

# Evolution of gate valves in municipal water management

Gate valves of various types have been manufactured by VAG for 40 years. They have stood the test of time in a wide variety of operating conditions throughout the world. Gatevalves play an important role wherever water is stored, transported, treated and distributed. What counts most are durability and decades of functional reliability. Valves used in water management have to withstand enormous loads, high water pressures, critical flow velocities as well as extreme

- temperatures and weather
- conditions, whether in tropical
- climates or in the desert. Therefore
- the materials they are made of have
- to be just right. Consequently,
- modernizing valves, which can
- often weigh tonnes, is very costly,
- particularly in major supply lines.
- VAG valves help to precisely
- control the complex processing
- systems required for this task and
- to make them even more efficient
- through automation. Resilient-

seated gate valves were introduced to the market by VAG in 1968.

Gate valves are isolating valves in which the closure device – the valve wedge - moves perpendicularly to the fluid flow.

According to the design of the VAG EKO®plus Gate Valve, the stem is sealed in the bonnet and consists of 3 O-rings; they prevent leakage to the atmosphere

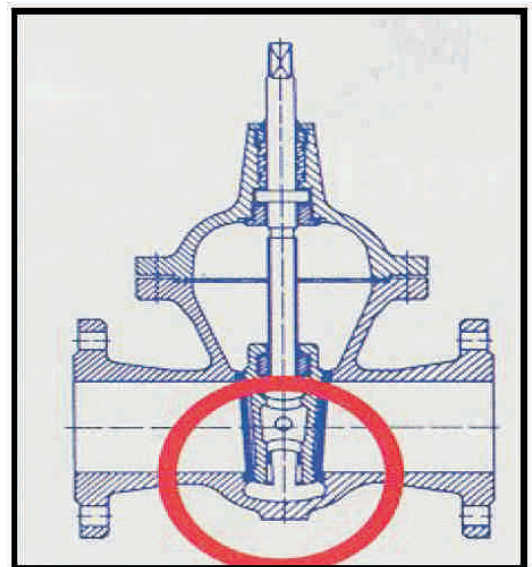


Fig.2: Metal-seated gate valve

- and water draw caused by vacuum (Fig. 1)
- With respect to the type of seat, two types of gate valves can be distinguished
- ■ Metal-seated gate valves (Fig. 2)
- ■ Resilient-seated gate valves (Fig. 3)
- Metal-seated gate valves are in a need of a gate sack, it does not consist of a flat bottom (risk of incrustations, risk of

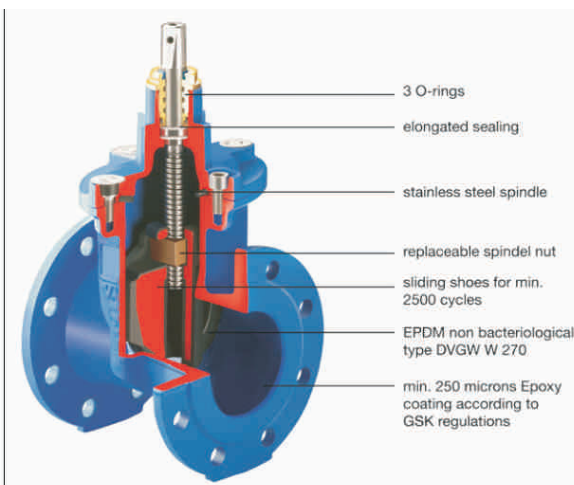


Fig.1: VAG EKO@plus Gate Valve (resilient-seated gate valve)

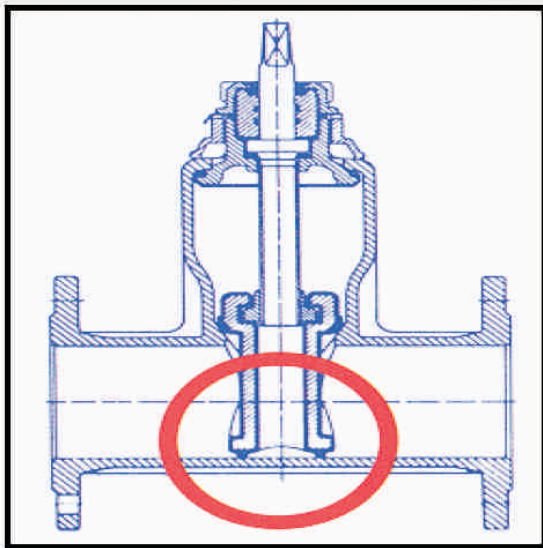


Fig. 3: Resilient-seated gate valve

**Socket type – Advantages**

- The same valve for PE and PVC (EKO@plus)
- No connection parts subject to corrosion.
- Easy to install.
- Stress-free connection

