

## VAG KFS / KOS metallic sealing Gate Valves



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## 1 General

### 1.1 Safety



These Operating and Maintenance Instructions must be observed and applied at all times along with the general "VAG Installation and Operating Instructions for Valves" (see [www.vag-group.com](http://www.vag-group.com) / Category: Installation and Operating Instructions).

Arbitrary alterations of this product and the parts and accessories supplied with it are not allowed. VAG GmbH will not assume any liability for consequential damage resulting from non-compliance with the instructions contained in this document.

When using this valve, the generally acknowledged rules of technology have to be observed (e.g. DIN-EN standards, VDI Guidelines etc.). The installation must only be carried out by qualified staff (see also Section 6.1 General safety instructions).

For further technical information such as dimensions, materials or applications, please refer to the respective documentation (KAT -A 1130 and KAT-A 1131).

VAG valves are designed and manufactured to the highest standards and their safety of operation is generally ensured. However, valves may be potentially dangerous if they are operated improperly or are not installed for their intended use.

Everyone dealing with the assembly, disassembly, operation, maintenance and repair of the valves must have read and understood the complete Operating and Maintenance Instructions (Accident Prevention Regulations, VBG1 § 14 and following).



**Before removing any protective devices and/or performing any work on the valves, depressurise the pipeline section and ensure it is free of hazards. Unauthorised, unintentional and unexpected actuation as well as any hazardous movements caused by stored energy (pressurised air, water under pressure) must be prevented.**

In case of equipment that must be monitored and inspected, all relevant laws and regulations, such as the Industrial Code, the Accident Prevention Regulations, the Ordinance of Steam Boilers and instructional pamphlets issued by the Pressure Vessels Study Group etc. must be complied with. In addition, the local accident prevention regulations must be observed

If a valve serving as an end-of-line valve is to be opened in a pressurized pipeline, this should be done with the utmost care to prevent the emerging fluid from causing damage. Care must also be taken when closing the valve to prevent crushing.

When a valve needs to be dismantled from a pipeline, fluid may emerge from the pipeline or the valve. The pipeline must be emptied completely before the valve is dismantled. Special care needs to be taken in case of residue which may continue flowing.

Arbitrary alterations of this product and the parts and accessories supplied with it are not allowed. VAG GmbH will not assume any liability for any hazards or consequential damage resulting from the improper use of this product or failure to use as prescribed or non-compliance with the instructions contained in this document.

### 1.2 Proper use

VAG KFS/KOS metallic sealing Gate Valves to EN 1171 are shut-off valves designed for installation in pipelines. VAG KFS/KOS metallic sealing Gate Valves are designed for shutting off the medium and not suitable for use as control or throttle valves.

For the respective technical application ranges (e.g. operating pressure, medium, temperature etc.) please refer to the product-related documentation (KAT 1130-A /KAT 1131-A).

For any deviating operating conditions and applications, the manufacturer's written approval must be obtained!

These Operating and Maintenance Instructions contain important information on the safe and reliable operation of VAG KFS/KOS Gate Valves.

Observing these Operation and Maintenance Instructions helps you to:

- Prevent hazards
- Reduce repair costs and down-time of the valve and/or the entire equipment
- Improve the operational safety and useful life of the equipment
- These Operating and Maintenance Instructions apply to all types of VAG KFS/KOS Gate Valves including all material and coating varieties.

### 1.3 Identification

According to DIN EN 19 all valves bear an identification label specifying the nominal diameter (DN), nominal pressure (PN), body material and the manufacturer's logo.

A cast-on rating plate on the body contains at least the following information:

#### VAG

**DN** Nominal diameter of the valve

**PN** Nominal pressure of the valve

**EN-GJS-400-15 (GGG40)** Example for the body material <sup>1)</sup>

<sup>1)</sup> Materials may vary and are specified in the order acknowledgement

## 2 Transport and storage

### 2.1 Transport

For transportation to its installation site, the valve must be packed in stable packaging material suitable for the size of the valve. The packaging must ensure that the valve is protected against atmospheric influences and external damage.

When the valve is shipped under specific external climatic conditions (e.g. overseas transport), it must be specially protected by wrapping it in plastic film and a desiccant must be added.

The factory-applied corrosion protection and any assemblies must be protected against damage and dirt by external influences during transport and storage (e.g. plastic wrapping film).

The VAG KFS/KOS Gate Valve must be transported with its wedge in a slightly closed position to protect the metal seat from dirt.

The design of the skid used for transportation must ensure that also protruding parts of the actuating drive (e.g. electric actuator) are reliably protected against collision (e.g. cannot knock against other parts during transportation, see Picture 1).



**Picture 1. Transportation position**

If the valve is equipped with an actuator, safe storage of the actuator preventing transverse loads from acting on the connecting points must be ensured.

When selecting and using lifting tackles, consider the weight of the valve and the kind of attachment. The weights of the VAG KFS/KOS Gate Valves can be found in KAT-A 1130 and KAT -A 1131. The use of the lifting tackles must comply with the applicable regulations.

The centre of gravity of VAG KFS/KOS Gate Valves with a large nominal diameter is not in the middle and the valve may tilt sideways when lifted if lifting tackles are not properly attached.

Avoid jerks and jolts when lifting or lowering the load as the forces generated by this may damage both the valve and the lifting tackles.

For transportation and also to facilitate assembly of the valve, lifting tackles such as cables and belts must only be attached to the body of the valve, bearing lugs or the lifting devices provided for this purpose. The actuator or the gearbox is unsuitable for this purpose. The length and positioning of the cables / belts must ensure that the valve is in a vertical position during the entire lifting process.

The general regulations relating to the use of lifting tackles must be complied with.

VAG KFS/KOS Gate Valves from a nominal diameter of DN 300 on are provided with eyebolts. These can be used for lifting the gate valves (see Picture 2).

For valves that have been factory-packed in transport crates (wooden crates), the centre of gravity of the entire unit must be taken into account. The centre of gravity is marked on each side of the crate at our factory and must be considered for all lifting operations.



**Picture 2. Eyebolts for lifting tackles from DN > 300**

## 2.2 Storage, packaging

To protect the seat from dirt, VAG KFS/KOS metallic sealing Gate Valves must be stored with their wedge slightly closed (crescent - see Picture 3).



**Picture 3. Storage of the gate valves in closed position**

Store the valve in dry and well-aerated rooms and prevent exposure to radiant heat from sources of heat. Protect any assembly units important for proper function such as the wedge and the metallic body seal against dust and other dirt by adequate covering.

Do not remove any protective caps on the connections / flanges and packaging materials until immediately prior to the installation of the valve.

The valve can be stored at ambient temperatures ranging from -20 °C to +50 °C (protected by adequate covers). If the valve is stored at temperatures below 0 °C, it should be warmed up to at least +5° C before installation and before it is put into operation.

## 3 Product and function description

### 3.1 Features and function description

VAG KFS/KOS metallic sealing Gate Valves to EN 1171 are designed for installation between flanges in a pipeline and serve for shutting off the medium.

The gate valves are designed for OPEN/CLOSE operation and not suitable for use as control or throttle valves in an intermediate position (vibrations > may cause the destruction of the valve).

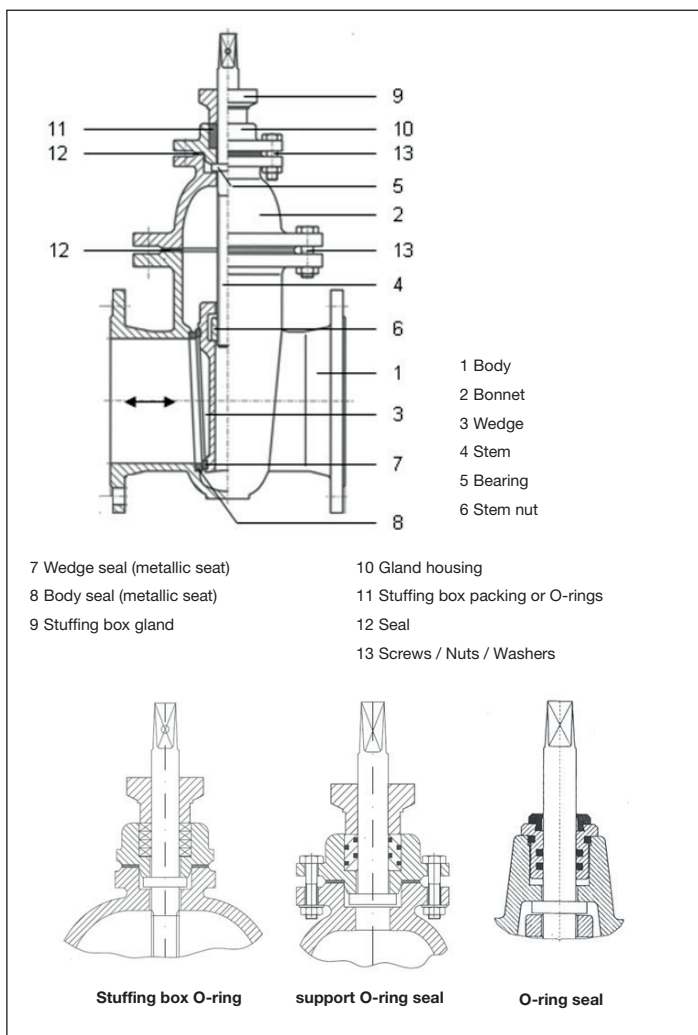
Valves referred to as “wedge” gate valves are valves whose (wedge-shaped) closure device moves across the flow direction into the seat designed with the same angle.

