

Knife Gate Valve

HERA-BD

Operating Manual



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Operating Manual HERA-BD

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Glossary

ATEX

The acronym ATEX is the French abbreviation for "Atmosphère explosible" and refers to the two European Union (EU) directives covering the area of explosion protection: ATEX Equipment Directive 2014/34/EU (also referred to as ATEX 95) and ATEX Workplace Directive 1999/92/EC (also referred to as ATEX 137).

Pressure Equipment Directive (PED)

The 2014/68/EU Directive sets out the requirements to be met by pressure equipment intended to be placed on the market in the European economic area.

1 General

1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

In the event of damage, immediately contact your nearest KSB sales organisation responsible to maintain the right to claim under warranty.

1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.3 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Type series booklet	Valve description
Flow characteristics ¹⁾	Information on Kv and zeta values
General assembly drawing ²⁾	Sectional drawing of the valve
Sub-supplier product literature ³⁾	Operating manuals and other product literature for the accessories

Observe the relevant manufacturer's product literature for the accessories.

1.4 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇨	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

¹ If any

² If inclusion in the scope of supply has been agreed; otherwise refer to the type series booklet.

³ If inclusion in the scope of supply has been agreed.

1.5 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2 Safety

2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
 - Manufacturer
 - Type designation
 - Nominal pressure
 - Nominal size
 - Flow direction arrow
 - Year of construction
 - Valve body material
- The operator is responsible for ensuring compliance with all local regulations not taken into account.
- The design, manufacture and testing of the valve are subject to a QM system to DIN EN ISO 9001 as well as the current European Pressure Equipment Directive.
- Bear in mind that valves exposed to creep-rupture conditions have a limited service life and have to meet the applicable regulations stipulated in the technical codes.
- In the case of customised special variants, further restrictions may apply with regard to the operating mode and service life. Refer to the relevant sales documentation for applicable limitations.
- The operator is responsible for ensuring compliance with all local regulations not taken into account.
- The operator is responsible for any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.

2.2 Intended use

- Only operate valves which are in perfect technical condition.
- Do not operate the valve in partially assembled condition.
- Only use the valve for fluids specified in the product literature. Take the design and material variant into account.
- Only operate the valve within the operating limits described in the other applicable documents.
- The valve's design and rating are based on predominantly static loading in accordance with the codes applied. Consult the manufacturer if the valve is subjected to dynamic loads or any other additional influences.
- Consult the manufacturer about any other modes of operation not described in the product literature.
- Do not use the valve as a foothold.

2.3 Personnel qualification and training

- All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the product this manual refers to and be fully aware of the interaction between the valve and the system.
- The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.
- Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.
- Training on the valve must always be supervised by specialist technical personnel.

2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices
 - Hazard to the environment due to leakage of hazardous substances

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.6 Safety information for the operator/user

Actuator-operated valves are intended for use in areas which cannot be accessed by unauthorised persons. Operation of these valves in areas which can be accessed by unauthorised persons is only permitted if appropriate protective devices are fitted at the site. This must be ensured by the operator.

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly. Do not touch rotating parts.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain any leakage of hazardous fluids (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the valve require the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Use suitable tools in accordance with EN 13463-1 for maintenance, inspection and installation.
- Carry out work on the valve during standstill only.
- The valve body must have cooled down to ambient temperature.
- The pressure in the valve body must have been released and the valve must have been drained.
- When taking the valve out of service always adhere to the procedure described in the manual.
- Decontaminate valves which handle fluids posing a health hazard.
- Protect the valve body and body bonnet/cover from any impacts.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 28)

2.8 Unauthorised modes of operation

- The valve is operated outside the limits stated in the operating manual.
- The valve is not operated in accordance with the intended use.

(⇒ Section 2.2, Page 8)

- Do not use knife gate valves for regulating volume flow. Use knife gate valves in either fully open or fully closed position, an intermediate position (throttling function) is not permitted.

2.9 Explosion protection

Always observe the information on explosion protection given in this section when operating the product in potentially explosive atmospheres.

Only valves marked as explosion-proof may be used in potentially explosive atmospheres.

Special conditions apply to the operation of explosion-proof valves to EU Directive 2014/34/EU (ATEX).

Especially adhere to the sections in this manual marked with the Ex symbol and the following sections, (⇒ Section 4.3, Page 15) , (⇒ Section 2.9.2, Page 11)

The explosion-proof status is only assured if the product is used in accordance with its intended use.

Never operate the product outside the limits stated on the name plate. Prevent impermissible modes of operation at all times.

2.9.1 Explosion protection marking

Manual actuation

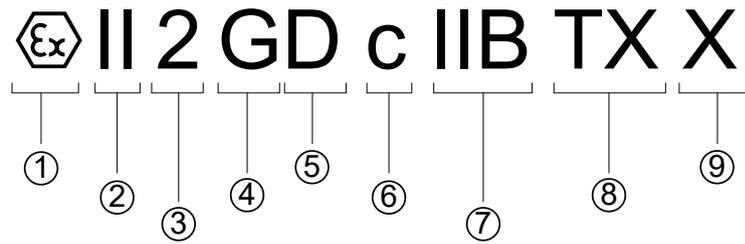
No ATEX marking required:

- The valves can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 2014/34/EU.

Pneumatic actuator (non-electrical equipment)

ATEX marking for a double-acting or single-acting (up to DN 400) pneumatic actuator on the name plate:





1	ATEX symbol	2	Group
3	Category	4	Gas
5	Dust	6	Constructional safety
7	Explosion group ⁴⁾	8	Temperature class ⁵⁾
9	Reference to the valve's operating manual		

Electric actuator (electrical equipment)

On request, the product may be used in potentially explosive atmospheres. A separate ATEX assessment is then carried out of the valve including actuator. The assessment and the corresponding ATEX marking on the name plate are based on the enquiry data (group, category, fluid).

2.9.2 Temperature limits for explosion protection

Any temperature increase due to frictional heat is negligible, as the speed of the moving parts is extremely low.

The fluid handled has no influence on the risk assessment in accordance with EU directive ATEX 2014/34/EU, even if the fluid handled is potentially explosive.

The operator must consider the following risks that may arise due to the fluid handled:

- Heating up of body surface
- Electrostatic charging due to fluid displacement
- Shock waves due to the installation position (water hammer), self-destruction or destruction of the fluid handled, foreign bodies introduced during installation.

Table 4: Temperature limits

Ambient condition	Value
Ambient temperature	-20 °C to +60 °C
Operating pressure	0.8 bar to 1.2 bar

⁴ IIB, IIC, IIC: gas, IIIA, IIIB, IIIC: dust

⁵ Maximum surface temperature

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

3.2 Transport

Transport the valve in the closed position.

	<p>⚠ DANGER</p>
	<p>The valve could slip out of the suspension arrangement Danger to life from falling parts!</p> <ul style="list-style-type: none"> ▶ Only transport the valve in the specified position. ▶ Never attach lifting accessories to the handwheel. ▶ Observe the information on weights, centre of gravity and fastening points. ▶ Observe the applicable local accident prevention regulations. ▶ Use suitable, permitted lifting accessories, e.g. self-tightening lifting tongs. ▶ For actuated valves observe the relevant actuator operating manual. Transport aids on the actuator are not suitable for suspending the entire valve/actuator assembly.

To transport the valve, suspend it from the lifting tackle as illustrated.

The valve can be transported by means of eyebolts or webbing slings.

Transport using eyebolts

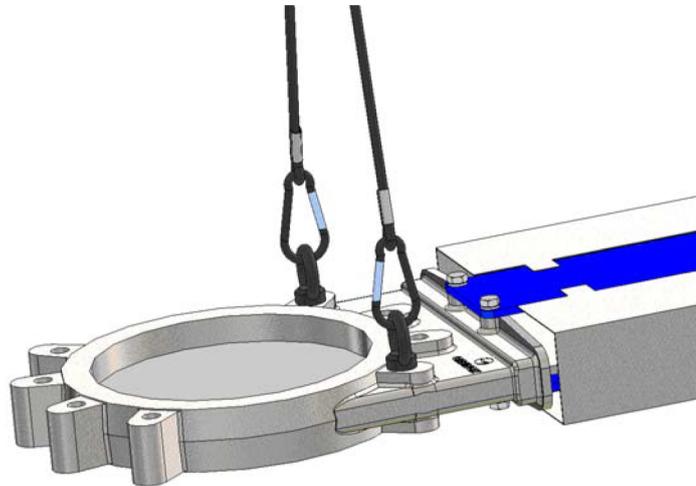


Fig. 1: Transport using eyebolts

Use eyebolts matching the thread of the attachment points on the valve. Screw at least two eyebolts into the tapped blind holes of the valve body.