**Wedge of the resilient seated gate valve**



Fig.4: VAG EKO@plus flanged type

leakage).

Metal-to-metal-seat valves are used for higher temperatures or higher pressures.

In the resilient seated-gate valve, this consists of a straight pocketless passage, has an elastomer sealing system and it is used for temperatures of up to 70° C and pressures of up to 25 bar. It has a flat bottom (no risk of incrustations, no risk of blocking)

In these days water gate valves are almost always resilient-seated because they are 100% leakproof.

According to EN 1074 Part 1 and Part 2 (formerly DIN 3352) designs are distinguished by the type of connection. The type of connection is called flanged gate valve (Figure 4) or flangeless (socket type) gate valve (Figure 5).

**Flanged type – Advantages**

- Pull-out proof connection.
- Detachable and easy to replace
- Pre-assembly outside the pipe trench.

• In the earlier days, EPDM rubber-lined wedges were used for resilient-seated gate valves. In July 2001, DVGW (German Technical Association for Gas and Water) published a report. In some cities in the north of Germany, waterworks found long-term coliform bacteria in the drinking water system. They had been growing on the EPDM rubber-lined wedges of gate valves (see Fig. 6). These hygienic findings were appearing in newly erected water networks and within new gate valves.

• On the rubber lining, significant biofilms of bacteria and slime were growing among which was also the coli bacterium. This resulted in the new hygienic requirement DVGW W 270 and furthermore

- in a so-called DVGW W 270 approved EPDM rubber type. This W 270 approved EPDM rubber type is of food-grade quality.
- The VAG EKO@plus Gate Valve wedge is equipped with this DVGW W270 approved EPDM rubber lining quality (see in fig: 7).
- Torque used to open/close the gate valves In metal-seated gate valves, the torque used to open/close the gate valves is so high because there is a



Fig. 7: VAG EKO@plus is equipped with DVGW W 270 approved EPDM rubber lining quality

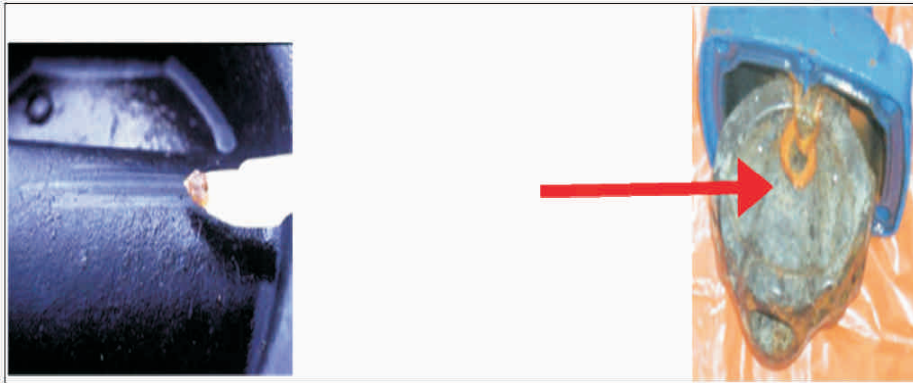


Fig. 6: Bacteria formation on EPDM rubber-lined wedges.

metal-to-metal contact while closing or opening the gate valve.

In resilient-seated gate valves, the torque used to open/close the gate valve is very low as compared to metal-seated gate valves, because there is a metal-to-rubber contact while closing or opening and the gate is equipped with plastic sliding shoes.

VAG EKO@plus Gate Valves are resilient-seated and have a glandless packing, so the torque required for VAG EKO@plus Gate Valve is very low as compared to other valves.