To make this possible, the body is interrupted at the relevant place and the operating forces generated have to be conducted into the bonnet of the body via the so-called valve bag and the body dome.

The pipeline pressure to be controlled is a relevant factor for the selection of the body type on which in turn the face-to-face length depends (see Section 3.1.1, Picture 5).

The sealing type is the essential feature of these gate valves. The sealing rings in both the body and the wedge are made of metal and this is where the name “metal-to-metal sealing” comes from.





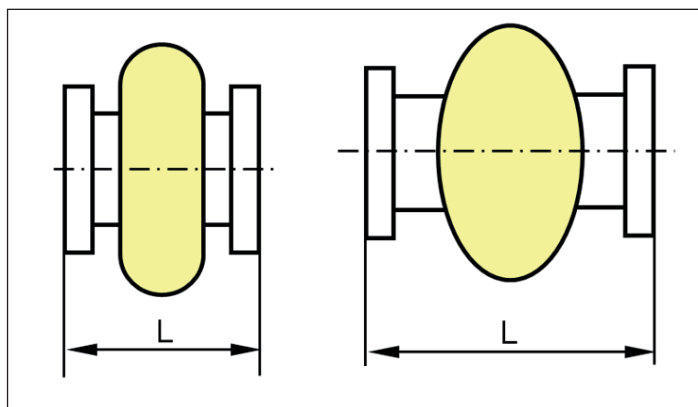
Picture 4. General design of a metal-to-metal sealing gate valve

The closure device is moved by the stem and releases the full pipeline cross-section (= nominal width) in the open position. The stroke is larger than the diameter of the seat as the seat overlap has to be taken into account. The body widens towards the top to be able to accommodate the wedge in the open position. This is the reason for the relatively large overall height compared to other types of valves.

In the closing area, the seals slide on each other at full differential pressure. The direction of flow does not matter as the valve seals on both sides.

The valve is closed in clockwise direction.

As a standard, the stem is sealed by a readjustable stuffing box; sealing with O-rings is possible as an option (see Picture 4).



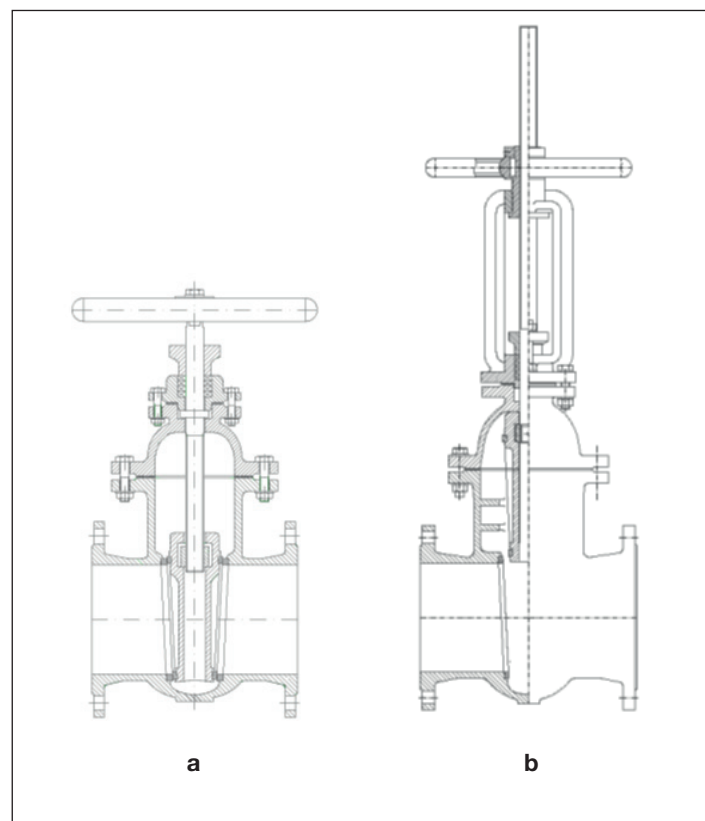
Picture 5. Flat type gate valve (KFS, left) Oval type gate valve (KOS, right)

### 3.1.1 Body design in dependence of the pressure rating

A body with a flat design can only bear minimal pressure loads. The nominal pressure decreases with increasing nominal diameters (isomorphic series, see also KAT-A 1131). However, the flat shape of the body permits a short face-to-face length "L" to EN 558-1, Basic Series 14 (formerly DIN 3202, F4). The body with an oval design is used for the medium-pressure range and is suitable for nominal pressures of up to PN ..., in all nominal diameters (isobaric series, see also KAT-A 1130). The oval shape of the body requires a longer face-to-face length "L" to EN 558-1, Basic Series 15 (formerly DIN 3202, F5).

### 3.1.2 Gate valves with non-rising / rising stem

Though having almost the same design, these gate valves are distinguished by the type of their stem (see Picture 6).



Picture 6. a) Non-rising stem b) Rising stem

- Stem located on the inside (a), non-rising: > Stem thread is in contact with the medium
- Stem located on the outside (b), rising: > Stem thread is not in contact with the medium

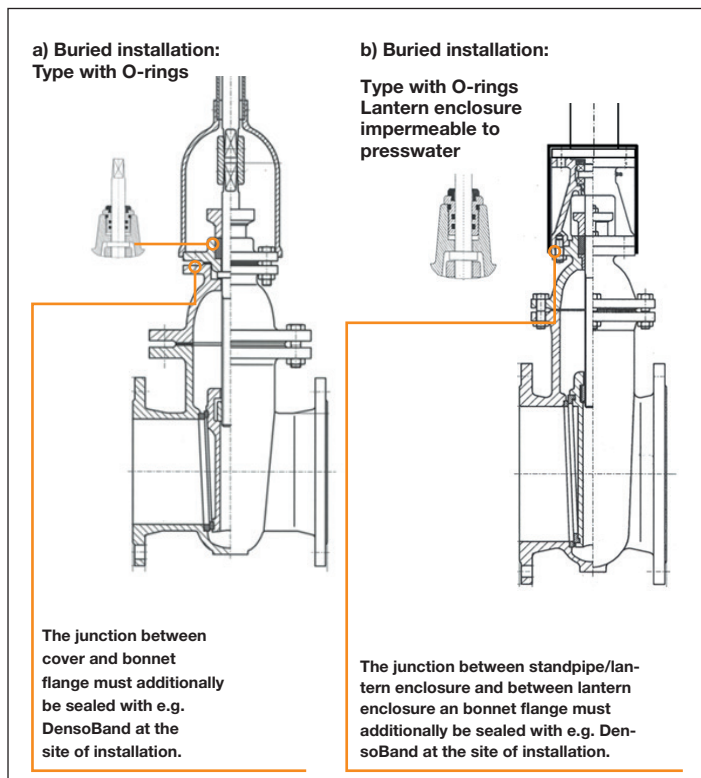
## 3.2 Applications

The materials of the VAG KFS/KOS metallic sealing Gate Valve make it suitable for use with the following media:

- Raw and cooling water, municipal wastewater, weak acids and alkaline solutions
- Use in media containing oil

For the respective technical application ranges (e.g. operating pressure, medium, temperature etc.) please refer to the product-related documentation (KAT-A 1130 /KAT-A 1131).

The manufacturer must be consulted in case of deviating operating conditions and applications, e.g. use in aggressive media.



Picture 7. a) Buried installation with stem extension for buried valves  
b) Buried installation with standpipe and lantern enclosure

The gate valve is designed for OPEN/CLOSE operation and not suitable for use as a control or throttle valve in intermediate positions (see Section 3.1).

As customised versions, VAG KFS/KOS metallic sealing Gate Valves are also suitable for buried installation.

#### Caution:



When a type with stem extension for buried valves is installed, the junction between the stem extension cover and the bonnet flange (see Picture 9a) has to be additionally sealed with e.g. DensoBand at the installation site. When a type with a lantern is installed (see Picture 9b), the junction between the standpipe and the lantern enclosure and between the lantern enclosure and the bonnet flange must also be sealed with e.g. DensoBand at the site of installation.