Transport using webbing slings

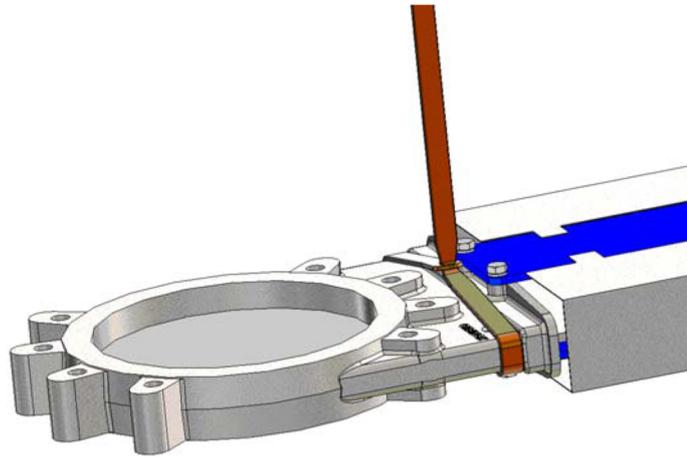


Fig. 2: Transport using webbing slings

Attach the webbing slings in the area between the gland packing and the flange such that the valve can be suspended in a balanced position.

3.3 Storage/preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken for storing the valve:

	CAUTION
	<p>Incorrect storage Damage due to dirt, corrosion, humidity and/or frost!</p> <ul style="list-style-type: none"> ▷ Close the valve using little force and store in the closed position. ▷ Store the valve in a frost-proof room where the atmospheric humidity is as constant as possible. ▷ Protect the valve from dust during storage, e.g. with suitable caps or foils. ▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals. ▷ Store the valve in vibration-free conditions.

Storage and/or temporary storage of the valves must ensure that even after a prolonged period of storage the valves' function is not impaired.

The temperature in the storage room must not exceed +40 °C.

Cover the actuators to protect them from dust and dirt, and protect them from mechanical damage; observe the actuator's operating manual.

If properly stored indoors, the equipment is protected for a maximum of 12 months.

For storing a valve which has already been operated, observe the measures to be taken for shutdown. (⇒ Section 6.3, Page 31)

3.4 Return to supplier

1. Drain the valve as described in the manual.
2. Flush and clean the valve, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the valve has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen also neutralise the valve and blow through with anhydrous inert gas to ensure drying.
4. When returning valves used for handling Fluids in Group 1 always complete and enclose a certificate of decontamination.
Indicate any safety measures and decontamination measures taken.

	NOTE
	<p>If required, a blank certificate of decontamination can be downloaded from the following web site: www.ksb.com/certificate_of_decontamination</p>

3.5 Disposal

	⚠ WARNING
	<p>Fluids handled, consumables and supplies which are hot or pose a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▷ Wear safety clothing and a protective mask if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Dismantle the valve.
Collect greases and other lubricants during dismantling.
2. Separate and sort the valve materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Valve Description

4.1 General description

- Knife gate valves

Valve for shutting off fluids in waste water applications, water applications, biogas plants, process engineering and industrial plants. For waste water, water, sludge, biogas and solids-laden fluids.

4.2 Product information

4.2.1 Product information as per Regulation No. 1907/2006 (REACH)

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <https://www.ksb.com/ksb-en/About-KSB/Corporate-responsibility/reach/>.

4.2.2 Product information as per Pressure Equipment Directive 2014/68/EU (PED)

The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Groups 1 and 2.

4.2.3 Product information as per Directive 2014/34/EU (ATEX)

The valves do not have a potential internal source of ignition and can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 2014/34/EU.

4.3 Marking

Table 5: General marking

Nominal size	DN ...
Nominal pressure class or max. permissible pressure/temperature	PN ... / ... bar / ... °C
Manufacturer	KSB
Type series/model or order number	HERA...
Year of construction	20..
Material
Traceability of the material
CE marking	

In accordance with the current European Pressure Equipment Directive (PED) the valves are marked as shown in the following table:

Fluids in Groups 1 and 2

Class	PN	DN										
		≤25	32	40	50	65	80	100	125	150	≥200	
150	10											
	16											
≥300	25											
	≥40											

Fig. 3: Fluids in Groups 1 and 2

Fluid groups

In accordance with Article 13 Para. 1 of the European Pressure Equipment Directive (PED) 2014/68/EU, Group 1 comprises all fluids posing physical or health hazards, e.g. fluids defined as

- Explosive
- Extremely flammable
- Highly flammable

- Very toxic
- Toxic
- Oxidising

Group 2 comprises all other fluids not referred to in Group 1.

4.4 Name plate

Valve with handwheel

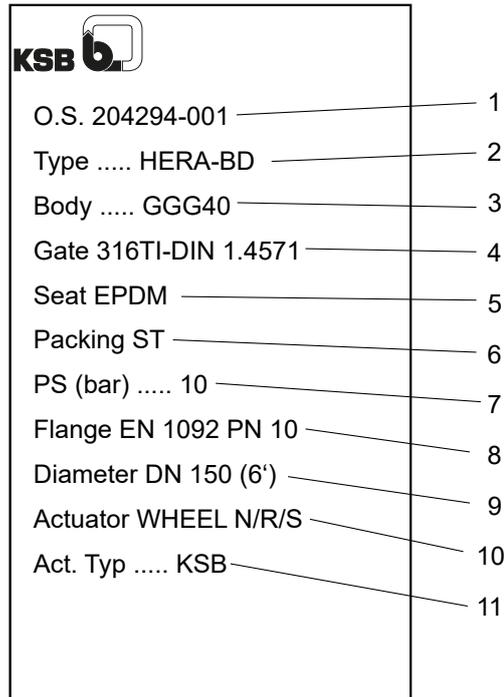


Fig. 4: Name plate for a valve with handwheel (example)

1	Reference number	2	Product name
3	Valve body material	4	Blade material
5	Seat material	6	Gland packing
7	Maximum operating pressure	8	Flange connection
9	Nominal size (DN)	10	Actuation
11	Manufacturer		

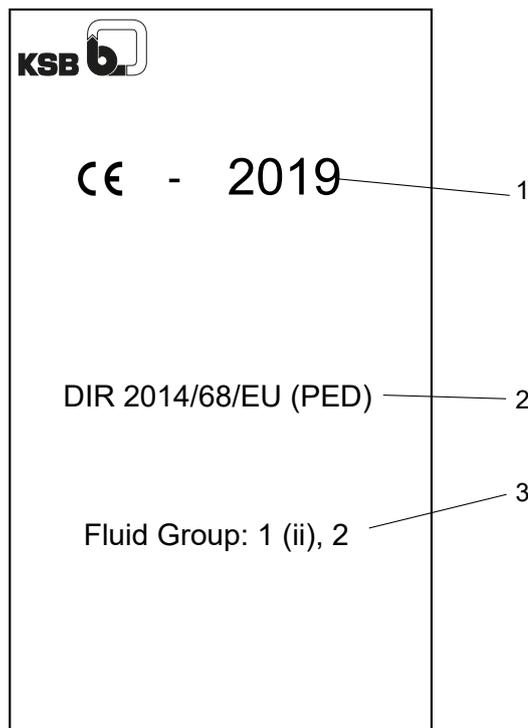


Fig. 5: Additional name plate for a valve with handwheel

1	Year of construction	2	Directive
3	Fluid groups as per PED		

Valve with pneumatic actuator

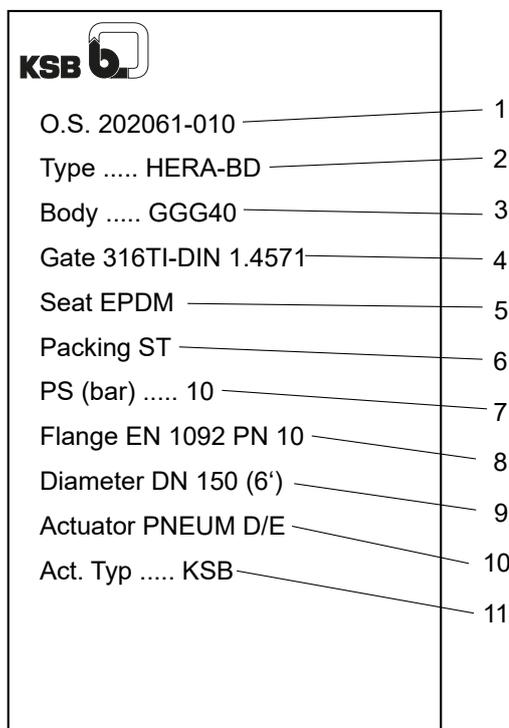


Fig. 6: Name plate for a valve with pneumatic actuator (example)

1	Reference number	2	Product name
3	Valve body material	4	Blade material
5	Seat material	6	Gland packing
7	Maximum operating pressure	8	Flange connection
9	Nominal size (DN)	10	Actuation
11	Manufacturer		

