



## Installation, Operation and Maintenance Manual

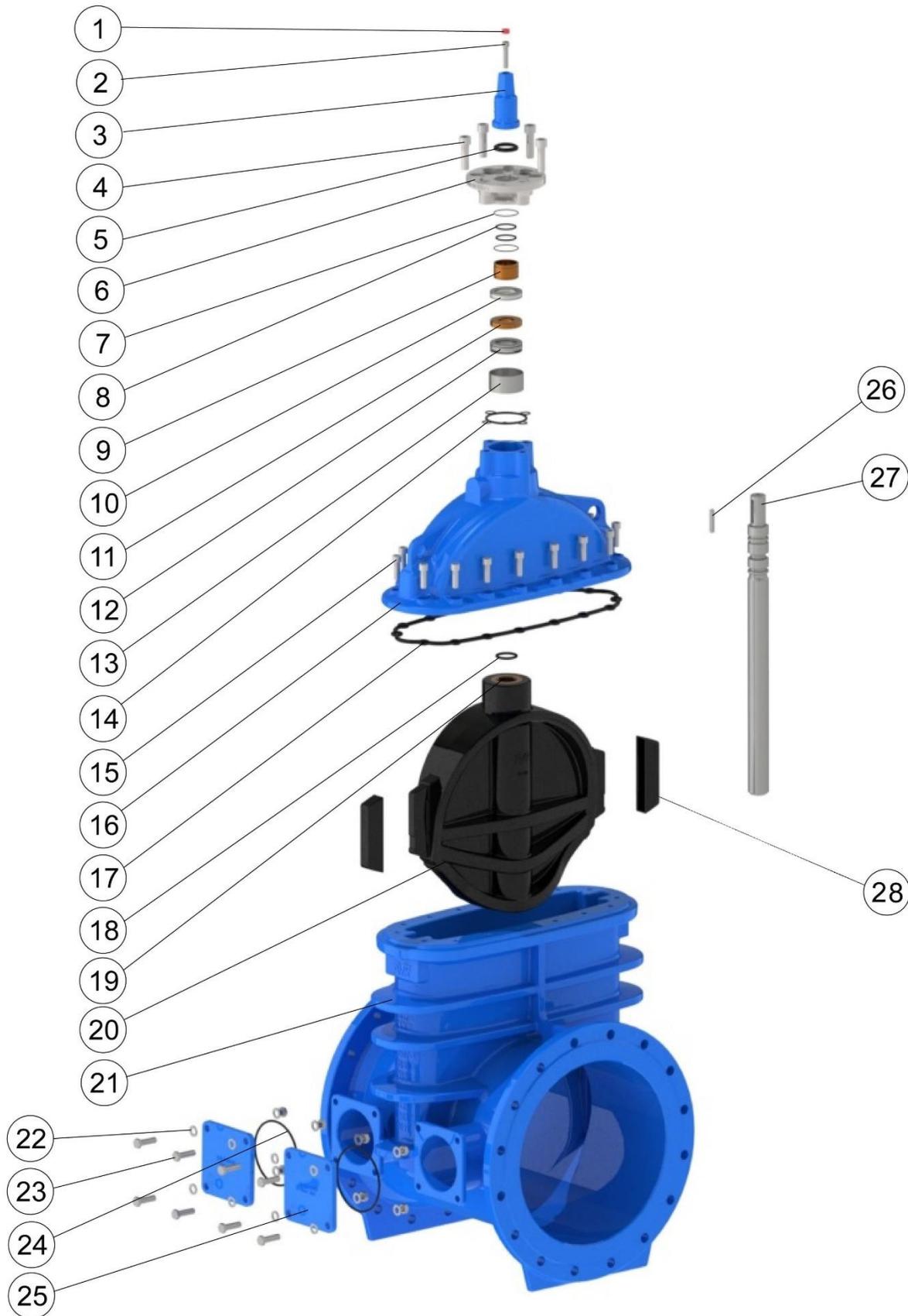
### AVK Wedge Gate Valve for Water and Wastewater

#### S36 and S570

- AVK S36 and S570 gate valves are designed according to AS/NZS 2638.2 and are for use in applications with drinking water, wastewater or other neutral liquids free of hydrocarbons.
- End connections on S570 include flanged, socket, combined flange/socket and spigot, S36 are fitted with a PE100 SDR11 pipe.
- Actuation is by stem cap, hand-wheel, gearbox or electrical actuator.
- S570 DN  $\geq$  450 are available with an integrated by-pass valve.