### 3.3 Permissible and impermissible modes of operation



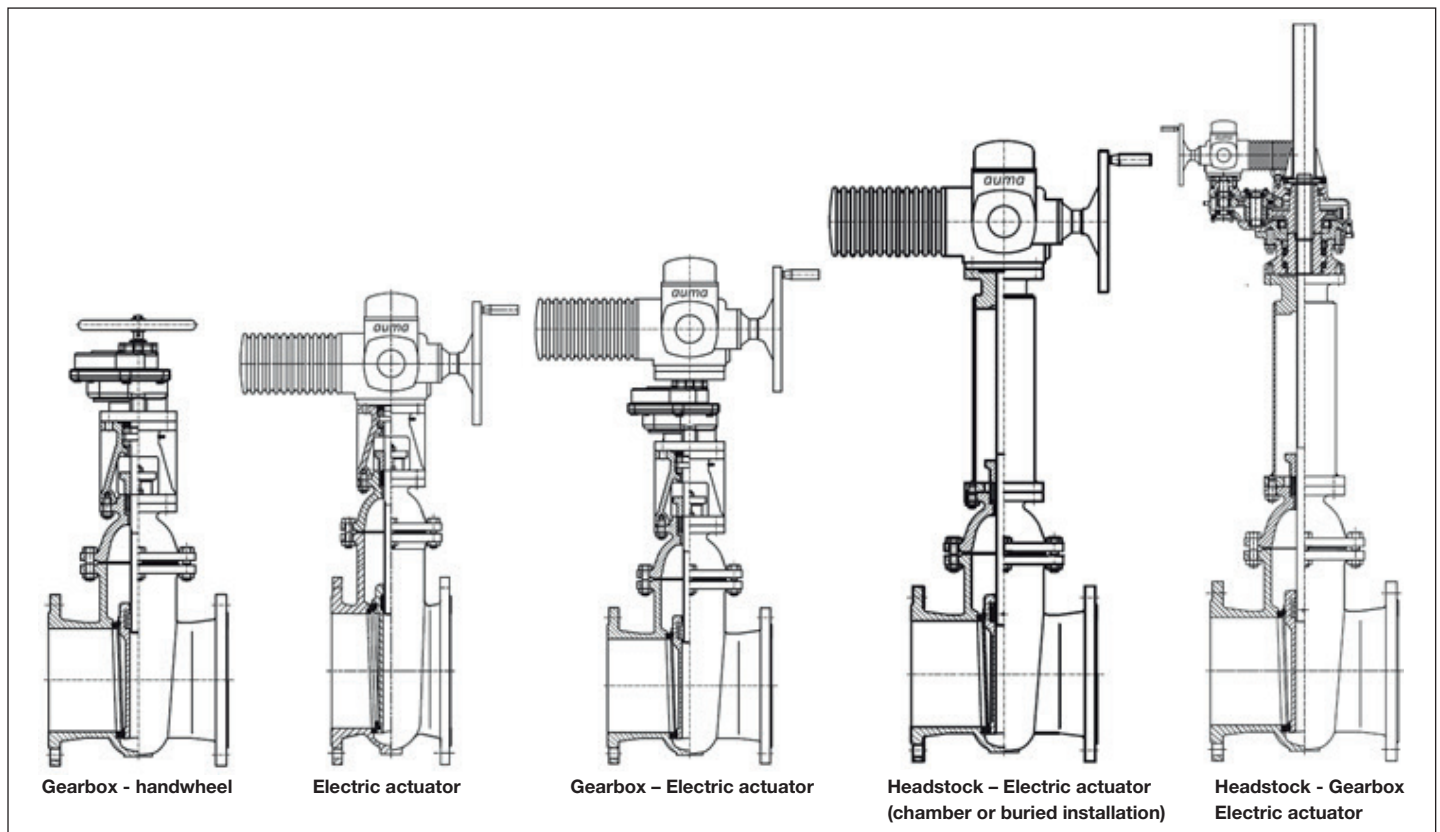
The maximum operating temperatures and operating pressures specified in the technical documentation (KAT 1130-A and KAT 1131-A) must not be exceeded. The pressure applied to the closed gate valve must not exceed its nominal pressure.

For the operation of the valve, the instructions contained in Section 5. Putting the valve into operation (see Section 5.3) must be complied with.

The maximum permissible flow velocity (at stable flow) is in accordance with EN 1074-1:

- PN 10 valves: maximum flow velocity of 3 m/s
- PN 16 valves: maximum flow velocity of 4 m/s

In turbulent flows (e.g. when the valve is installed downstream of elbows etc.), an asymmetric flow is generated which causes heavy unilateral strain inside the valve. This is why the place of installation must be carefully chosen (see Sections 4.2 to 4.3) to prevent asymmetric flow. Should this be impossible because of the structural conditions on site, the flow velocity must be reduced accordingly (see Section 4.2.2). Should a reduction of the flow velocity be impossible, the valve must be serviced at shorter intervals (see Section 6).



Picture 8. Model varieties (extract, examples)

DN	PN	Permissible working pressure	Permissible operating temperature for water and wastewater	Test pressure in bar with water	
mm	bar	bar	°C	body	seat
50 ... 200	10	10	60	15	11
250 ... 300	6	6	60	9	6,6
350 ... 500	4	4	60	6	4,4
600 ... 700	2,5	2,5	60	3,75	2,75
800	1,6	1,6	60	2,4	1,76
900 ... 1200	1	1	60	1,5	1,1

Table 1. Flat type gate valve, Factory test of the valve to DIN EN 12266-1

DN	PN	Permissible working pressure	Permissible operating temperature for water and wastewater	Test pressure in bar with water	
mm	bar	bar	°C	body	seat
50 ... 1200	10	10	50	15	11
50 ... 600	16	16	50	24	17,6

Table 2. Oval type gate valve, Factory test of the valve to DIN EN 12266-1

### 3.4 Pressure and leak-tightness test

Leak-tightness in the seat of metal-to-metal sealing gate valves to EN 1171:

- Admissible leakage according to EN 1171; Sect. 4.2.3: Leak rate B
- Tested to DIN EN 12266-1; Table A5; Leak rate B =  $0.01 \times \text{DN} [\text{mm}^3/\text{s}]$

The tests stated above apply to valves of a nominal diameter of up to and including DN 1200.

For larger nominal diameters, the test conditions and the permissible leakage have to be agreed on separately between the manufacturer and the operator.

## 4 Installation into the pipeline

### 4.1 Site requirements



When installing the valve between pipeline flanges, these must be coplanar and in alignment. If the pipes are not in alignment, they must be aligned before installation of the valve as otherwise this may result in impermissibly high loads acting on the valve body during operation, which may eventually even lead to fracture.

When installing the valve into the pipeline, make sure it is free from load bearing. No pipeline forces must be transmitted to the valve. The valve must not be used as an anchor point for the pipeline.

Support the valve at the installation site in a manner that permits movement in the direction of the pipe axis.

The space between the flanges must be large enough to prevent damage to the coating of the raised faces of the flanges during installation of the valve. Suitable dismantling joints need to be provided. In case of works around the valve causing dirt (e.g. painting, masonry or working with concrete), the valve must be protected by adequate covering.

### 4.2 Installation location

The selection of the installation location of the valve must ensure that the valve is not affected by turbulences in the flow and that the settlement of solids is prevented (see Section 4.2.1 / Picture 9).

It also needs to be ensured that sufficient space is provided for

assembly, operation, later function checks and maintenance works (at least enough space for “one man” = about 600 mm around the valve). If the valve is installed in the open, it must be protected on site against extreme atmospheric influences, such as the formation of ice, by adequate covers.

#### 4.2.1 Stable flow

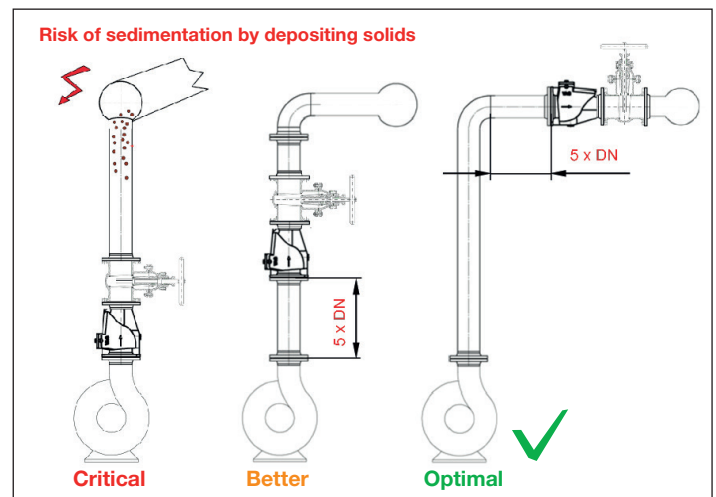
A steady, stable flow ensures the undisturbed position of the wedge in the flow during the stroke, even at higher flow velocities (see Section 3.3). A straight damping zone of  $5 \times \text{DN}$



should be provided upstream of the gate valve to ensure stable flow.

If an adequate damping zone cannot be provided, turbulences in the flow may generate vibrations on the wedge and the bearing and reduce their useful life.

A pump pressure line should always be integrated horizontally, if possible.