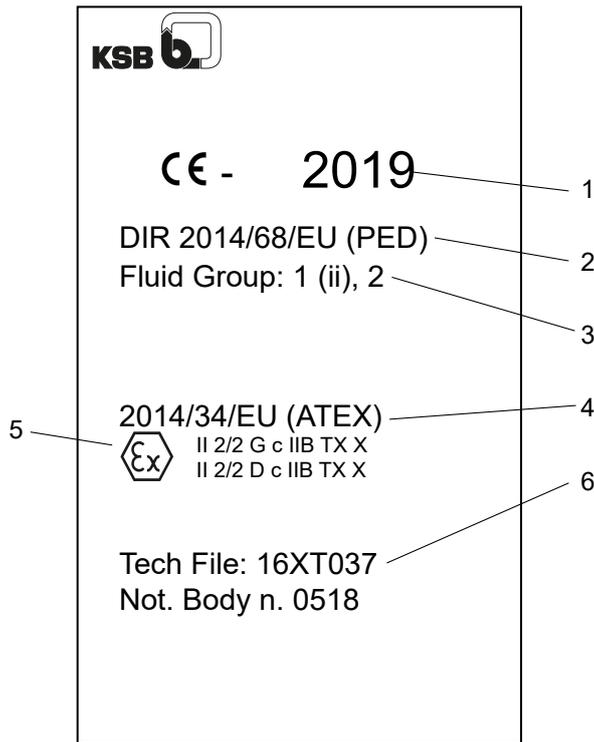


Fig. 7: Additional name plate for a valve with pneumatic actuator (example)

1	Year of construction	2	Directive
3	Fluid groups as per PED	4	ATEX Directive
5	Explosion protection symbol	6	ATEX document number

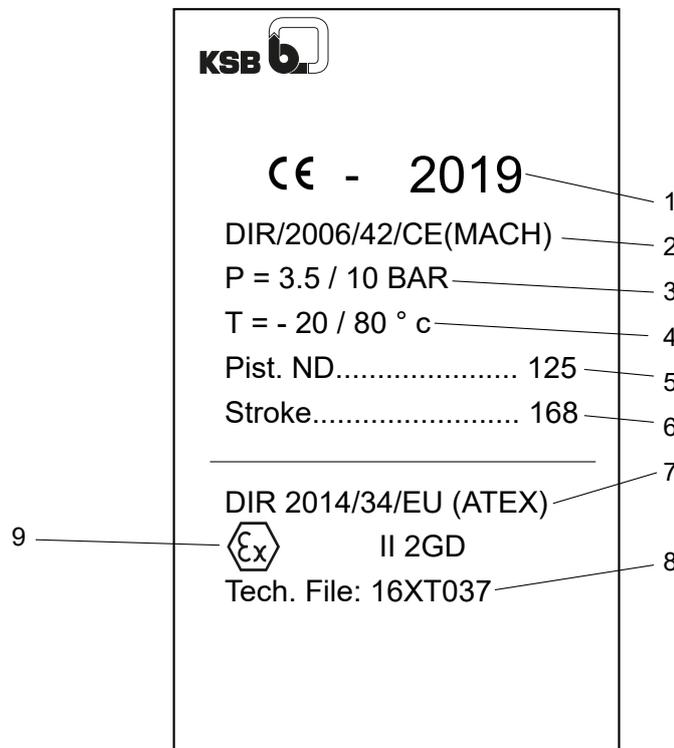


Fig. 8: Additional name plate for a valve with pneumatic actuator (example)

1	Year of construction	2	Directive
3	Control pressure ⁶⁾ (minimum / maximum)	4	Application temperature ⁶⁾ [°C] (minimum / maximum)
5	Inside diameter of pneumatic cylinder	6	Stroke
7	ATEX Directive	8	ATEX document number
9	Explosion protection symbol		

Valve with electric actuator

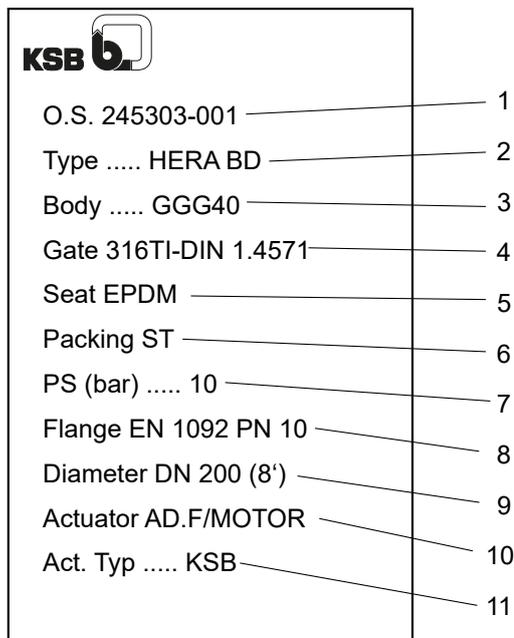


Fig. 9: Name plate for a valve with electric actuator (example)

1	Reference number	2	Product name
3	Valve body material	4	Blade material
5	Seat material	6	Gland packing
7	Maximum operating pressure	8	Flange connection
9	Nominal size DN	10	Actuation
11	Manufacturer		

⁶⁾ For pneumatic actuator

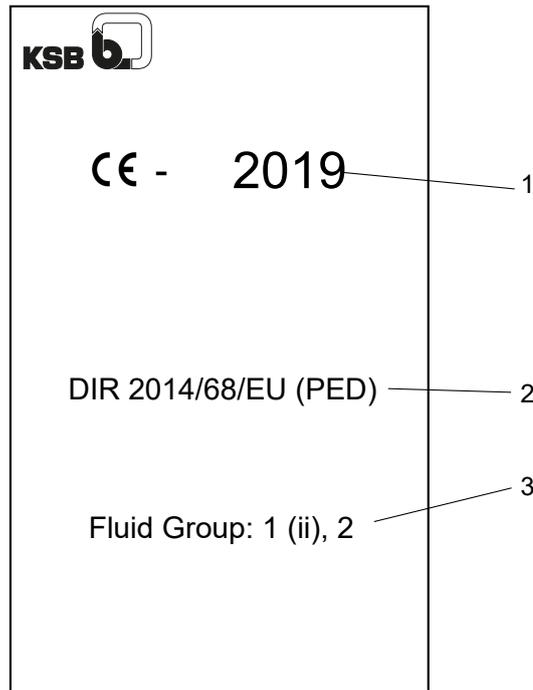


Fig. 10: Additional name plate for a valve with electric actuator (example)

1	Year of construction	2	Directive
3	Fluid groups as per PED		

4.5 Design details

Design

- Wafer-type design: suitable for clamping between pipe flanges or dead-end service at full operating pressure
- Single-piece (\leq DN 500) or two-piece ($>$ DN 500) body with integrated flange seal
- Short face-to-face length to EN 558-1/20
- Non-rising stem
- Non-rising handwheel
- Blade made of 1.4571 as standard (\leq DN 400)
- Confined U-shaped seal made of EPDM
- Transverse seal with gland packing
- Robust yoke for actuator mounting as standard
- All steel parts and cast iron parts epoxy-coated (200 μ m) to protect against corrosion, colour: RAL 5015, blue

Variants

- Blade made of 1.4571 / AISI 316 Ti (\geq DN 450)
- Stem made of 1.4571 / AISI 316 Ti
- Nuts and bolts made of A4
- Sealing material made of NBR or Viton (U-shaped seal and O-rings)
- Gland packing made of stainless steel braiding, with scraper effect
- Chain wheel \leq DN 600
- Quick-action lever \leq DN 150
- Gearbox \geq DN 400
- Double-acting pneumatic actuators \leq DN 800

- Electric actuators \leq DN 1200 (with rising stem)
- Limit switch(es)
- Solenoid valves to NAMUR
- 3.1 certificate
- Larger nominal sizes and other variants on request

4.6 Function

- Design** The knife gate valve consists of a single-piece body 100 (\leq DN 500) or a two-piece body ($>$ DN 500), yoke 166, the functional unit (stem 200 and blade 360) and the actuating element.
- Function** The valve is operated by a manual actuating element (handwheel or lever), an electric or a pneumatic actuating element (actuator).
- Sealing** The body 100 and yoke 166 are connected by hexagon head bolts 901.
The passage of blade 360 in the body is sealed by a gland packing 461/412.2. Design with spring-loaded gland packing 461/412.2 available.
The seat/disc interface is sealed off by a U-shaped seal 410 made of elastomer.