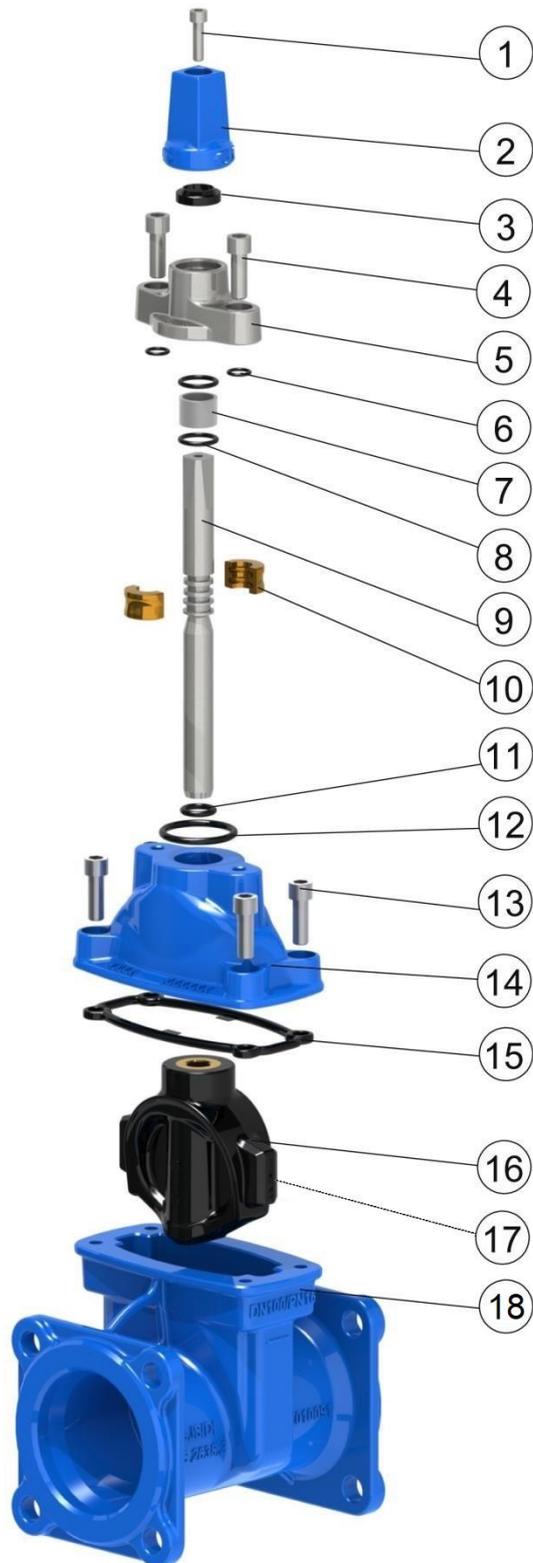
### 1. AVK S570, DN ≥ 450, exploded view



## 2. AVK S570, DN ≥ 450, parts list

Item	Description	Material
1	Operation direction indicator	Plastic
2	Stem cap bolt	Stainless steel
3	Stem cap	Ductile iron
4	Gland flange bolt	Stainless steel
5	Wiper ring	NBR rubber
6	Gland flange	Stainless steel (DN450-600) Ductile iron (DN750)
7	Radial bearing outer O-ring	NBR
8	Radial bearing inner O-ring	NBR
9	Radial bearing bush	Brass
10	Upper thrust bearing	CSB
11	Thrust collar	Stainless steel
12	Lower thrust bearing	CSB
13	Support bush	Polyamide
14	Gland flange gasket	NBR
15	Bonnet bolt	Stainless steel
16	Bonnet	Ductile iron
17	Bonnet gasket	EPDM rubber
18	Stem seal O-ring	NBR/EPDM
19	Wedge nut	Brass
20	Wedge	Ductile iron/EPDM rubber
21	Body	Ductile iron
22	Blind flange bolt washer	Stainless steel
23	Blind flange bolt	Stainless steel
24	Blind flange O-ring gasket	EPDM
25	Blind flange – by-pass boss	Ductile iron
26	Lock pin	Steel
27	Stem	Stainless steel
28	Wedge shoe	Polyamide