Picture 9. Integration of gate valves into wastewater pumping stations

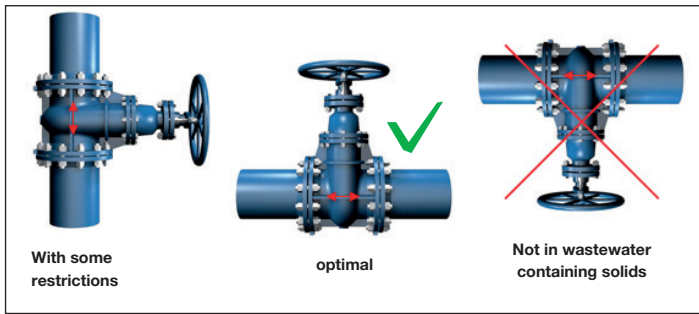
#### 4.2.2 Flow velocity

The VAG gate valves are suitable for operation at a maximum flow velocity to EN 1074-1 (see Section 3.3). This requires their installation with an upstream damping zone (see Section 4.2.1).



If the installation of the valve with a damping zone is impossible, this may lead to increased wear of the wedge and bearing. As a counter-measure, the flow velocity should be reduced to a maximum of 2 m/s (e.g. by selecting a valve with a larger nominal diameter) or the valve should be serviced at shorter intervals.

When the valve is operated in vertical pipelines conveying wastewater with solids, the flow velocity should be as high as possible (in compliance with the performance limits of the valve) to reliably remove solids with a risk of sedimentation (see Picture 9). The flow velocity in ascending pipes should not be below 2 m/s.



Picture 10. Installation positions

### 4.3 Installation position

The VAG KFS/KOS Gate Valves can be installed in horizontal or ascending pipelines (90° angle of ascent). This applies to clean media that do not contain solids.



When the valve is operated in wastewater containing solids and installed in vertical pipelines (with the gate valve installed in a horizontal position), it has to be considered that sediments settle in the bonnet when the valve is open. These sediments may block the valve so that it cannot be operated any more.

This requires more frequent maintenance, and frequent “preservational operations” are advisable.

Gate valves used for operation in wastewater containing solids etc. should therefore preferably be installed in horizontal pipelines (gate valve in upright position with perpendicular axis) as this will prevent them from becoming clogged by deposits as described above.

When the valve is installed at the end of a pipeline, it may have to be supported on site. It must be ensured that its free outlet side is not accessible to anyone (risk of accidents).

It needs to be ensured at the site of installation that the valve is freely accessible from all sides for operation and maintenance works.

### 4.4 Assembly instructions and fittings

Before installing the valve, check it for possible damage that it may have suffered during transport and storage. Protect the valve against dirt at the construction site by adequate covering until installation. For installation, the components essential for proper function, such as the wedge, bearing etc., must be free from dust and dirt. VAG does not assume any liability for consequential damage caused at the construction site by e.g. shot-blasting residues, welding electrodes etc.

The functional parts must be checked for proper operation prior to installation.

Should the valve be repainted later on, ensure that no paint is applied to the functional parts. The identification plates must not be painted over either.

If the equipment is sand-blasted for cleaning prior to the installation of the valve, these parts must be adequately covered. If solvents are used for cleaning, make sure that the solvents do not destroy the coating, the seals of the pipeline or the seals of the valve.

The components essential for proper function, such as the wedge, stem or bearing must be protected against dust and other

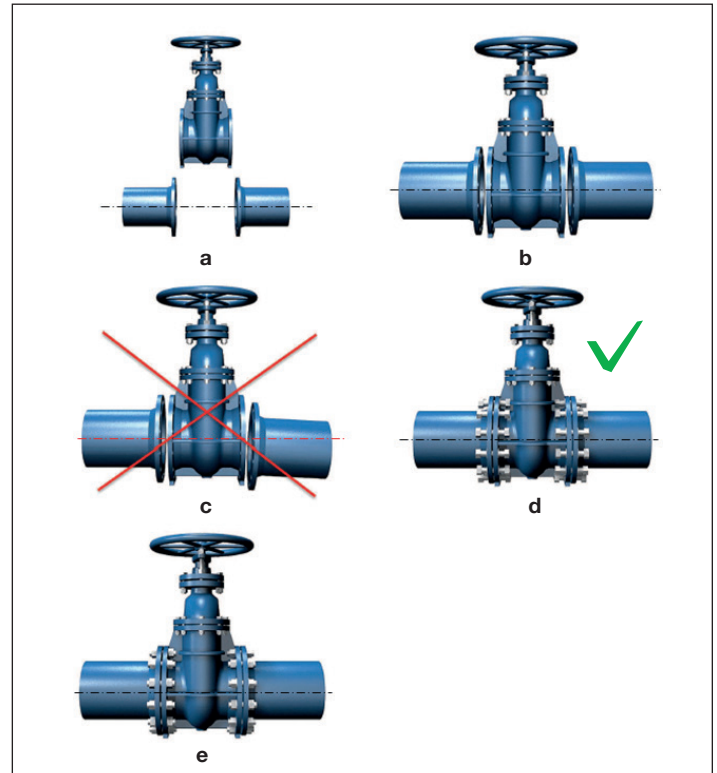
dirt by covering them with suitable plastic film. This film must not be removed until installation.

To facilitate assembly, valves of larger nominal diameters are equipped with eyebolts that can be used for attaching transport and lifting gear (see Section 2.1 and Picture 2). The valve must not be suspended by its actuator or any other places as this may cause damage.

Insert the valve into the pipe and avoid contact with the pipe flanges (see Pictures 11a and 11b).

Insert flange seals on both sides between the pipe flanges and the flanges of the valve.

Align the valve in the centre of the pipe before tightening the fastening bolts (see Picture 11d).



Picture 11. Installation (schematic representation. For actual installation, an additional dismantling joint is required)

Fasten the bolts hand-tight to fix the valve in its position. Then fasten the bolts evenly and crosswise to prevent unnecessary tension and the resulting cracks or breaks (see Picture 12).

Installation into non-centric pipes is not allowed (See Picture 11c).



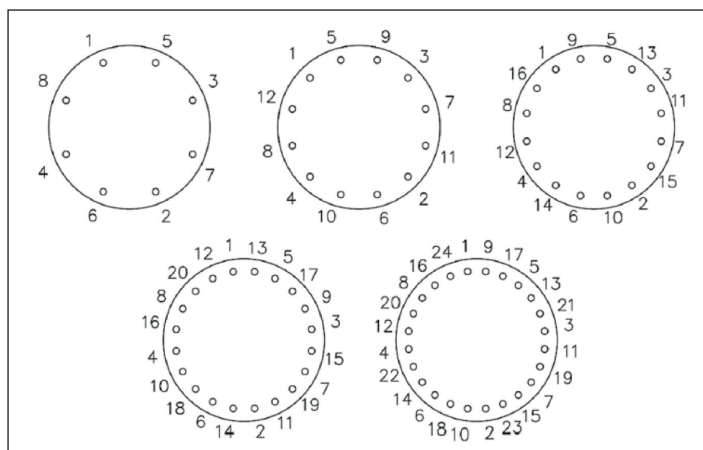
To protect the coating, use hexagonal bolts and nuts with washers in the through holes from flange to flange when bolting the valve to the pipe flanges.

Fasten the bolts evenly and crosswise to prevent unnecessary tension and the resulting cracks or breaks.

The pipe must not be pulled towards the valve. Should the gap between the valve and flange be too wide, this has to be compensated by thicker seals.

We recommend using steel-reinforced rubber seals to DIN EN 1514-1 Form IBC. If raised face flanges are used, these seals are mandatory.





No pipeline forces must be transmitted to the valve. The valve must not be used as an anchor point for the pipeline (see also Section 4.1).

## 5 Putting the valve into operation

### 5.1 Visual inspection

Upon its delivery / arrival in goods receipt and prior to its installation, all parts of the valve must be checked for damage. Damaged parts of the coating have to be expertly repaired.

Before putting the valve and the equipment into operation, perform a visual inspection of all functional parts. Check whether all bolted connections have been properly fastened.

## 5.2 Function check

Prior to its installation, the function parts of the valve have to be completely opened and closed at least once and should be checked for trouble-free operation.

Make sure that no objects are present in the flow passage, which may block the movement of the gate.



**Caution!** The pressure applied to the closed valve must not exceed its nominal pressure (see Technical Data Sheets KAT-A 1130 and KAT-A 1131).

For operation, the instructions contained in Section 5.3 must be observed.

When operating the valve for the first time, make sure that the movement of the wedge and the actuating components, if any, is steady and vibration-free. These parts must not be jammed and their movement must not be blocked or hindered in any other way.

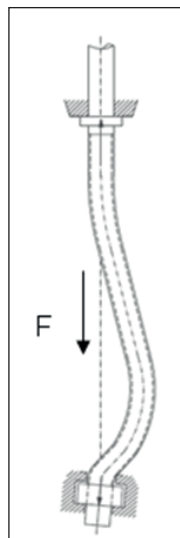
To function properly, the wedge needs some clearance towards the guide skids inside the body, i.e. it may “clatter” when operated in dry state. In actual operation, the flow pushes the wedge onto the guide skids on one side causing the wedge to move steadily and with reduced noise.

In particular after repair work but also upon the commissioning of new equipment, the pipeline should be cleared / cleaned again with the valve being in fully open position. Special attention and care is required here as regards the valve bag and the metallic seals.