4.7 Scope of supply

The following items are included in the scope of supply:

- Valve
- Valve operating manual

5 Installation at Site

5.1 General information/Safety regulations

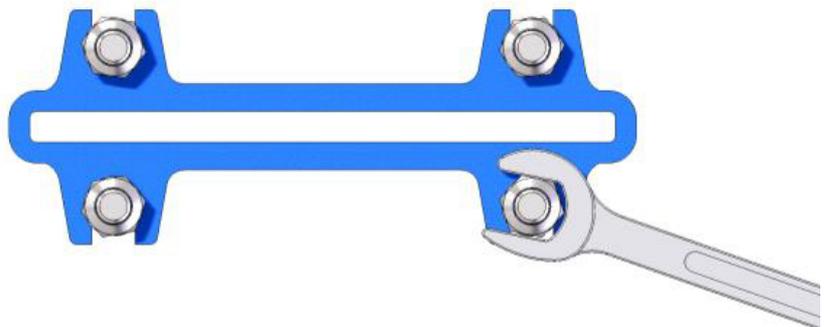
The consultant, construction company or operator are responsible for positioning and installing the valves. Planning errors and installation errors may impair the reliable function of the valves and pose a substantial safety hazard.

	<p>⚠ WARNING</p>
	<p>Damage to pressure enclosure or add-on parts Leakage from or rupture of the valve Valve/add-on parts not functional</p> <ul style="list-style-type: none"> ▸ Check the valve for in-transit damage prior to installation. ▸ Check any add-on parts for in-transit damage. ▸ Do not install damaged valves.
	<p>⚠ DANGER</p>
	<p>Dead-end valve High-pressure hazard! Risk of burns!</p> <ul style="list-style-type: none"> ▸ Protect the valve against unauthorised and/or unintentional opening.

5.2 Check before installation

Before beginning with the installation check the following:

- The electric actuator can be operated on the power supply network in accordance with the data on the name plate. (⇒ Section 4.4, Page 17)
- Gland packing 461 has been checked for leakage before it is subjected to load conditions for the first time. If gland follower 452 has loosened, re-tighten nuts 920.2 evenly and alternately (crosswise). There must be no metal-to-metal contact between gland follower 452 and blade 360.



If the gland bolts are tightened excessively, the forces required to actuate the valve will increase accordingly, resulting in excessive compression of the gland packing and impaired valve function.

5.3 Installation position

The valve provides bi-directional shut-off. This allows the valve to be installed in either direction, regardless of the flow direction.

The valve should preferably be installed vertically in horizontal pipes (installation position A). Installation positions A, B and C are permitted. Consult KSB for installation positions A* or C*.

Horizontal pipe: Provide adequate holders or supports for valves with nominal sizes \geq DN 300 or equipped with heavy actuators when installed in positions B and C.

Vertical pipe: Provide adequate holders or supports for the valves.

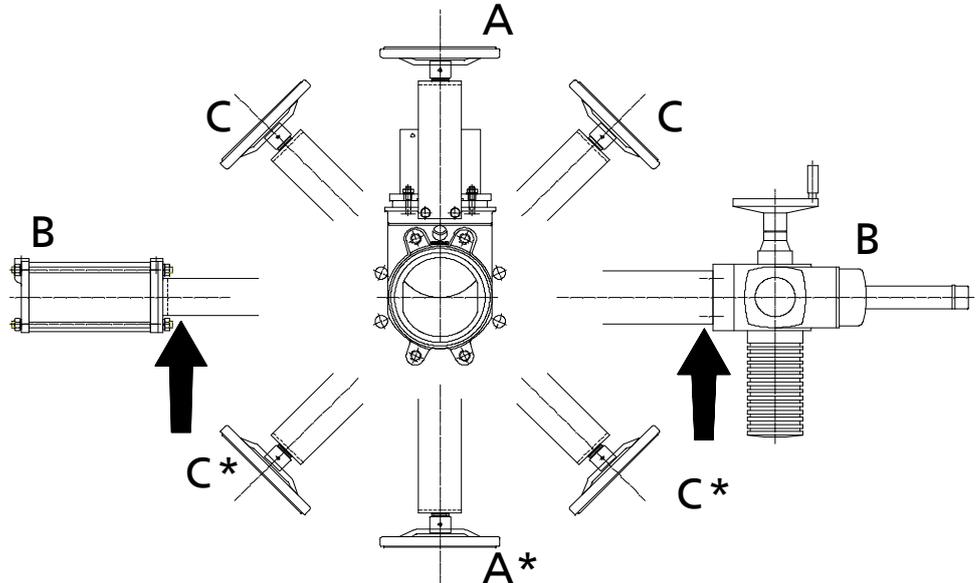


Fig. 11: Valve installation positions

*	Consult KSB.
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	NOTE
For the valves to reach the documented Kv values, the flow direction must correspond to the flow direction arrow.	

5.4 Preparing the valve

	CAUTION
Outdoor installation Damage due to corrosion! ▷ Provide weather-proof protection to protect the valve against moisture.	

1. Thoroughly clean, flush and blow through all vessels, piping and connections.
2. Remove the valve's flange covers before installing it in the piping.
3. Check that the inside of the valve is free from any foreign objects. Remove any foreign objects.
4. If required, install a strainer in the piping.

5.5 Piping

	<p style="background-color: #f4a460; padding: 5px;">⚠ WARNING</p> <p>Impermissible piping forces Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> ▷ Connect the pipes to the valve without transmitting any stresses or strains. ▷ Take structural measures to prevent any piping forces from being transmitted to the valve. ▷ Avoid mechanical loads beyond normal levels, e.g. piping forces, moments and vibrations.
	<p style="background-color: #fff9c4; padding: 5px;">CAUTION</p> <p>Painting of the piping Valve function impaired! Loss of important information provided on the valve!</p> <ul style="list-style-type: none"> ▷ Protect stem and plastic components prior to applying paint. ▷ Protect printed name plates prior to applying paint.

5.5.1 Flange connection

- Fasteners** Use the flange bolt holes specified in the table when connecting the valve to the pipe. (⇒ Section 8.2, Page 44)
- Flange connection**
- ✓ The mating flange faces are clean and undamaged.
 - ✓ Verify that the piping is correctly aligned and the flanges are parallel.
 1. Clamp the valve between the pipe flanges without additional sealing elements.
 2. Use an appropriate tool to evenly tighten the fasteners crosswise. (⇒ Section 7.3, Page 42)

5.6 Earthing

	<p style="background-color: #d9534f; padding: 5px;">⚠ DANGER</p> <p>Electrostatic charging Explosion hazard! Fire hazard! Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Provide potential equalisation. ▷ Make sure that the connection between valve body and piping is electrically conductive. (Testing in line with EN 12266-2, Annexes B.2.2.2 and B.2.3.1). Perform testing whenever the valve has been removed and re-installed in the piping. ▷ Perform regular tests to ensure that the valve/piping connection is electrically conductive. The electrical resistance to earth must be $< 10^6 \Omega$.
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5.7 Valve with actuator

	<p>⚠ DANGER</p> <p>Incorrect actuating elements Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Only use actuating elements approved for ATEX zones: handwheel, lever, pneumatic actuator (only double-acting actuators are permitted), electric actuator. ▷ Actuating elements are marked in accordance with the required ATEX zone. ▷ Observe the blade's maximum travel speed of ≤ 1 m/s.
	<p>⚠ WARNING</p> <p>Impermissible loads resulting from operating conditions, add-on parts and valve-mounted components, e.g. actuators Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> ▷ Lay the piping in such a way that detrimental thrust forces and bending forces are kept away from the valve body. ▷ Additional loads, e.g. traffic, wind or earthquakes are not taken into account for standard variants; these require a separate design. ▷ Support the valve including add-on parts and valve-mounted components.

Install valves with gearboxes or actuators with the stem in the vertical position. If this requirement cannot be met, adequately support the actuator on site or consult KSB.

Electric actuators

	<p>⚠ DANGER</p> <p>Unqualified personnel performing work on valves with actuator Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Ensure that the connection to the power supply and the process control system is performed by a trained electrician. ▷ Observe regulations IEC 60364 and, for explosion-proof models, EN 60079.
	<p>⚠ WARNING</p> <p>Incorrect connection to the mains Damage to the mains network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.
	<p>CAUTION</p> <p>Change of limit switch points Impairment of the functional reliability! Damage to the actuator!</p> <ul style="list-style-type: none"> ▷ Never change the pre-set limit switch points.

Mounted actuators are factory-set and ready for operation.

Electric actuators are factory-set ready for operation and wired as follows:

- Valve CLOSED: travel-dependent
- Valve OPEN: travel-dependent

Circuit diagrams, see the manufacturer's operating manual for the electric actuator.

Pneumatic actuators

	 DANGER
	<p>Work on valves with energy storage, e.g. spring mechanisms or compressed air storage</p> <p>Danger to life resulting from incorrect assembly</p> <ul style="list-style-type: none"> ▷ Ensure that work on the actuator is performed by qualified specialist personnel. ▷ Observe the actuator's operating manual.