### 3. AVK S36/570, DN ≤ 400, exploded view



#### 4. AVK S36/570, DN ≤ 400, parts list

Item	Description	Material
1	Stem cap bolt	Stainless steel
2	Stem cap	Ductile iron
3	Wiper ring	NBR rubber
4	Gland flange bolt	Stainless steel
5	Gland flange	Stainless steel
6	O-ring	NBR rubber
7	Radial bearing bush	Polyamide
8	Radial bearing O-ring	NBR rubber
9	Stem	Stainless steel
10	Thrust collar	Brass
11	Stem seal O-ring	NBR rubber, drinking water approved
12	Gland flange gasket O-ring	NBR rubber
13	Bonnet bolt	Stainless steel
14	Bonnet	Ductile iron
15	Bonnet gasket	EPDM rubber
16	Wedge	Ductile iron/EPDM rubber
17	Wedge shoe	Polyamide
18	Body	Ductile iron

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## 6. Principle of Operation

The S36 and S570 are conventional, resilient seated gate valves where the obturator is a gate that moves perpendicular to the flow when opening and closing the valve.

The wedge is completely encapsulated in rubber which provides the soft seal.

The stem is non-rising with a thrust bearing embedded in the bonnet of the valve. The bearing on the small sizes consists of a copper alloy thrust collar, while the large sizes use a stack of stainless steel washers covered with a layer of PTFE coated bronze.

The copper alloy wedge nut is fixed to the wedge and transfers the operating forces between wedge and stem.

This design is solid and robust and able to handle high loads without jamming or requiring extraordinarily high operational force. Maximum differential pressure and system pressure are identical.

## 7. Health and Safety at work

Make sure all relevant Health and Safety issues and regulations are adhered to prior to and during installation or maintenance work carried out on this product. It is the end user's responsibility to ensure that safe working practices are followed at all times.

Whenever AVK's products are installed, operated or maintained the inherent dangers of pressurised liquids and gasses must be addressed. Before work on a valve or other piping component is undertaken, that may involve the release of internal pressure, the valve or line must be fully isolated, depressurised and drained prior to commencing the work.

**FAILURE TO COMPLY WITH THIS MAY RESULT IN SEVERE INJURY OR DEATH.**

All workers handling the product must be aware of the weight of the components or assemblies to be handled and manipulated during installation and maintenance.

It is essential that staff undertaking these operations are adequately trained and it is the responsibility of the end user that only trained and competent staff undertake these duties. This manual has been designed to assist, but it cannot replace quality training in the workplace. However, the AVK technical staff is always available and ready to answer questions relating to specific problems that may not be covered by this manual.

AVK's products are designed to be fit for purpose and to a high reliability standard. This provides a safe, low risk product 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 it and to make it available to all staff that may need to refer to it.

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

## 8. Receiving and Storage

Unloading must be carried out carefully. The load must be put gently to the ground without dropping.

Lift only by means of shackles in the holes provided by the body/cover or by means of slings around the body casting. Do not lift by handwheels, by-pass valves or other accessories.

If a forklift is used it shall have sufficient capacity to lift the required weight and have a valid inspection certificate.

All workers involved in the unloading shall be able to perform their functions. They shall wear safety boots, safety vest, safety goggles and hard hat.

All slings used for the lifting shall be of sufficient strength. A record shall document that they have been stored under cool, dry conditions away from sunlight and chemical atmosphere, and that they still perform according to their marked strength.

Immediately after unloading the item should be inspected for compliance with specifications and damage in shipment. A compliance with specification check shall comprise: size, pressure class, open-close direction, end connection type and colour.

A damage in shipment check shall comprise: coating, seating surfaces, bent stems or shafts, cracked parts, loose bolts, missing parts or accessories or any other evidence of mishandling during shipment.

Each item should be operated through one complete open-close cycle in the position in which it is to be installed.

Storage shall be under dry, cool conditions, away from direct sunlight and corrosive or otherwise chemically active atmosphere.

Products containing resilient rubber seals should be stored in a state where the rubber is not compressed.