### 5.3 Operation

The valve is closed by turning its actuating device to the right, which means when seen from the top:

By clockwise turns of e.g. the square cap, a T-key, handwheel or electric actuator. Proper function is to be checked by opening and closing the valve several times.



The dimensions of the stems and actuators allow operation of the valve by one person via the handwheel (admissible hand force according to EN 12570, break-away force). Extensions for operation (e.g. handwheel grips etc.) are not admissible and may damage the valve by excessive force.

**If a resistance is noticed while the valve is in an intermediate position, the flow passage should be checked for obstacles or dirt in the valve bag.**

Do not try to further close the valve (danger of buckling of the stem) until the cause of the resistance has been found.

As a standard, the gate valves (see KAT-A 1130 and KAT-A 1131) are equipped with a stem made of stainless steel grade 1.4057 (17 Cr).

When the valve is used in more aggressive media (e.g. sea water, brackish water etc.), at least stainless steel grade 1.4571 (18 Cr) should be used to prevent corrosion. The disadvantage of this material, however, is that its strength is only about half the strength of stainless steel grade 1.4057.

Due to this, the grade 1.4571 material tends to buckle considerably more quickly than the grade 1.4057 material at the same stem dimensions (depends on the bearing and happens when the valve is being closed). It does not matter whether the torque is generated manually or by the electric actuator. This is why both factors must be taken into account.

Buckling destroys the stem (see Picture 13).

The valve may not be operated at full nominal pressure (PN ..) in some cases and the admissible operating pressure may have to be reduced.

(According information by manufacturer required, see example)

**Example: Oval type gate valve DN 400 PN 10, handwheel**

One needs to distinguish between two pressures:

- **Nominal pressure PN**  
The valve with a nominal pressure of PN 10 is suitable for a 10 bar maximum pipeline pressure both in the closed and fully open position.
- **Operating differential pressure  $\Delta p_p$**   
(differential pressure at which the valve is operated)
  - with a stem made of 1.4057: max. admissible operating differential pressure = **10 bar**
  - with a stem made of 1.4571: max. admissible operating differential pressure = **5 bar**  
(the operating differential pressure is reduced to 5 bar)
  - If the required operating differential pressure exceeds the pressure admissible for the grade 1.4571 material, another

material of a higher quality must be used (prevention of buckling).

- The admissible operating differential pressure is usually specified in VAG's quotations / order acknowledgements.

The wedge in the closed position and/or the limit stop in the open position limit the stroke.

Turning the valve beyond these limits by using excessive force, or a wrongly connected rotary field of the electric actuator, may damage the valve or cause the stem to buckle (see Pictures 13 and 15).

#### Gate valve with electric actuator (opening and closing operation):

An AUMA actuator is used as an example for the following explanations and information.

Generally, this also applies to the use of actuators made by other manufacturers and their operating manuals.

During the construction phase, the complete actuator unit – which may consist of a gearbox with position indicator and flange-mounted electric actuator – must be adequately protected against external influences of a mechanical nature and against e.g. tar / concrete splatter or other dirt.



**The captivated AUMA operating manual on the actuator must be carefully read and observed prior to commissioning**

**Work on the electric actuator must only be performed by qualified staff.**

Before the electric actuator is put into service, the valve always has to be opened manually (emergency manual operation) by about 30% - 40%. Afterwards the electrical rotary field has to be checked (see below.) as otherwise the limit switches cannot be properly controlled.



(Danger: The electric actuator may move into the so-called breakdown torque [many times the nominal torque] and the overload caused by this results in the buckling of the stem, see Picture 15).

#### Actuators type SA 07.6 – 16.2:

Of particular importance:

- Rotary field (see AUMA Operating Manual, Section 9.5.1 pages 27 and 28),
- Heating (see AUMA Operating Manual, Section 5.2.2 page 17),
- IP68 connection (see AUMA Operating Manual, Section 5.2.1 page 17).

#### Actuators type SAEx 07.6 - 16.2:

Of particular importance:

- Rotary field (see AUMA Operating Manual, Section 9.5.1 pages 32 and 33),
- Heating (see AUMA Operating Manual, Section 5.3.2 page 22),
- IP68 connection (see AUMA Operating Manual, Section 5.3.1 page 21).

VAG does not assume any liability for damage caused by over-

load as a result of improper operation or unauthorised changes.

- In order to protect the seals, the valve is always in the closed position upon delivery.
- For the OPEN and CLOSED positions, the valve is to be operated electrically via the limit switch (series-connected torque switch).

“CLOSED” << path-dependent

“OPEN” << path-dependent

In case of complete deliveries, i.e. valves with factory-mounted actuators, the valves are delivered with default settings for limit



Picture 14. Electric actuator



Picture 15. Buckling caused by misconnected rotary field

positions (OPEN and CLOSED positions) and torques (for OPEN and CLOSED positions).

The controller /PLC for the electric actuators is installed and wired at the site of construction / installation.

## 6 Maintenance and repair

### 6.1 General safety instructions

Read the complete instructions carefully before beginning with your maintenance work.

VAG's warranty only covers manufacturing and material defects.



VAG does not assume any liability for damage caused by improper or incorrect installation.

**Prior to inspection or maintenance work on the valve or its assemblies, shut off the pressurised pipeline, depressurise it and secure it against inadvertent activation.**

Depending on the type and risk of the fluid conveyed and on the risk of electric shock, if any, comply with all relevant safety regulations!

After completing the maintenance work and before resuming operation, check whether all connections have been properly fastened and are leak-tight.

Perform the steps described for initial set-up described in Section 5.

## 6.2 Inspection and operation intervals

The condition of the valve should be checked at least once per year. (DVGW Instruction Sheet W 400-3-B1).

A so-called preservational operation should be performed at least twice per year. In case of extreme operating conditions or heavily polluted media, such preservational operations should be performed more frequently. Soiling, abrasion and incrustations will result in increased wear.

The operator assesses the need for inspection and operation intervals which should be adapted to the operator's requirements.

**The following items need to be checked:**

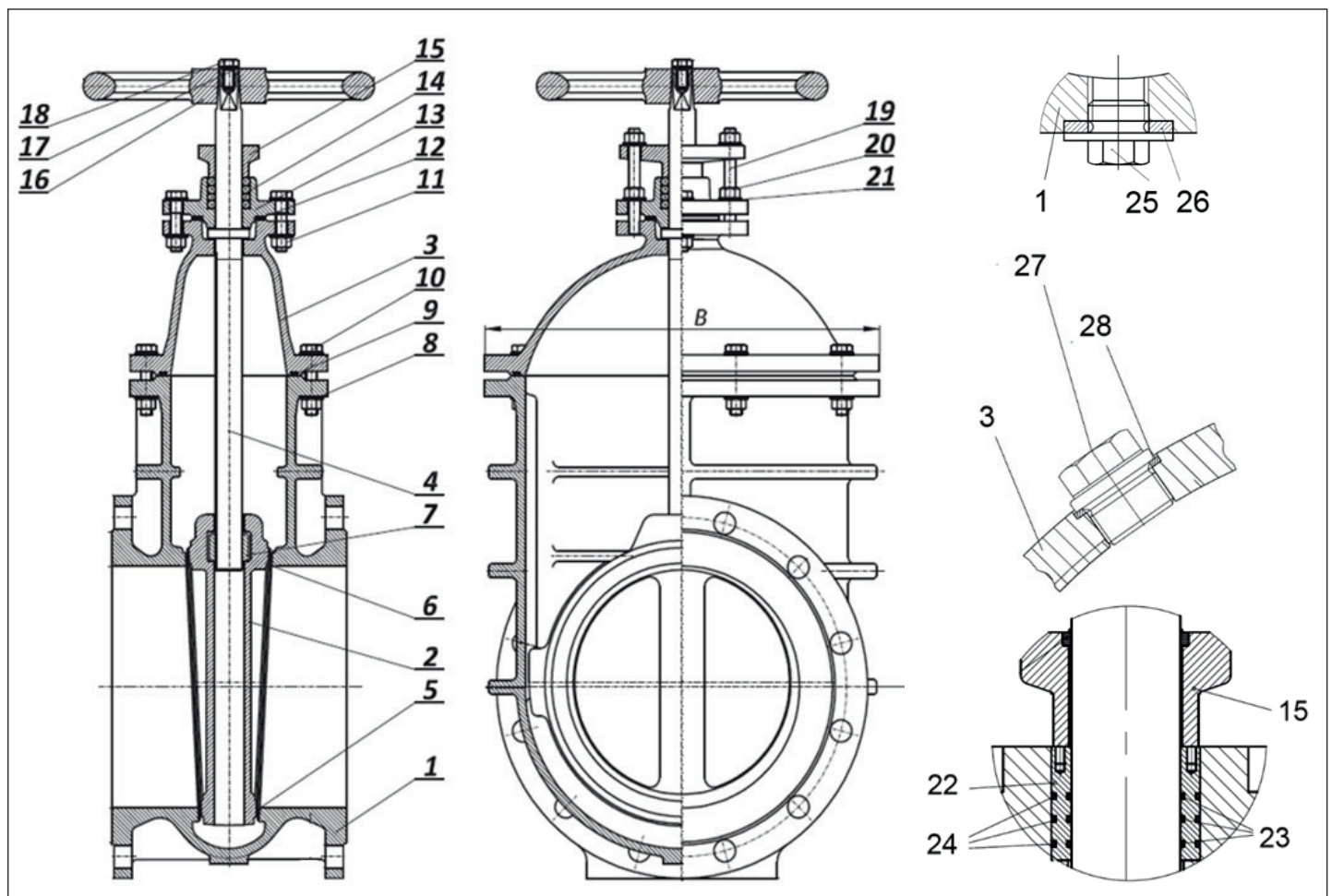
- Corrosion on visible parts (repair or replacement)
- Leak-tightness of the stem bushing
- (Retighten the stuffing box packing or replace it, if required, and/or replace O-rings, if required)
- Leak-tightness of the bonnet seal towards the basic body
- (Check whether connecting bolts have been properly fastened, retighten, if necessary)
- Leak-tightness of the upper bonnet seal towards the stuffing box support / towards the lantern, if applicable
- (Check whether connecting bolts have been properly fastened, retighten, if necessary)
- Perform one complete stroke (OPEN-CLOSE and vice versa). Pay special attention to the smooth operation of the valve (if necessary, disassemble, clean and lubricate the moving parts. If the wedge has to be disassembled, mark the position of the wedge seat towards the sealing face of the body and observe the marking when reassembling the wedge.).