**Highest demands on valve technology**

The protection of our environment requires sophisticated systems and processing technology.

Thus, the demands of consultants and operators of water technology plants in terms of functional safety and reliability are also greater. In addition, in the selection of valves from an economic viewpoint, consultants, planners, plant manufacturers and operators are increasingly focusing on all-purpose products with installation advantages and a high degree of operational reliability. The highest demands of quality and user-

friendliness are being made on valves. All components must enable the absolutely trouble-free and fully automated operation of water treatment and supply facilities. The type of coating and associated certification is of utmost importance in the selection of valves. Valves with the RAL quality mark GSK meet the requirements for “heavy-duty corrosion protection”. This guarantees the customer a perfect and tested epoxy-based coating quality and thus a safe and reliable coating suitable for use in drinking water systems (Figure 5). According to the present state of the art, epoxy technology is the most advanced

coating process. This entails spraying the shot-blasted and heated valve body with coating powder which then melts.

An all-round powder coating with a minimum layer thickness of 250 microns (for wet epoxy 150 microns only) guarantees maximum adhesion and long-term protection from external influences.

The RAL quality mark GSK is only awarded to manufacturers satisfying the high demands of comprehensive quality assurance (Figure 6).

Drinking water must be free from pathogens, fit for human consumption and clean. Consumer confidence in drinking water supply is high and a DVGW (German Technical Association for Gas and Water) certificate shows that the acknowledged high standards of performance are fulfilled for German water supply systems. Among other things, each valve must be fit for the intended purpose and tested with 2500



Fig. 7: Gate Valve with extension spindle



Fig. 8: Leakage of water due to the gland packing

the pipeline (Fig. 9).

Then the whole water in the pipeline was contaminated. But nowadays this type of sealing system is not used any more (although some manufacturers are still producing this type of valves).

**But the VAG EKO@plus Gate Valve** sealing system is glandless packing.

Because the sealing system consists of 3 O-rings and a wiper ring, they are 100% leak-proof.

## Range of application of EKO@plus Gate Valves

VAG's range of gate valves includes diameters of up to DN 600. The long established and

proven VAG EKO@plus Gate Valve is available in all nominal diameters from DN 50 to DN 600 in PN 10, PN 16 and PN 25 (up to DN 500). BETA HA for house connections is available from DN 25 to DN 50.

According to the face-to-face length, gate valves of different types are available

- Short face-to-face length (EN558-1 R14)

- Long face-to-face length (EN558-1 R15)

Face-to-face-length acc. to EN 558-1, basic series short pattern in accordance with EN 558-1, basic series 14, formally BS 5163-89/ IS 14846-2000/ DIN 3202, F4.

Face-to-face lengths to BS, ANSI, SABS, GOST, IS, or CZ are available,

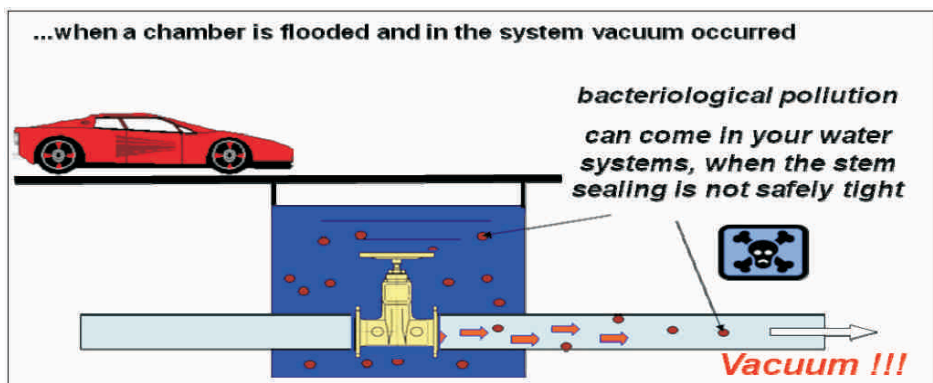


Fig. 9: Flooded chamber and in the system vacuum occurred due to the sealing system (gland packing).

load cycles as a proof of design test. Moreover, the certification of the elastomers used ensures that there will be no negative micro-bacteriological growth in accordance with DVGW worksheet W 270. VAG EKO@plus Gate Valves meet all of these requirements to the fullest extent.