Valves with double-acting actuators are standard designs. Valves with single-acting actuators are available on request. In either case, the supply pressure must range between 3.5 and 10 kg/cm². To ensure the pneumatic actuator reaches its maximum service life, it must be supplied with completely dry, filtered and oiled compressed air.

5.8 Insulation

	 WARNING
	<p>Cold/hot piping and/or valve</p> <p>Risk of thermal injury!</p> <ul style="list-style-type: none"> ▷ Insulate the valve. ▷ Fit warning signs.

For any insulation fitted on the valve observe the following:

- The valve's function must not be impaired.
- The sealing areas between blade and gland must remain easily accessible.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

	<p>! DANGER</p> <p>Surge pressure/water hammer potentially occurring at high temperatures Danger to life caused by burns or scalds!</p> <ul style="list-style-type: none"> ▷ Do not exceed the valve's maximum permissible pressure. ▷ Use valves made of nodular cast iron or steel. ▷ The operator shall provide general safety measures for the system.
	<p>CAUTION</p> <p>Overloading of valve Damage to the valve!</p> <ul style="list-style-type: none"> ▷ The nominal pressure classes only apply at room temperature. Refer to the pressure/temperature ratings tables for higher temperature values. (⇒ Section 6.2.3, Page 31) . Using the valve in conditions deviating from those specified will lead to overload which the valve cannot withstand.
	<p>CAUTION</p> <p>Aggressive flushing liquids and pickling agents Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Ensure that cleaning procedure and duration match the valve body materials and seal materials when performing flushing and pickling. ▷ Responsibility for the compatibility of the pickling media used and the pickling procedure itself lies with the pickling company.

Before commissioning/start-up of the valve ensure that the following requirements are met:

- The valve has been connected to the piping at both ends.
- The shut-off function of the installed valve has been checked by opening and closing it several times.
- Gland packing 461 has been checked for leakage before it is subjected to load conditions for the first time. If gland follower 452 has loosened, re-tighten nuts 920.2 evenly and alternately (crosswise). There must be no metal-to-metal contact between gland follower 452 and blade 360.
- The actuator has been connected to the power supply in accordance with the actuator's operating manual.
- The piping has been flushed.
- For valves with electric or pneumatic actuators travel limits have been set.
- The material, pressure data and temperature data of the valve are compatible with the operating conditions of the piping. (⇒ Section 6.2, Page 30)
- The material's chemical resistance and stability under load have been checked.

6.1.2 Actuation/operation

	CAUTION
	<p>Excessively long idle periods Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Check the function by opening and closing the valve at least once or twice a year.

6.1.2.1 Actuating element – handwheel

	CAUTION
	<p>Use of additional levers Damage to the valve as a result of excessive forces!</p> <ul style="list-style-type: none"> ▷ Never use additional levers to operate the valve. ▷ Only actuate handwheel-operated valves by hand.

Viewed from above, the valve is opened by turning the handwheel in counter-clockwise direction, and closed by turning the handwheel in clockwise direction. Direction symbols are marked on the top of the handwheel.

6.1.2.2 Actuating element – lever

For actuation open the locking device in the upper part of yoke 166. Move the lever in opening or closing direction as required and lock in position with the locking device.

6.1.2.3 Actuating element – pneumatic actuator

	! WARNING
	<p>Improper handling of pneumatic actuator Crushing of fingers! Damage to the actuator or the valve!</p> <ul style="list-style-type: none"> ▷ Ensure that any objects and parts of the body are removed from the actuator coupling area prior to starting the actuator.

For pneumatic actuators, the control pressures specified in the order confirmation must be observed.

If required, consult the manufacturer for closing torques and opening torques or actuating forces.

Operate the actuator three or four times before commissioning.

6.1.2.4 Actuating element – electric actuator

	! WARNING
	<p>Improper handling of electric actuator Crushing of fingers! Damage to the actuator or the valve!</p> <ul style="list-style-type: none"> ▷ Never touch the rotating components. ▷ Ensure that any objects and parts of the body are removed from the actuator coupling area prior to starting the actuator.

Electric actuators are factory-set ready for operation and wired as follows:

- Valve CLOSED: travel-dependent
- Valve OPEN: travel-dependent

Circuit diagrams, see the manufacturer's operating instructions for the electric actuator.

6.1.3 Functional test

Visual inspection Check the following functions:

1. After the valve has been subjected to load conditions for the first time, check gland packing 461 for leakage.
2. If the gland follower 452 has become loose, re-tighten the nuts 920.2 evenly and alternately (crosswise). (⇒ Section 7.3, Page 42) . There must be no metal-to-metal contact between gland follower 452 and blade 360.

	CAUTION
	<p>Excessively tightened gland packing Valve function impaired!</p> <ul style="list-style-type: none"> ▷ Damage to the valve body and the gland packing. ▷ Observe the tightening torques. (⇒ Section 7.3, Page 42) .

6.2 Operating limits

6.2.1 Fluid temperature

	⚠ DANGER
	<p>Excessive fluid temperature Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Maximum permissible temperature for gas/air, water vapour/air and mist/air mixtures: 80 % of the fluid's minimum ignition temperature in °C. ▷ Maximum permissible temperature for dust/air mixtures: $\frac{2}{3}$ of the dust cloud's minimum ignition temperature minus 10 °K or of the dust layer's (thicker than 5 mm) minimum ignition temperature minus 85 °K.

	NOTE
	<p>The maximum fluid temperatures apply to all categories. Differences between categories have been defined on the basis of foreseeable and rare occasions of malfunctions.</p>

6.2.2 Sealing element and gland packing temperature

Table 6: Maximum permissible sealing element temperature

Material	[°C]
EPDM	120
VITON	200
NBR	120

Table 7: Maximum permissible gland packing temperature

Type	[°C]
ST	240
MF355	240

6.2.3 Pressure/temperature ratings

Table 8: Test pressure and operating pressure

PN	DN	Shell test	Leak test (seat)	Permissible operating pressure
		With water		
		Tests P10 and P11 to DIN EN 12266-1	Test P12 to DIN EN 12266-1 ⁷⁾	-10 to +120 °C
		[bar]	[bar]	[bar]
10	50 - 250	15	11	10
6	300 - 400	9	6,6	6
5	450	7,5	5,5	5
4	500 - 600	6	4,4	4
2	700 - 1200	3	2,2	2

6.3 Shutdown

6.3.1 Measures to be taken for shutdown

During prolonged shutdown periods, ensure that the following conditions are met:

1. Drain fluids which change their physical condition due to changes in concentration, polymerisation, crystallisation, solidification, etc. from the piping.
2. If required, flush the piping with the valves fully opened.

6.3.1.1 Valve with handwheel

1. Close the valve by turning the handwheel in clockwise direction.

6.3.1.2 Valve with lever

1. Open the locking device in the upper part of yoke 166. Move the lever in closing direction as required and lock in position with the locking device.

6.3.1.3 Valve with electric actuator

1. Disconnect the equipment from the power supply.

6.3.1.4 Valve with pneumatic actuator

1. Disconnect the equipment from the air supply.

6.4 Returning to service

For returning the equipment to service, observe the sections on commissioning/start-up (⇒ Section 6.1, Page 28) and the operating limits (⇒ Section 6.2, Page 30) .

In addition, carry out all servicing/maintenance operations before returning the valve to service. (⇒ Section 7, Page 32)

⁷⁾ DN 50 - 600: leakage rate A, DN 700-1200: leakage rate B

7 Servicing/Maintenance

7.1 Safety regulations

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Improper handling of ATEX-compliant valves Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel (ATEX training). ▷ Check the gland packing after 100 actuations or after three months. After checking, the operator must define new inspection intervals. ▷ Make sure that the connection between body and piping is electrically conductive. (Testing in line with EN 12266-2, Annexes B.2.2.2 and B.2.3.1). Perform testing whenever the valve has been removed and re-installed in the piping. ▷ Dead-end service is not permitted. ▷ Do not apply a new coating. Should a new coating be required, contact the manufacturer. ▷ Only use sealing elements made of EPDM, Viton, nitrile or PTFE. ▷ Only use approved gland packing types ST and MF355 (stainless steel). (⇒ Section 7.2.4.3, Page 37) . ▷ Always use original spare parts in order to comply with the ATEX certification. ▷ Only use washers to DIN 6798A for potential equalisation. The washer ensures potential equalisation between epoxy-coated components (up to 200 µm) such as yoke, body and the stainless steel contact guard. ▷ Clean the valves regularly using suitable anti-static equipment, e.g. vacuum cleaner system. Do not simply sweep away dust, dispose of it in accordance with local regulations or in another controlled manner.
	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Sparks produced during servicing work Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Observe the safety regulations in force at the place of installation. ▷ Always perform maintenance work on an explosion-proof valve outside of potentially explosive atmospheres.
	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Valve under pressure Risk of injury! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> ▷ Depressurise the valve and its surrounding system prior to any maintenance work and installation work. ▷ If there is fluid leakage, depressurise the valve. ▷ Allow the valve to cool down until the temperature of the fluid in all the valve's chambers is lower than the fluid's vapourisation temperature. ▷ Never vent the valve by removing the bonnet bolting or gland packing. ▷ Use original spare parts and appropriate tools, even in emergencies.