## 9. Installation and Commissioning

**WARNING:** *Prior to installation make sure that all pressurized lines involved in the installation are isolated, depressurized and drained before starting any work. Failure to do so may result in sudden pressure release and subsequent severe injury or death.*

Before installation make sure the operating conditions are within the limits for which the valve is designed:

- Max. temperature 70°C
- Max. operating pressure 16 bar
- Max. test pressure 24 bar
- Max. flow speed 5 m/s

Check that seats and end connections are clean.

For lifting the valve use only lifting lugs, eye nuts or a sling around the body casting.

Orientation is not critical, and the valves can be installed in any position, however, the most effective self-cleaning is achieved with the stem pointing vertically upwards and horizontal to flow.

NOTE: Resilient seat gate valves may have a small air gap under the wedge bottom if being closed in dry conditions, using relatively low torque with the valve inadequately restrained. This is because the friction between the wedge rubber and the coated valve body seats is higher in dry conditions. The air gap is designed to allow for full compression of the rubber on the wedge against all sealing surfaces. Full compression takes place when the rubber wedge is lubricated by the pipeline medium thus allowing the valve to be fully closed.

### Socket valves

Valves with sockets must be installed according to pipe manufacturers' recommendations. Check that the outside diameter of the pipe corresponds to the inside diameter of the valve socket before installation. If gaskets are mounted in the valve, make sure they are placed correctly and are adequately lubricated.

Check that longitudinal support is adequate so that the pipes are not pulled out of the sockets.

### Spigot ends

Valves with plastic or spigot pipe ends are installed either by means of welding or the use of a coupling. For welding procedures please refer to the pipe manufacturers' specifications. For choice of coupling please consult an AVK representative.

### Flanged valves

Make sure the adjacent flanges are parallel and that the distance between them can fit the valve's face-to-face dimension without extensive stress. The valve and the flange bolts should not be used to pull an ill-fitting piping system together.

- Place the valve between the pipe flanges
- Insert the bolts and tighten loosely
- Tighten the bolts in increments keeping the flanges parallel during the process and following a diagonal sequence as sketched on Fig. 1
- Finally tighten to correct torque as recommended by the gasket supplier or in Water Services of Australia standard WSA109.

The following table shows the number of bolts and their size to be used with corresponding valve dimensions.

DN	AS 4087 Fig. B5		AS 2129 table E	
	Bolt size	Quantity	Bolt size	Quantity
80	M16	4	M16	4
100	M16	4	M16	8
150	M16	8	M20	8
200	M16	8	M20	8
225	M16	8	M20	12
250	M16	8	M20	12
300	M20	12	M24	12
375	M24	12	M24	12
400	M24	12	M24	12
450	M24	12	M24	16
500	M24	16	M24	16
600	M27	16	M30	16
750	M30	20	M33	20

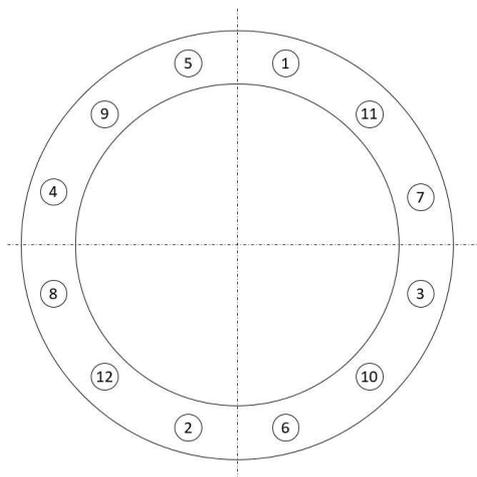


Fig. 1, Tightening sequence flange bolts – a similar criss-cross pattern should be followed for the other numbers of bolts

## 10. Application Hazards

- Do not use for throttling service as this will greatly reduce the lifetime of the main seal
- Gate valves have a limited number of operations within their lifetime, so they are not well suited in applications that require multiple daily activations. If installed anyway, regular replacement of stem nuts and thrust bearings must be anticipated
- Do not use in applications exposed to freezing temperatures unless sufficient flow is maintained through the valve or other protection is provided to prevent freezing
- Do not use with corrosive or dissolving media
- Valves for drinking water are equipped with EPDM seals and should not be used with hydrocarbons of any kind, like petrol, kerosene, diesel fuel, etc.
- Valves with socket or spigots for push-on joints are not able to take up longitudinal stress and must be supported in longitudinal direction
- Do not install closer than 5 pipe diameters downstream of tees or elbows or other irregularities as this can cause turbulence and cavitation inside the valve that reduces its performance and durability
- Always make sure to keep within design limits of pressure, temperature, etc.