### **Valves equipped with a gearbox and/or an electric actuator:**

- Lubricate the stem/stem bearing (see also Section 6.3.2).
- Also check the limit positions.
- Comply with the other instructions for the electric actuator (see Section 5.3 Electric actuators).

## 6.3 Maintenance and replacement of parts

The required spare and wearing parts can be found in the spare parts list of KAT-E 1130/1131.



Picture 16. Parts and item numbers (example)



Item	Designation	Material <sup>2)</sup>	Item	Designation	Material <sup>2)</sup>
1	Body	EN-GJS-400-15 (GGG40)	13	Gland housing	EN-GJS-400-15 (GGG40)
2	Wedge	EN-GJS-400-15 (GGG40)	14	Stuffing box packing	Aramid / PTFE
3	Bonnet	EN-GJS-400-15 (GGG40)	15	Stuffing box gland	EN-GJS-400-15 (GGG40)
4	Stem	1.4057 / 1.4571 / 1.4462	16	Handwheel	EN-GJS-400-15 / Stahl
5	Seat, Bz	2.1050.01 / 2.1060.01	17	Washer DIN 125	Stainless steel A2 / A4
6	Wedge seat, Bz	2.1050.01 / 2.1060.01	18	Hexagon screw	Stainless steel A2 / A4
7	Stem nut	Bronze RG 7	19	All-thread rod	Stainless steel A2 / A4
8	Hexagon nut	Stainless steel A2 / A4	20	Hexagon nut	Stainless steel A2 / A4
	Washer DIN 125	Stainless steel A2 / A4	21	Washer DIN 125	Stainless steel A2 / A4
9	O-ring	EPDM / NBR	22	Seal bushing	Bronze RG 7
10	Hexagon screw	Stainless steel A2 / A4	23	O-ring	EPDM / NBR
	Washer DIN 125	Stainless steel A2 / A4	24	O-ring	EPDM / NBR
11	Hexagon screw	Stainless steel A2 / A4	25	Drain plug DIN 910, Form A	Stainless steel A2 / A4
	Hexagon nut	Stainless steel A2 / A4	26	Sealing ring DIN 7603	Cu
	Washer DIN 125	Stainless steel A2 / A4	27	Vent screw DIN 5586, A	Stainless steel A2 / A4
12	Seal	IT	28	Sealing ring DIN 7603	Cu

**Table 3: Parts and item numbers <sup>2)</sup> Materials may vary /Material types according to order acknowledgement**

### 6.3.1 Replacement and/or repacking of a stuffing box ring



**Ensure that the pipeline is depressurised, free from tensions and deenergised prior to any installation work!**

**Installation work must only be performed by authorised staff.**

#### Step 1:

Unscrew the nuts and remove the washers of the lower bolted connection. (see red circle in Figure 17)

#### Step 2:

Unscrew the lock nuts (see red circles in Fig. 18).

#### Step 3:

Lift the lantern by about 1 x height of the nut so that the two nuts of the stuffing box gland can be removed (see Fig. 19).

#### Step 4:

Remove the nuts and washers on the stuffing box gland (see red circles in Fig. 20).

#### Step 5:

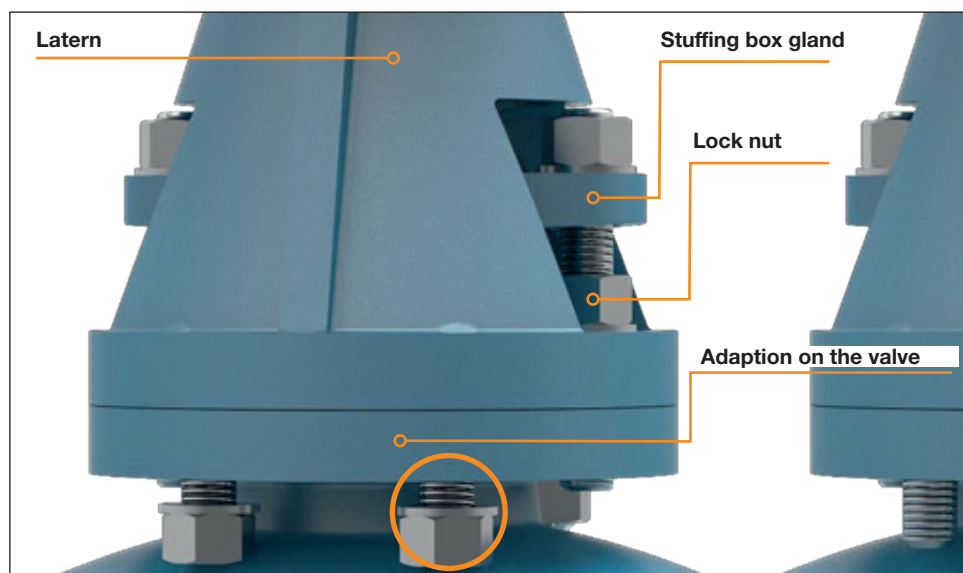
Push the lantern back down again into its initial position. Then push the stuffing box gland upward up to the stop at the lantern window. (see Fig. 21).

#### Step 6:

Now you can install the new stuffing box ring (see Fig. 22).



Always observe staggering the stuffing box rings. Always install the slots of the rings in a staggered manner (see red arrows in Fig. 23)!



**Picture 17. Change or re-packing of a stuffing box ring**

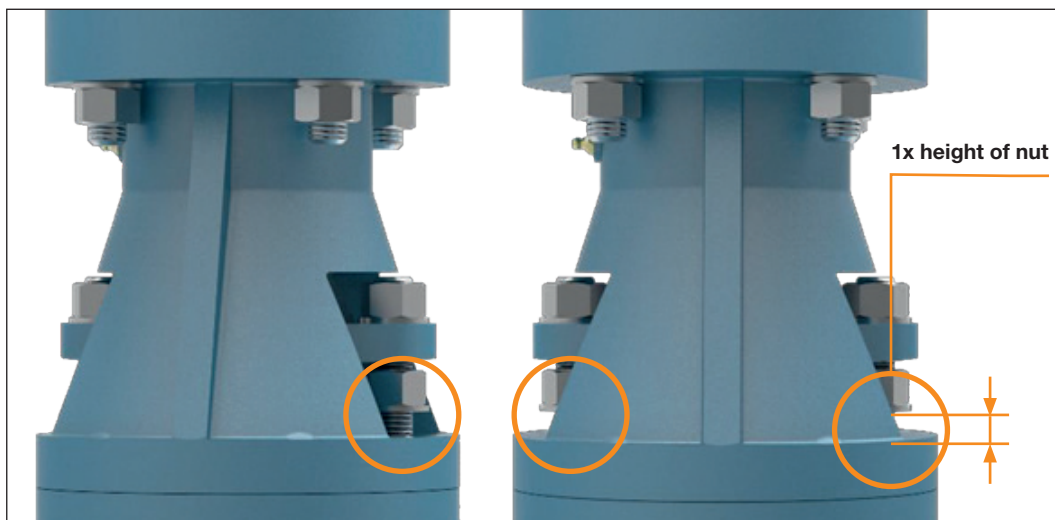
The lantern and stuffing box gland are then refastened in reverse order.

Afterwards tighten the nuts of the packing box gland evenly. Then open and close the valve several times and refasten the nuts again during the stroke until sufficient pretension is achieved.

