective action: Verify gasket is not damaged. Replace if necessary.

PROBLEM: Valve hard to operate.

Probable Cause: Gland Bolts too tight or tightened unevenly.

Corrective action: Loosen then re-tighten Gland Bolts evenly.

Probable Cause: If the valve has not been operated over a prolonged period of time, build-up may occur on the internal parts.

Corrective Action: Open or close the valve one turn at a time until fully opened or closed. Repeat the process a few times then flush the system to remove any debris.

Probable Cause: Pressure build-up in system.

Corrective Action: Relieve pressure and bleed off any air build-up.