## Gate valves with extension spindle:

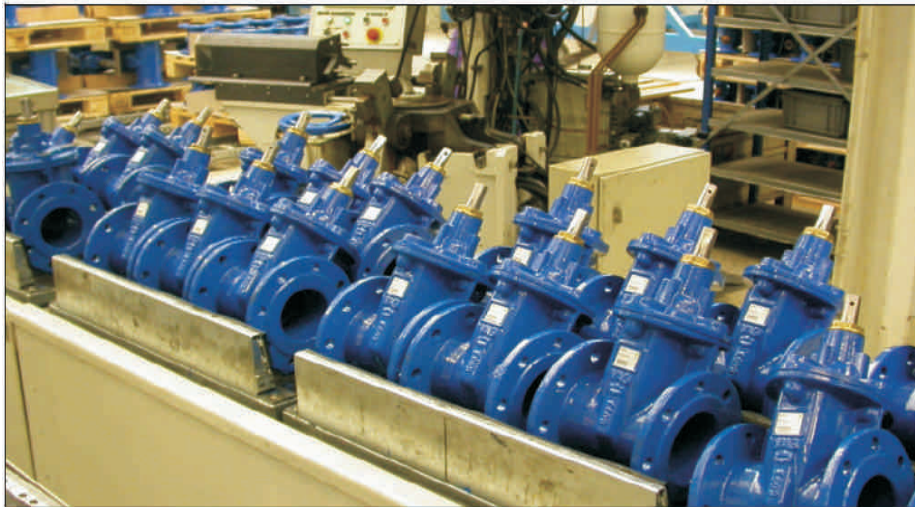
In case of underground installation of gate valves, for underground pipelines it used to be quite common to construct valve chamber to operate the valves. But nowadays there is no need of construction of a valve chamber any longer; the valve is operated by using

- an extension spindle and we can prevent
- contamination and avoid maintenance
- of valve kits. (A gate valve with
- extension spindle is shown in Fig. 7).

## Sealing system of gate valves

- Formerly, the sealing system of gate
- valves was gland packing, but in this
- sealing system the risk of leakage was
- higher (Fig. 8).

- When the valve chambers were flooded
- due to this type of sealing system, the
- water in the valve chamber was
- contaminated easily due to the pressure
- difference between the inside and
- outside of the valve, and then the
- contaminated water easily entered into



too.

## Actuators for gate valves

By means of actuators, external forces are transmitted to the wedge in order to safely and reliably move it in any operating situation. Gate valves are equipped with mechanical or electric actuators. Sluice gates with mechanical actuators (predominantly with manual worm gears) are employed in plants as well as underground. (Worm gears are used for valves with 90° operating turn, spur gears are used for gate valves, and gate valves can be equipped with linear pneumatic actuators).

Valves with electric actuators are used to automate plants whenever performance and safety of the water supply system are essential. You can efficiently and safely move the valve using an electrical controller. Additional features can be implemented quickly and easily by adding various modules.

The ready-to-operate unit is available for delivery in your operation of mounted terminal or control box. The unit only needs to be connected to the power supply to be put it into operation.

The valve and actuator are ready for

operation in just a few steps. The actuators are also well prepared for individual use. Actuating times can be easily and individually set on site and the adjustable flow controller assists in this.

## Installation guidelines for gate valves

To ensure the best possible flow conditions, gate valves should never be installed directly downstream of pumps or elbows. Gate valves can be installed along with the pipelines.

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## The company



V A G ' s  
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storing drinking and industrial water. Moreover, the company is a solution partner for leading power stations and industrial enterprises: chemical plants or steel manufacturers, conventional or nuclear power plants. Many types of valves guarantee operational safety, for example in cooling water circuits, district heating networks or water treatment plants.

VAG-Armaturen GmbH is a German company with more than 130 years of experience in the design and manufacturing of heavy-duty valves for all kinds of water applications. With more than 1,200 employees worldwide the valve manufacturer is a globally active company and is setting new standards as a solution and system provider in water and waste-water technology. With over 180 sales representatives, 18 subsidiaries and 4 production facilities VAG is at home around the world.

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