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

	WARNING
	<p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate valves used in fluids posing a health hazard.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the valve with a minimum of servicing/maintenance expenditure and work.

	NOTE
	<p>Before removing the valve from the piping, ensure that the pipe has been taken out of service and released for repair/maintenance work.</p>

	NOTE
	<p>All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. For contact details please refer to the enclosed "Addresses" booklet or visit "www.ksb.com/contact" on the Internet.</p>

Never use force when dismantling and reassembling the valve.

Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

Pneumatic actuators

	WARNING
	<p>Actuator parts moving due to pre-loaded springs when auxiliary energy supply fails Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe the actuator's operating manual.

7.2 Servicing/Inspection

7.2.1 Supervision of operation

	DANGER
	<p>Excessive sealing element and gland packing temperatures Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Observe the maximum permissible valve temperature. ▷ Observe the maximum permissible fluid temperature. ▷ Observe the maximum permissible temperature at sealing elements and gland packing. (⇒ Section 6.2.2, Page 30)

	DANGER
	<p>Incorrectly serviced gland packing Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Check the gland packing after 100 actuations or after three months.

	 DANGER
	<p>Improper cleaning of valve Explosion hazard by electrostatic discharge!</p> <ul style="list-style-type: none"> ▷ When cleaning the valves, use suitable anti-static equipment.

The service life can be extended by taking the following measures:

- Checking the function by actuating the valve at least twice a year
- Regularly lubricating the stem with grease (⇒ Section 7.2.2.1, Page 34)
- Adding or replacing packing rings in good time
- Replacing the U-shaped seal in good time

7.2.2 Inspection work

7.2.2.1 Grease lubrication

The stem is supplied packed with grease.

Lubricate the stem every 30 days. Use a calcium grease of the following characteristics: water-repellent, low ash content and excellent adhesion.

7.2.3 Dismantling the valve

7.2.3.1 General information/Safety regulations

	 WARNING
	<p>Hot surface Risk of injury!</p> <ul style="list-style-type: none"> ▷ Allow the valve to cool down to ambient temperature.

	 WARNING
	<p>Unqualified personnel performing work on the valve Risk of injury!</p> <ul style="list-style-type: none"> ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.

Always observe the safety instructions and information. (⇒ Section 7, Page 32)

In the event of damage you can always contact KSB Service.

7.2.3.2 Preparing the valve

1. Interrupt energy supply and make sure it cannot be switched on again unintentionally.
2. Depressurise and drain the valve.
3. Remove any protective covers from valves with actuators.
4. Shut down the actuators as specified in the actuator's operating manual.

7.2.3.3 Dismantling the gland packing

✓ The notes and steps stated in (⇒ Section 7.2.3.1, Page 34) to (⇒ Section 7.2.3.2, Page 34) have been observed or carried out.

1. **For designs with non-rising stem:** Undo the bolts joining blade 360 to the stem nut.

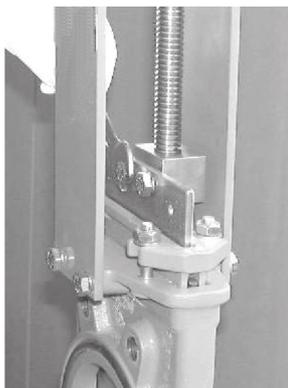


Fig. 12: Non-rising stem: Undoing the bolts

2. **For designs with rising stem:** Disconnect stem 200 from blade 360.⁸⁾



Fig. 13: Rising stem: Undoing the bolts

3. **For designs with rising stem:** Undo the bolts of yoke 166 and take off yoke 166 without removing the actuator.⁸⁾
4. Undo the gland follower nuts.
5. **Design with spring-loaded gland packing:** Remove washers 550.1, 550.2 and spring 950.1.



Fig. 14: Undoing the gland follower nuts

6. Remove the gland follower.
7. Remove old gland packing 461.

7328.8/12-EN

⁸ For electric actuators only

7.2.3.4 Removing the U-shaped seal

7.2.3.4.1 Removing the U-shaped seal – single-piece body (\leq DN 500)

✓ Gland packing 461 has been removed.

1. Remove blade 360.
2. Remove the sliders.

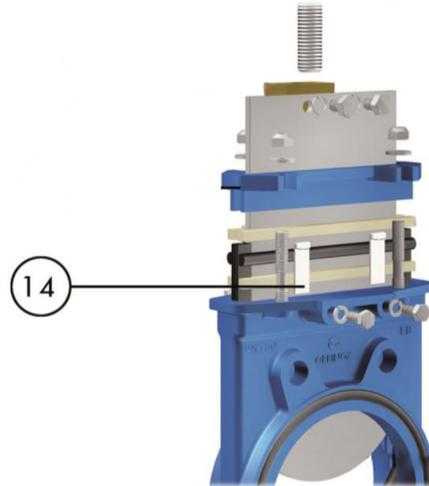


Fig. 15: Detailed view of gate valve layout with sliders (14)

3. Remove U-shaped seal 410 and clean the seal chamber.

7.2.3.4.2 Removing the U-shaped seal – two-piece body ($>$ DN 500)

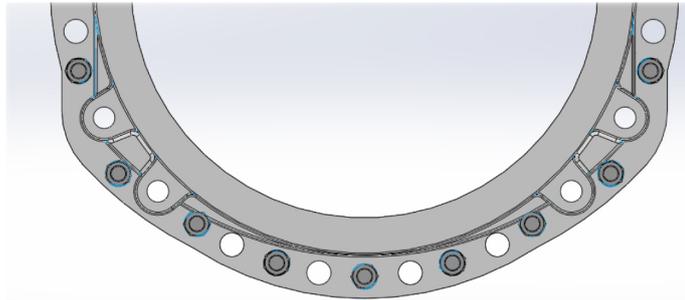


Fig. 16: Bolting of two-piece body

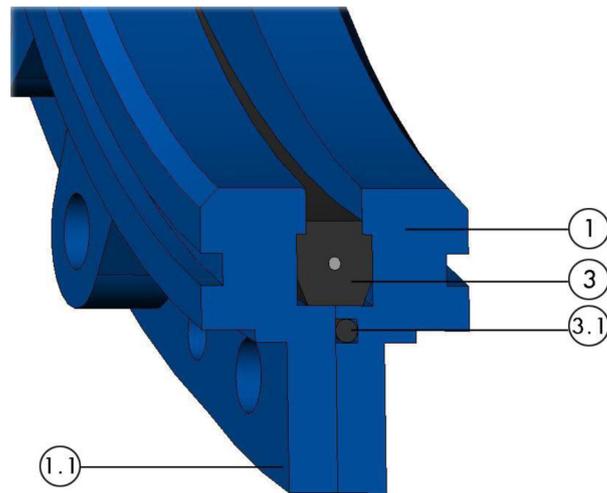


Fig. 17: Cross-section of two-piece body

1	Body	1.1	Counterbody
3	U-shaped seal	3.1	O-ring

- ✓ Gland packing 461 has been removed.
- 1. Undo the bolts joining the body and the counterbody.
- 2. Carefully separate the counterbody from the body.
- 3. Remove and clean blade 360.
- 4. Remove the U-shaped seal and clean the seal chamber.
- 5. Remove the O-ring and clean the O-ring seat.

7.2.4 Assembling the valve

7.2.4.1 General information/Safety regulations

	CAUTION
	<p>Improper reassembly Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Reassemble the valve in accordance with the general rules of sound engineering practice. ▷ Use original spare parts only.

Tightening torques Use an appropriate tool to tighten the fasteners crosswise.

7.2.4.2 Tools required

(For gland packing type MF355 only)

- Angle grinder
- Mallet
- Brass screwdriver

7.2.4.3 Fitting the gland packing

- ✓ The spare parts required are available.
- ✓ The tool required for installing gland packing type 355 is available.
- ✓ All dismantled parts have been cleaned and checked for wear.

1. Fit a new gland packing 461.
The packing arrangement consists of:

Type ST (primarily waste water applications)

- First layer: PTFE sealing cord
- Second layer: EPDM O-ring cord
- Third layer: PTFE sealing cord

Type MF355 (primarily industrial applications)

- First layer: braided stainless steel sealing cord (scraper effect)
- Second layer: EPDM O-ring cord
- Third layer: PTFE sealing cord

2. The sealing cords must be fitted on both sides of blade 360. Refer to table "Sealing cord dimensions" for the lengths of the sealing cords.

