

Gate Valve

**ECOLINE GTB 150-600**

**Installation/Operating Manual**



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Installation/Operating Manual ECOLINE GTB 150-600

Original operating manual

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## Glossary

### **Pressure Equipment Directive 2014/68/EU (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 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Installation at Site.

### 1.3 Target group

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

### 1.4 Other applicable documents


**Table 1:** Overview of other applicable documents

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

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

### 1.5 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

<sup>1)</sup> If included in agreed scope of supply; otherwise refer to the type series booklet.

<sup>2)</sup> If included in agreed scope of supply

## 1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 <b>DANGER</b>	<b>DANGER</b> This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	<b>WARNING</b> This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<b>General hazard</b> In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	<b>Electrical hazard</b> In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	<b>Machine damage</b> In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.



## 2 Safety

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

### 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
  - Pressure class
  - Nominal size
  - 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 regulations and directives for pressure equipment.
- 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 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.



### 2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

### 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 accessible to 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.
- 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 19)

## 2.8 Unauthorised modes of operation

- The valve is operated outside the specified limits.
- The valve is not operated in accordance with the intended use.
- Use gate valves exclusively for fully open or fully closed service. An intermediate position (throttling function) is not permitted.

### 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

The valves are supplied ready for operation.


Transport the valve in the closed position.

The connection ports are closed with suitable material (caps, plugs, covers).


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

#### 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:

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

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


	<b>NOTE</b>
	<p>If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.</p>

### 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.

	<p><b>NOTE</b></p> <p>If required, a blank certificate of decontamination can be downloaded from the following web site: <a href="http://www.ksb.com/certificate_of_decontamination">www.ksb.com/certificate_of_decontamination</a></p>
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### 3.5 Disposal

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

### 4.1 General description

- Bellows-type gate valve

Valve for shutting off fluids in the petrochemical industry, process engineering, general industry, energy, beverage industry and food industry.

### 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 (zone 2+22) to ATEX 2014/34/EU.

### 4.3 Marking

Table 4: General marking

Parameter	Values
Nominal size [inch]	NPS ...
Nominal pressure class	Class ...
Manufacturer's mark	KSB
Type series / model	ECOLINE...
Material	.....
CE conformity marking	
Identification number of the notified body	0036

In accordance with the current regulations and directives for pressure equipment the valves are marked as shown in the following table:

#### Fluids in Groups 1 and 2

Class	< 1"	1 ¼"	1 ½"	2"	> 2"
	25	32	40	50	> 50
150					
> 300					

Fig. 1: CE conformity marking: Fluids in Groups 1 and 2

#### Fluid groups

In accordance with the current regulations and directives for pressure equipment, Group 1 comprises all fluids posing physical or health hazards, e.g. fluids defined as

- Explosive
- Extremely flammable
- Highly flammable
- Very toxic
- Toxic
- Oxidising

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

## 4.4 Design details

### Design

- Valve design to API 600 and MSS SP-117
- Flexible wedge
- Bolted cover
- Outside screw
- Outside yoke
- Metal-seated
- Back seat
- Rising stem
- Non-rotating stem
- Non-rising handwheel
- Graphite gland packing
- Stainless steel/graphite gaskets
- Stem sealed by multi-walled bellows and back-up gland packing

### Variants

- Limit switches
- Locking device
- Position indicator
- Drain plug
- Free stem end and top flange to ISO 5210
- NACE standard
- Gearbox
- Electric actuators
- Pneumatic actuators
- Seal-welded body/bonnet joint (except Class 150)
- Leakage monitoring hole in the gland packing area
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Design in compliance with ISO 15848-1/2 fugitive emission requirements
- Customised design for special fluids, e.g. molten salt (ECOLINE GTB-HS)
- Other flanged end designs or butt weld ends to ASME B16.25

## 4.5 Function

- Design** The gate valve comprises the pressure-retaining parts (body 1, bonnet 8, bonnet extension 10 and yoke 23), the functional unit (stem 4, wedge 2 and bellows 9) and the actuating element.
- Function** The valve is operated by a manual actuating element (handwheel 20) or a mechanical actuating element (gearbox 28). Handwheel 20 is fitted on stem nut 18 by means of a square drive or hexagon drive and secured with dust-proof nut 21.
- Sealing** Bonnet 8 is bolted to body 1 with studs 5 and nuts 7; the joint is sealed to atmosphere by gasket 6. Bonnet 8 is welded with bonnet extension 10, which is sealed with yoke 23 by means of studs 26 and nuts 25. The joint is sealed to atmosphere by gasket 11.
- The passage of stem 4 through bonnet 8 and bonnet extension 10 is sealed by bellows 9. Back-up gland packing 13 is tightened at gland follower 16 by means of eyebolt 15 and nuts 17. The stem seal with bellows 9 is maintenance-free. Bellows 9 is welded to bellows end fitting 12.
- The seating surfaces of seat ring 3 and wedge 2 are made of rust-proof material.