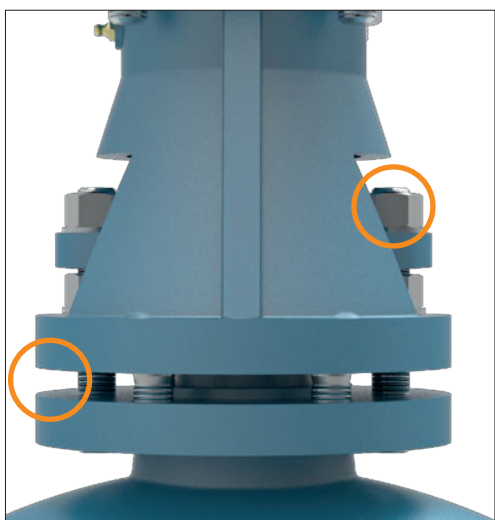
#### Note:

Depending on the swelling behaviour of the packing rings, it may make sense to let them drip for a while so that the rings can absorb humidity which will make them leak-tight. This is especially important when the valve has not been in operation for longer periods of time (storage, transport, downtime of the plant).

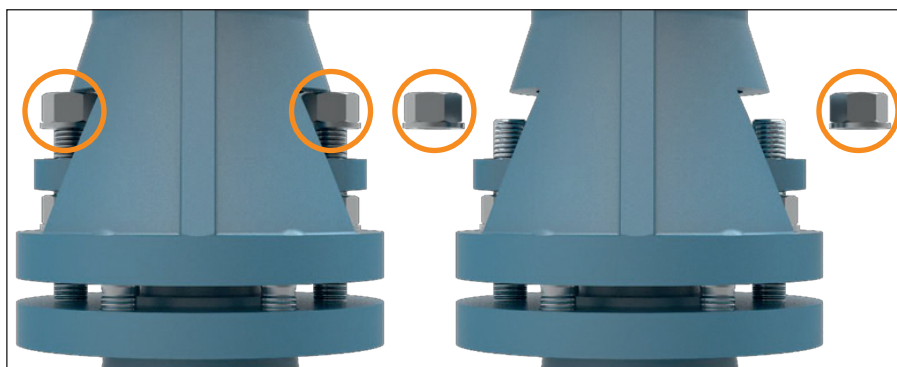




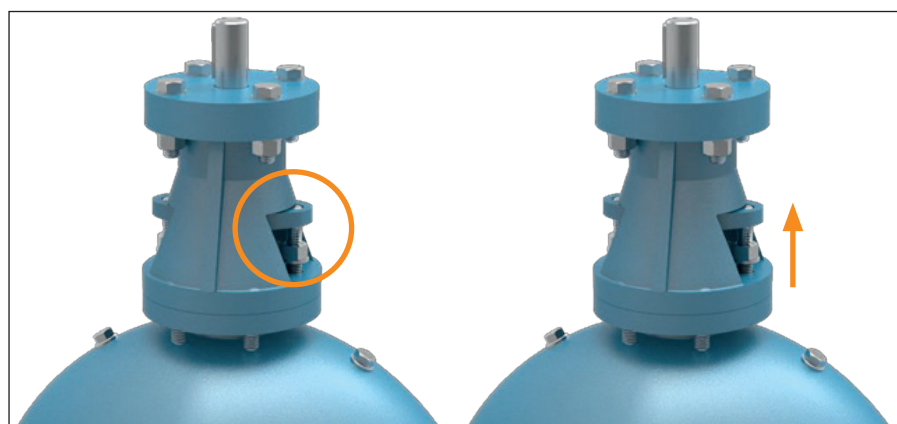
Picture 18. Loosen the locknuts



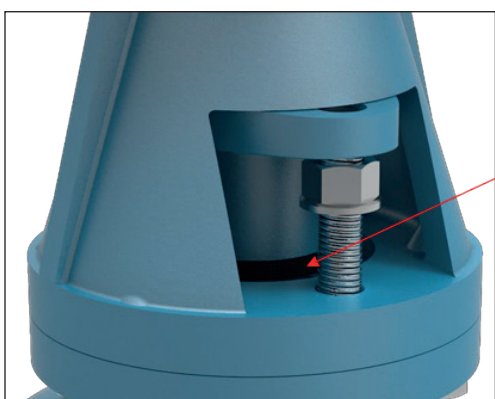
Picture 19. Lifting the lantern



Picture 20. Removing the nuts



Picture 21. stuffing box gland



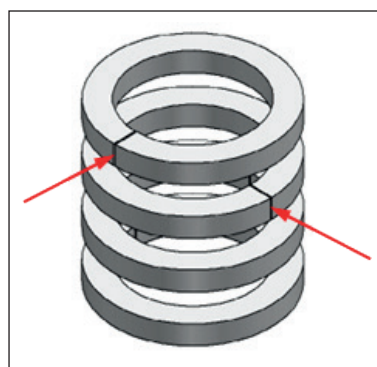
Picture 22. Equipped with 1 piece packing ring

### 6.3.2 Lubrication of the stem / stem bearing

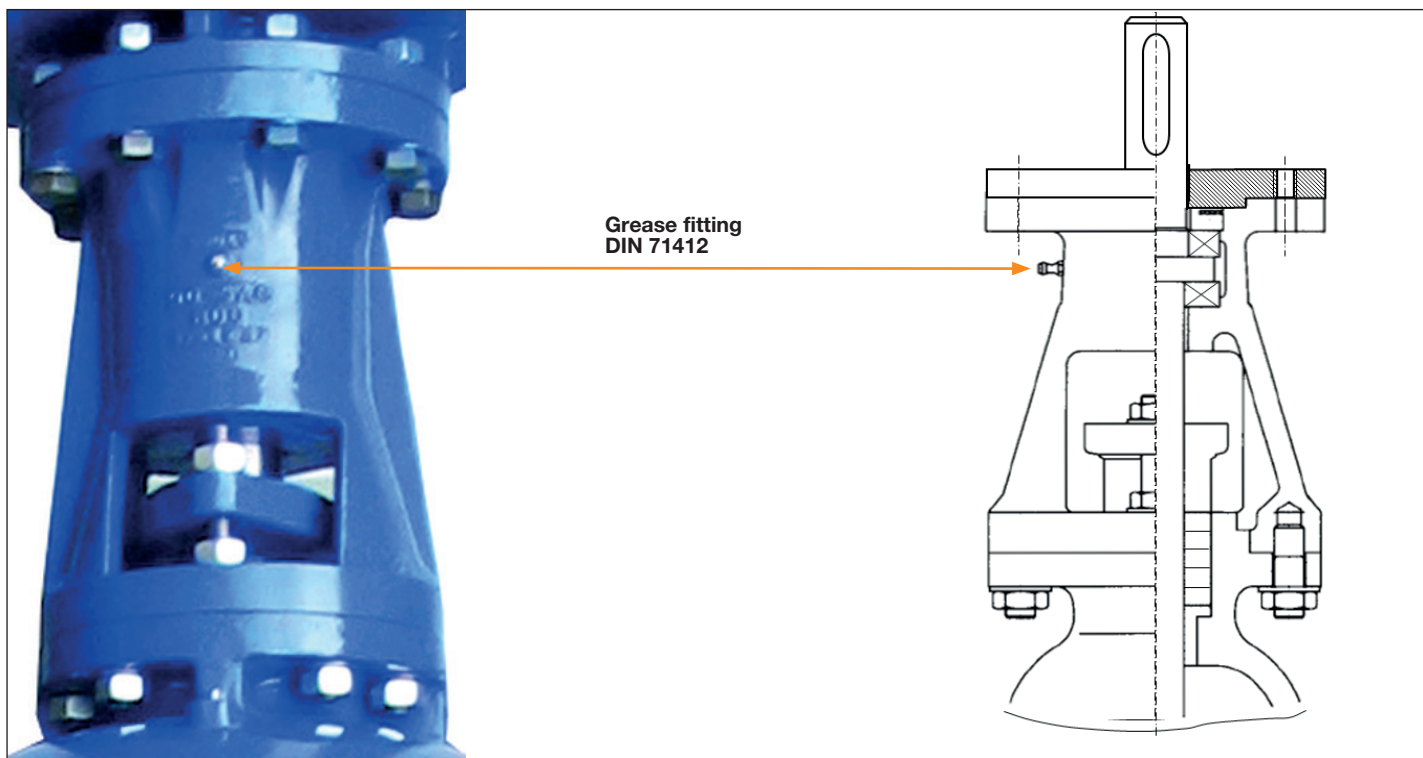
To ensure trouble-free function of the bearing, it should be lubricated at the recommended intervals (see also Section 6.2).

In case of electrically actuated gate valves or gate valves equipped with a gearbox, the stem bearing must be lubricated during maintenance (see Section 6.2). Use a grease gun to inject mineral-oil based lithium-soap EP multi-purpose grease into the grease fitting.

Due to its rising stem, the rising-stem version requires a different solution. The stem bearing of this version is accommodated through the thread nut (output form "A") below the electric actuator (or gearbox) (Figure 25). The thread nut is driven via the electric actuator (cam pair) and has an axial bearing. The rising stem rises through the turning stem nut.



Picture 23. Packing rings



Picture 24. Version with non-rising stem

#### Lubrication of the bearings:

Use a grease gun to inject mineral-oil based lithium-soap EP multi-purpose grease into the grease fitting [2] (see also AUMA Operating Manual, Chapter "Maintenance and Repair").