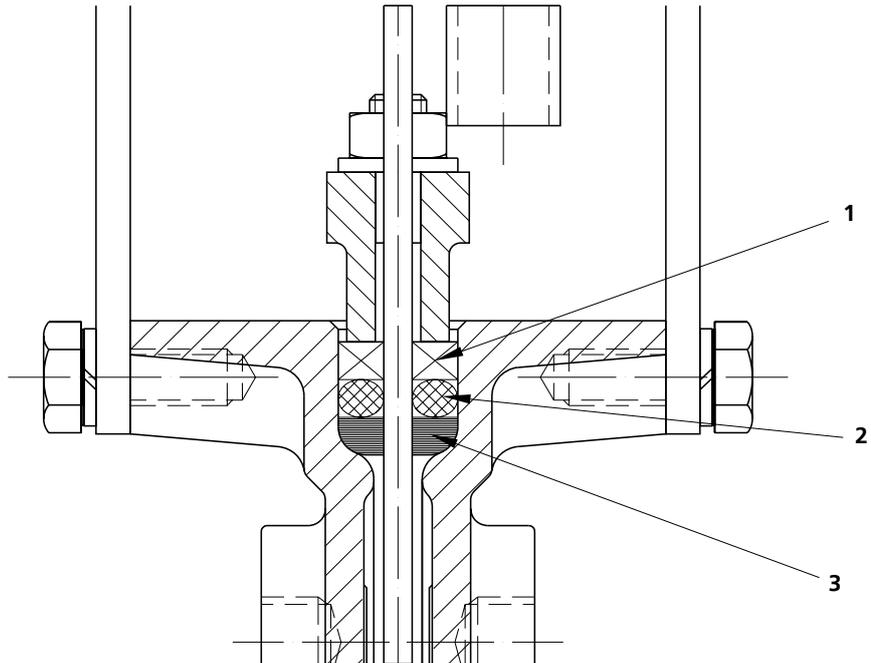


Fig. 18: Gland packing arrangement

1	PTFE sealing cord	2	O-ring cord
3	Type ST: PTFE sealing cord Type MF355: braided stainless steel sealing cord		



Fig. 19: Sealing cord dimension

Table 9: Dimensions [mm]

DN	A	Braided stainless steel sealing cord	PTFE sealing cord	O-ring cord
50	71	71	81	81
65	86	86	96	96
80	101	101	111	111
100	121	121	131	131
125	152	152	162	162
150	177	177	187	187
200	229	229	239	239

DN	A	Braided stainless steel sealing cord	PTFE sealing cord	O-ring cord
250	279	279	289	289
300	331	331	341	341
350	380	380	400	400
400	436	436	456	456
450	486	486	506	506
500	536	536	556	556

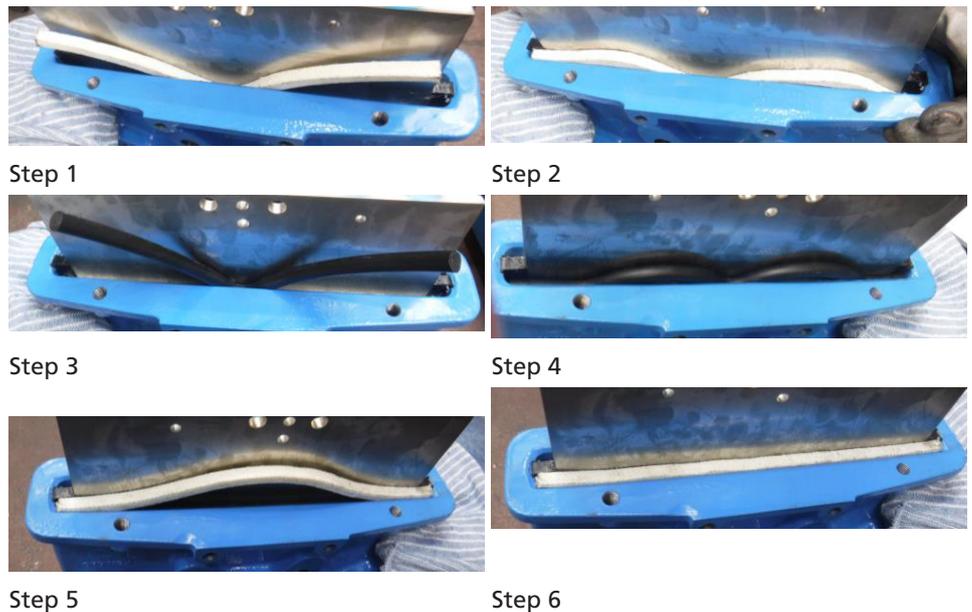
Table 10: Valves ≤ DN 300

Packing layers	Type ST (waste water)	Type MF355 (industry)
First layer	PTFE sealing cord: A + 10 mm	Braided stainless steel sealing cord: A
Second layer	EPDM O-ring cord: A + 10 mm	EPDM O-ring cord: A + 10 mm
Third layer	PTFE sealing cord: A + 10 mm	PTFE sealing cord: A + 10 mm

Table 11: Valves ≥ DN 350

Packing layers	Type ST (waste water)	Type MF355 (industry)
First layer	PTFE sealing cord: A + 20 mm	Braided stainless steel sealing cord: A
Second layer	EPDM O-ring cord: A + 20 mm	EPDM O-ring cord: A + 20 mm
Third layer	PTFE sealing cord: A + 20 mm	PTFE sealing cord: A + 20 mm

3. For designs with gland packing type ST: Fit the sealing cords, working from the middle outwards.



4. For designs with gland packing type MF355: Cut the sealing cord to the specified length with the angle grinder.



Fig. 20: Cutting the sealing cord

5. For designs with gland packing type MF355: Compress the sealing cord (very stiff) using a mallet.



Fig. 21: Compressing the sealing cord

6. For designs with gland packing type MF355: Start fitting the sealing cord from one end. To avoid blade damage use brass screwdriver only.

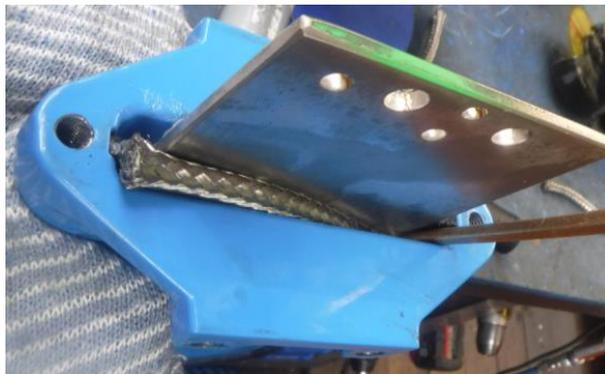


Fig. 22: Fitting the sealing cord

7. Position gland follower 452.
8. Design with spring-loaded gland packing: Fit washers 550.1, 550.2 and spring 950.1.
9. Evenly tighten gland follower 452 crosswise. (⇒ Section 7.3, Page 42)



Fig. 23: Tightening the gland follower

10. **For designs with non-rising stem:** Connect stem nut 544 to blade 360.
For designs with rising stem: Fit yoke 166 (with actuator) and tighten with bolts.⁹⁾
11. **For designs with rising stem:** Connect stem 200 to blade 360.⁹⁾
12. Fit protective devices on valves with actuators.
13. Subject system to load conditions and re-tighten gland follower 452 in such a manner that leakage does not occur. (⇒ Section 7.3, Page 42) .

7.2.4.4 Fitting the U-shaped seal

7.2.4.4.1 Fitting the U-shaped seal – single-piece body (\leq DN 500)

- ✓ The seal chamber has been cleaned.
- ✓ All dismantled parts have been cleaned and checked for wear.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
 1. Fit the new U-shaped seal in the body.
 2. Insert cleaned blade 360.
 3. Insert the sliders.

7.2.4.4.2 Fitting the U-shaped seal – two-piece body (\geq DN 500)

- ✓ The seal chamber has been cleaned.
- ✓ All dismantled parts have been cleaned and checked for wear.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
 1. Place the new U-shaped seal and the new O-ring into the respective recesses in the body.
 2. Assemble the body and counterbody.
 3. Fit all bolts joining the body and the counterbody, but do not fully tighten at this stage.
 4. Tighten the bolts in the lower flange section.
 5. Place the valve in a vertical position.
 6. Apply grease to the edges of cleaned blade 360.
 7. Insert cleaned blade 360. If the gap is too narrow, slightly loosen the body bolts.
 8. Tighten all bolts on the body and counterbody.

⁹⁾ For electric actuators only

7.2.4.5 Leak testing

After reassembly, subject the valve to shell testing and leak testing to DIN EN 12266-1.