## 11. Operation and Maintenance

### 11.1. Operation

The valves can be operated manually by either ring key and bar, tee key, handwheel, gearbox or electric/hydraulic actuation.

Operation direction is shown on the stem cap and handwheel with red insert for clockwise-to-close (CC) and white insert for anti-clockwise-to-close (ACC).

The torque required to close the valve is well within the requirements of AS/NZS 2638.2 for MOT (maximum operating torque).

Approximate number of turns between fully open and fully closed are;

DN	Turns to Close
80	19
100	23
150	27
200	35
225	43
250	43
300	52
375	59
400	59
450	40
500	45
600	52
750	70

### By-Pass Valves

The sizes DN450-750 can be fitted with a small by-pass valve to relieve the pressure difference across the main valve. This may reduce the necessary operating torque and allow for a smaller actuator.

## 11.2. Maintenance

**WARNING:** Prior to all maintenance work that requires disassembly make sure that the pressurized line involved is isolated, depressurized and drained before starting disassembly. Failure to do so may result in sudden pressure release and subsequent severe injury or death.

S36 and S570 gate valves are designed to operate without maintenance throughout their lifetime. However, to keep deposits from accumulating it is recommended to exercise the valve by operating it through one open-close or close-open cycle every 2-6 months depending on medium and operating conditions.

If the valve is operated frequently the lifetime of the bearings and seals can be exceeded, and it can be necessary to replace some of the wear parts.

### 11.2.1. Radial bearing and upper stem seal components

The valves are equipped with a detachable gland flange that gives access to the radial bearing and the two O-rings that seal it. Replacement of these parts is an exception from above rule and can be performed with line and valve under full system pressure **provided the valve is turned to its completely open position** prior to the operation.

- 1) Open the valve completely
- 2) Remove stem cap bolt (1) and stem cap (2)
- 3) Remove gland flange bolts (4)
- 4) Remove gland flange (5) with wiper ring (3)  
Note: The wiper ring is a factory installed press fit and must be re-ordered as an assembly along with the gland flange
- 5) Replace the O-rings and the radial bearing bush (7)
- 6) Lubricate the O-rings using a food grade grease that contains no acetate or silicone oil
- 7) Reassemble in reverse order