#### Lubrication of the rising stem:

- Move the gate valve into the CLOSED position.
- Then turn out the stem protection tube (counter-clockwise).
- Move the gate valve into the OPEN position (while opening the valve, you can check the quality of the trapezoidal thread at the same time).
- Use a trowel / spatula to apply grease (KLÜBERPLEX BE31-502) to the now lower part of the stem.
- Move the gate valve into CLOSED position again and remove excess grease.
- Then reassemble the stem protection tube.

### 6.3.3 Releasing air from the valve bonnet (dome)

As an option (and if specified in the order acknowledgement), the valve bonnet is equipped with a vent screw (e.g. G 1/2").

This is of particular importance e.g. in pump lines as air accumulates below the valve bonnet during the initial set-up of the line or if the line runs dry in the meantime. The medium must be allowed to enter air-free on the suction side of the pump, as otherwise the pump will be damaged.

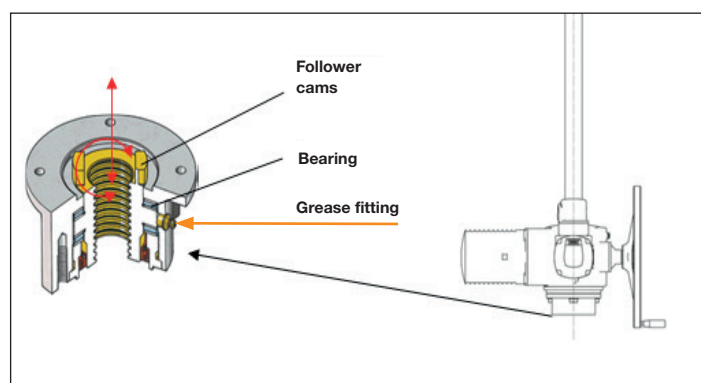
#### Venting:

For venting the bonnet, proceed as follows: With the pipeline filled, slowly and carefully unfasten the vent screw (12) until you can hear the air escaping (**do not turn out the screw completely >> risk of the screw being ejected at high speed!**) and then wait until water emerges. Afterwards fasten the screw again.

### 6.3.4 Flushing the valve bag

#### Flushing (possible as an option when flushing facilities are available on site):

As an option, a drain plug (e. g. thread size 3/4") is factory-mounted to the valve bag (when specified in the order acknowledgement). This plug actually serves for completely draining the valve bag, but can also be used as a so-called flushing port, if required. For flushing, a permanently installed water pipe or a hose is connected to the valve bag. The pipe / hose needs a shut-off device (e.g. a ball valve) to ensure no medium can escape during operation.

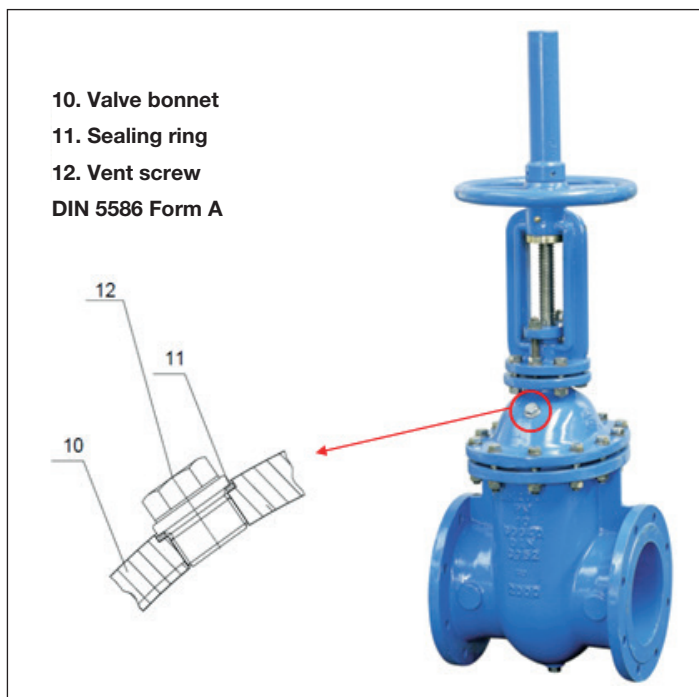


Picture 25. Rising stem

The flushing procedure is as follows:

- a) The water main must have an adequate differential pressure – the higher, the better (observe admissible pressures).
- b) For flushing, pressure is applied to the flushing pipe, with the valve closed.
- c) Then the main valve is opened slowly by about 10 to per cent.

The pressure of the flushing line removes the deposits and the high gap velocity in the passage of the main valve washes out the swirled-up pollutants together with the main flow.

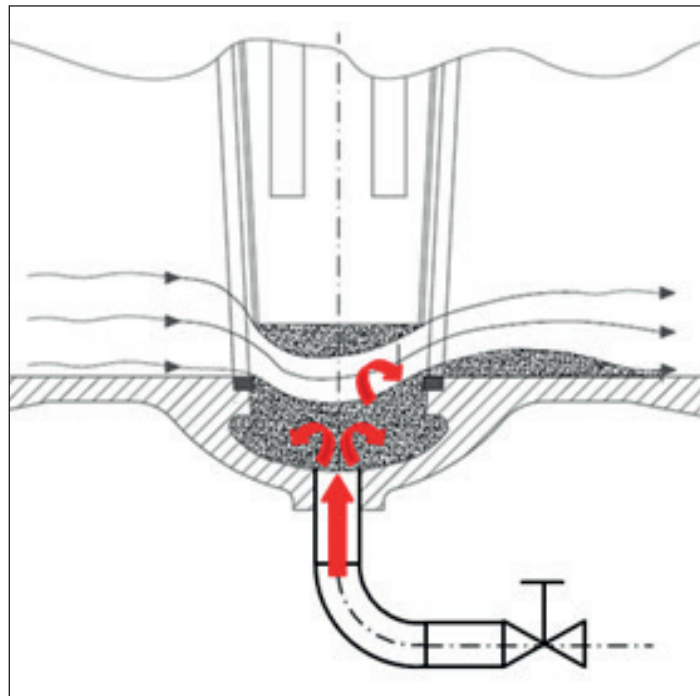


Picture 26. Example of the vent screw

When flushing has been completed, the shut-off valve of the flushing line must be closed. After successful flushing, the valve bag should be free from deposits and to check it, the valve should be opened and closed once.

This flushing process is to be understood as an option only and provides the possibility to first try to clean the valve without having to take corrective action in the pipeline.

It is advisable to flush the valve in the course of the preservational operations (for intervals, see Section 6.2). If flushing does not achieve the desired result, the root cause must be identified and further action may have to be taken. Observe the instructions contained in Section 5.3).



Picture 27.

## 7 Trouble-shooting



Please observe the general safety instructions in Section 6.1 and following for all repair and maintenance work.

Problem	Cause	Remedial action
Valve does not seal and/or wedge does not reach the closed position	Foreign matter jammed in the seat area	Flush valve (see Section 6.3.4), open bonnet, if required; remove wedge and remove foreign matter. This work should be done by a qualified fitter.  Entering the pipeline may be possible in case of valves with large nominal diameters.
	Deposits from the medium in valve bag	Flush valve bag (see Section 6.3.4). If this does not achieve the desired result, open bonnet, remove wedge and remove foreign matter or sediments from valve bag. This work should be done by a qualified fitter.  Entering the pipeline may be possible in case of valves with large nominal diameters.
	Torque on electric actuator misadjusted, limit switch misadjusted or defective	Consult the Operating Manual of the manufacturer of the electric actuator or contact VAG's Service.
Cavitation (loud, banging noise of the flow)	Operating data changed?  The valve is operated with inadmissible flow parameters exceeding the design data	The valve is only suitable for use with the documented operating parameters.  Replace the gate valve by a suitable valve.

Problem	Cause	Remedial action
Gate valve blocks / torque too high	Foreign matter jammed	See above
	Stuffing box gland overtightened	Loosen the stuffing box gland a little
	Stem not lubricated	Lubricate stem (see Section 6.3.2)
	Stem buckled	Replace stem
	Stem nut defective	Replace stem nut
	Torque on electric actuator misadjusted, limit switch misadjusted or defective	Consult the Operating Manual of the manufacturer of the electric actuator or contact VAG's Service.
Gate valve leaky at the bonnet	Gasket defective or bonnet nuts loose	Retighten bonnet nuts; replace gasket, if necessary.
Gate valve leaky at the stem seal	Stuffing box gland not properly tightened	Retighten stuffing box gland, repack/replace packing rings if required. Caution: Check stem for smooth operation. Excessive tightening torque may block the stem.
	O-ring (s) defective	Replace O-ring(s)

**Table 4: Trouble-shooting**

## 8 How to contact us

### Head office

VAG GmbH

Carl-Reuther-Str. 1

68305 Mannheim

Germany

Telephone: +49 (621) 749-0

Fax: +49 (621) 749-2153

info@vag-group.com

<http://www.vag-group.com>

### Service

Our service hotline can be reached 24/7 world-wide. In case of emergency, please contact us by phone.

Servicehotline: +49 621-749 2222

Service per E-Mail: [service@vag-group.com](mailto:service@vag-group.com)