7.3 Tightening torques

Screwed/bolted connection of body

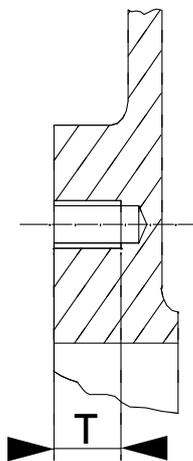


Table 12: Tightening torques for bolts/screws and maximum thread engagement depth (T) in tapped blind holes of body

DN	T	Nm
	[mm]	
50	10	60
65	10	60
80	12	60
100	12	60
125	14	70
150	14	70
200	14	70
250	18	110
300	21	110
350	21	150
400	28	150
450	30	190
500	40	190
600	26	230
700	20	230
800	20	280
900	20	280
1000	20	340
1200	35	340

Gland packing

Table 13: Tightening torques for stuffing box screws

DN	[Nm]	
	Type ST (2x PTFE + EPDM)	Type MF355 (Stainless steel + PTFE + EPDM)
50 - 100	15	17,5
125 - 200	20	25
250 - 600	30	32,5
700 - 1200	35	35

8 Related Documents

8.1 General assembly drawing with list of components

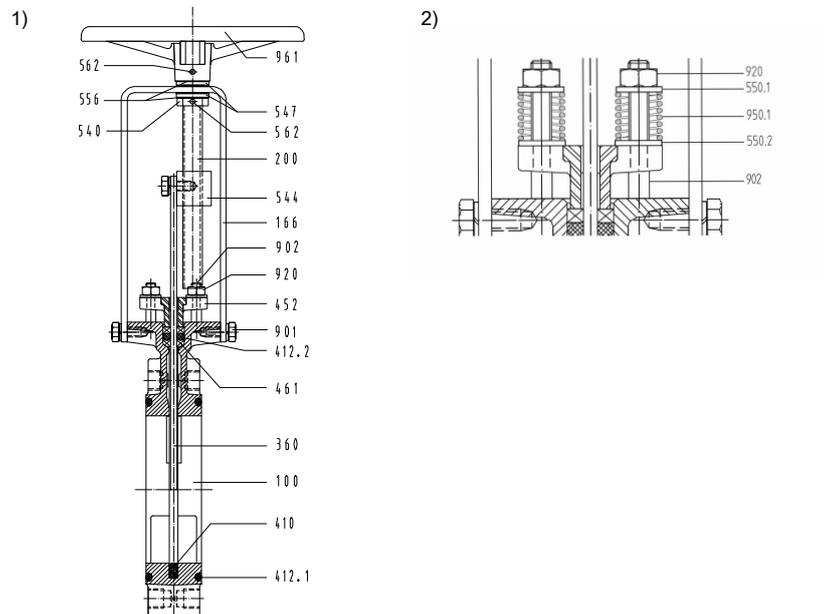


Fig. 24: Sectional drawings
 1) Valve with handwheel
 2) Detailed view of spring-loaded gland packing

Table 14: Overview of available materials

Part No.	Description	Material	Material number	Note
100	Body	EN-GJS-400-15	5.3106	DN 50 - 500: epoxy-coated, single-piece DN 600: epoxy-coated, two-piece
166	Yoke	Steel	1.0044 / S275JR	Epoxy-coated
200	Stem	Stainless steel	1.4016 / AISI 430	Non-rising
360	Blade	Stainless steel	1.4571 / AISI 316 Ti	DN 50 - 400
		Stainless steel	1.4301 / AISI 304	≥ DN 450
410	U-shaped seal	EPDM with steel core	-	-
412.1	O-ring	EPDM	-	Integrated flange seal
412.2	O-ring	EPDM	-	-
452	Gland follower	EN-GJS-400-15	5.3106	Epoxy-coated
461	Gland packing	PTFE-impregnated synthetic fibres	-	-
540	Bush	Stainless steel	1.4301 / AISI 304	-
544	Threaded bush	Brass	-	-
547	Guide bush	Manganese bronze	C86300 / CB762S	-
556	Anti-friction disc	PET + solid lubricant	-	-
562	Spring-type straight pin	Steel	DIN 7346	-
901	Hexagon head bolt	A2	-	-
902	Stud	A2	-	-
920	Hexagon nut	A2	-	-
961	Handwheel	Steel	-	DN 50 - 300: epoxy-coated
		EN-GJS-400-15	5.3106	≥ DN 350: epoxy-coated

7328.8/12-EN

8.2 Dimensions and weights

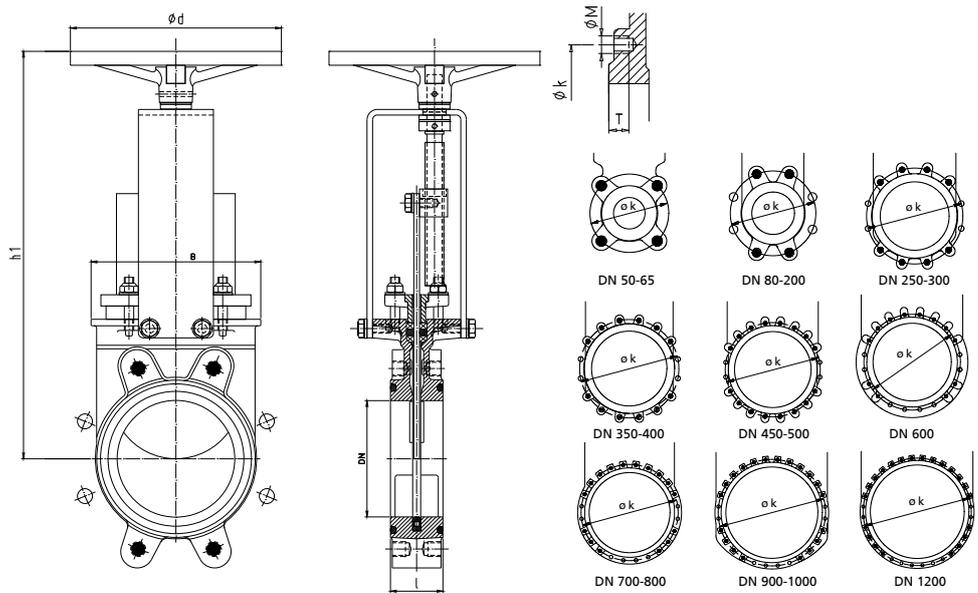


Fig. 25: Sectional drawing

Table 15: Dimensions and weights

PN	DN	l	h ₁	B	ø d	[kg]
		[mm]	[mm]			
10	50	43	312	113	225	8
	65	46	339	128	225	9
	80	46	364	143	225	10
	100	52	405	162	225	12
	125	56	439	181	225	15
	150	56	485	209	225	17
	200	60	595	263	310	30
	250	68	695	315	310	42
6	300	78	785	370	310	60
	350	78	932	420	410	90
	400	102	1017	478	410	140
5	450	114	1119	532	550	185
4	500	127	1219	584	550	204
	600	110	1379	762	550	230
2	700	110	1736	890	800	380
	800	110	1923	1012	800	550
	900	110	2047	1112	800	680
	1000	110	2487	1240	800	800

Table 16: Dimensions [mm]

PN	DN	ø k	Number of bolt holes z	Bolt size ø M	Blind hole depth T	Tapped blind holes n ₁		Clearance holes ⁽¹⁰⁾ n ₂		Tapped holes ⁽¹¹⁾ n ₃	
		[mm]				Qty	Qty	Qty	Qty	Qty	
10	50	125	4	M16	10	4	0	0			
	65	145	4	M16	10	4	0	0			
	80	160	8	M16	12	4	4	0			
	100	180	8	M16	12	4	4	0			
	125	210	8	M16	14	4	4	0			
	150	240	8	M20	14	4	4	0			
	200	295	8	M20	14	4	4	0			
	250	350	12	M20	18	8	4	0			
6	300	400	12	M20	21	8	4	0			

¹⁰ Bolts passing along the side of the body

¹¹ Tapped from both ends, not through-tapped

PN	DN	ø k	Number of bolt holes z	Bolt size ø M	Blind hole depth T	Tapped blind holes n ₁ 	Clearance holes ⁽¹⁾ n ₂ 	Tapped holes ⁽¹⁾ n ₃ 
		[mm]	Qty		[mm]	Qty	Qty	Qty
6	350	460	16	M20	21	6	4	6
	400	515	16	M24	28	6	4	6
5	450	565	20	M24	30	12	4	4
4	500	620	20	M24	40	8	4	8
	600	725	20	M27	26	12	8	0
2	700	840	24	M27	20	16	8	0
	800	950	24	M30	20	16	8	0
	900	1050	28	M30	20	20	8	0
	1000	1160	28	M33	20	20	8	0

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/20 up to DN 500
 ≥ DN 600: see table

Flanges: DIN EN 1092-2

Other flange designs

- Other flange designs on request

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KSB SE & Co. KGaA

Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0

www.ksb.com