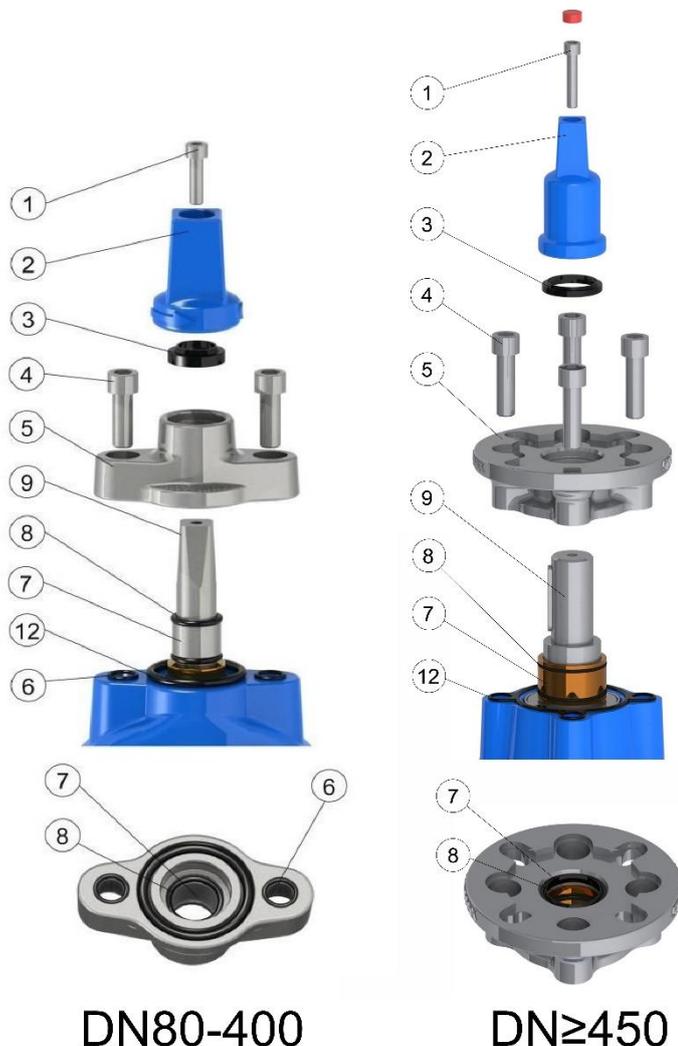


Fig. 2, Upper stem components

### 11.2.2. Thrust bearing, wedge and lower stem seal components

- 1) Isolate, depressurize and drain the line in which the valve is installed
- 2) Complete steps 2) through 4) in section 11.2.1
- 3) Turn the stem (9) in the closing direction until it disengages from the wedge and remove it from the valve
- 4) Using a small, flat bladed screwdriver remove the hot melt glue that covers the bonnet bolts (13)
- 5) Remove the bonnet bolts (13)
- 6) Remove the bonnet (14) and bonnet gasket (15)
- 7) Remove the wedge (16) by re-threading the stem (9) back into the wedge and use it as a handle or lever to extract the wedge
- 8) Inspect the interior of the valve body and remove any debris
- 9) Check the wedge nut for wear and replace if necessary. The wedge nut is an integral part of the wedge and the complete assembly (16) must be replaced as a unit
- 10) Replace stem seal O-ring (11) and thrust bearing collar (10). Note: If the valve is used with drinking water the stem seal O-ring must be approved for this.
- 11) Re-assemble in reverse order
- 12) Torque the bonnet bolts (13) in a diagonal criss-cross pattern to 40-50 Nm and re-seal with hot-melt glue

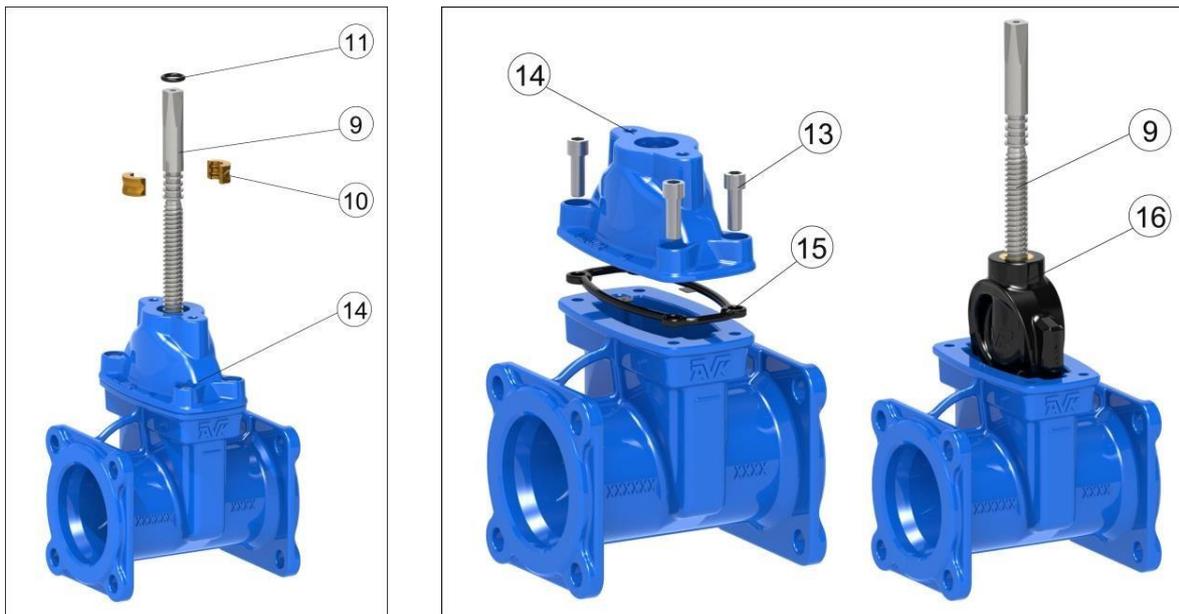


Fig. 3. Lower stem components, DN80-400

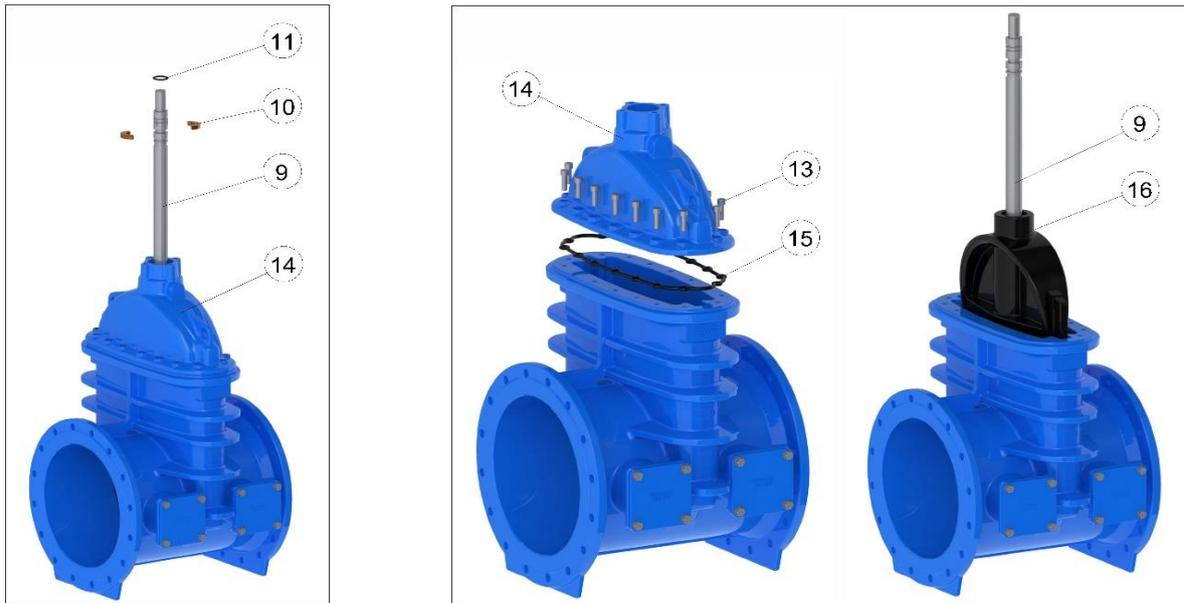


Fig. 4, Upper stem components DN ≥450

## 12. Decommissioning

When decommissioning the valve, it should be disposed of according to local regulations and in a way that allows as much recycling of materials as possible.

The AVK S36 and S570 valves do not contain hazardous materials.

### 13. Trouble Shooting

- Symptom: Valve leaking from stem/gland flange  
Cause: Damaged or worn stem seal O-ring  
Cure: Replace the lower stem seal O-ring, cf. 11.2.2
- Symptom: Valve leaking around bonnet and body  
Cause: Bonnet bolts loose or damaged bonnet gasket  
Cure: Tighten bonnet bolts or replace bonnet gasket
- Symptom: Valve leaking around pipe connections  
Cause: Loose bolts or damaged gasket  
Cure: Replace gasket and torque bolts to recommended values
- Symptom: Valve leaking around socket end or spigot connections  
Cause: Longitudinal stress on the piping and connections pulls the parts apart  
Cure: Establish longitudinal support
- Symptom: Valve hard to operate  
Cause: Worn wedge nut or thrust bearing  
Cure: Replace the worn parts
- Symptom: Valve hard to operate  
Cause: Lime or other deposits on the internal parts have built up over time  
Cure: Operate the valve between fully open and fully closed a couple of times to break off the deposits

### 14. Recommended Spare Parts

For these valves it is normally not necessary to keep a stock of spare parts, but in case the valve is installed in a high load application, where replacement of wear parts must be anticipated, a selection should be kept in store:

- a) Upper stem seal and bearing
  - 1) Radial bearing bush
  - 2) Gland flange with wiper ring
  - 3) O-ring set
- b) Lower stem seal and bearing
  - 1) Thrust bearing
  - 2) Stem seal O-ring; note that if the valve is used with drinking water the O-ring must be approved for this
  - 3) Wedge with wedge nut
  - 4) O-ring and gasket set

The use of inferior materials or parts in a valve can have serious consequences so in order to retain the highest level of safety and performance, only genuine AVK spare parts should be used. AVK cannot accept responsibility for the fitting and subsequent failure of non-AVK or non-approved parts.