### 4.6 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

Responsibility for positioning and installing the valve lies with the consultant, the engineering contractor or the operator. Planning errors and installation errors can prevent the reliable function of the valves and pose a substantial safety hazard.

	<div data-bbox="507 414 683 459"><b>! DANGER</b></div> <p><b>Dead-end valve</b> High-pressure hazard! Risk of burns!</p> <ul style="list-style-type: none"> <li>▸ Protect the valve against unauthorised and/or unintentional opening.</li> </ul>
	<div data-bbox="507 651 703 696"><b>! WARNING</b></div> <p><b>Exposed rotating parts</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▸ Do not touch rotating parts.</li> <li>▸ When the equipment is in operation, perform any work with utmost caution.</li> <li>▸ Take suitable precautions, e.g. provide safety covers.</li> </ul>
	<div data-bbox="507 943 639 987"><b>CAUTION</b></div> <p><b>Improper installation</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▸ Protect the body and body bonnet/cover from any impacts.</li> </ul>

### 5.2 Installation position


Always install the bellows-type gate valve vertically in a horizontal pipe. Installation with the stem in an upward inclined, horizontal or downward inclined position (as in, e.g. a vertical pipe) is not permitted.

Make sure that the non-rising handwheel can be operated and that there is sufficient clearance available for the rising stem.

The position and flow direction must be in accordance with the manufacturer's data.

The valve must not be fitted downstream of tees and level or three-dimensional double bends.


### 5.3 Preparing the valve

	<div data-bbox="507 1579 639 1624"><b>CAUTION</b></div> <p><b>Outdoor installation</b> Damage due to corrosion!</p> <ul style="list-style-type: none"> <li>▸ Provide weather-proof protection to protect the valve against moisture.</li> </ul>
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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.



## 5.4 Piping

	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Painting of the piping</b> Valve function impaired! Loss of important information provided on the valve!</p> <ul style="list-style-type: none"> <li>▷ Protect stem and plastic components prior to applying paint.</li> <li>▷ Protect printed name plates prior to applying paint.</li> </ul>
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- Lay the piping in such a way that detrimental thrust forces and bending forces are kept away from the valve body.
- For any further work (e.g. construction work, cleaning measures) protect the piping against contamination (e.g. by covering it with a tarpaulin).

### 5.4.1 Flange connection

**Fasteners** Only use fasteners and sealing elements of approved materials. Always use all flange bolt holes provided when connecting the valve to the pipe.


- Flange connection**
- ✓ The mating flange faces are clean and undamaged.
  - ✓ Verify that the pipe is correctly aligned and the flanges are parallel.
    1. Properly insert the sealing elements at the valve flanges.
    2. Align the valve between the pipe flanges.
    3. Use an appropriate tool to evenly tighten the fasteners crosswise.



## 5.5 Valve with actuator

	<div style="background-color: #FFA500; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Impermissible loads resulting from operating conditions, add-on parts and valve-mounted components, e.g. actuators</b> Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> <li>▷ Lay the piping in such a way that detrimental thrust forces and bending forces are kept away from the valve body.</li> <li>▷ Additional loads, e.g. traffic, wind or earthquakes are not taken into account for standard variants; these require a separate design.</li> <li>▷ Support the valve including add-on parts and valve-mounted components.</li> </ul>
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Install valves with gearboxes or actuators with the stem axis in a vertical position. If this requirement cannot be met, adequately support the actuator on site or consult KSB.

### Electric actuators

	<div style="background-color: #FF4500; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Unqualified personnel performing work on valves with actuator</b> Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Ensure that the connection to the power supply and the process control system is performed by a trained electrician.</li> <li>▷ Observe regulations IEC 60364 and, for explosion-proof models, EN 60079.</li> </ul>
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	<div data-bbox="507 190 702 235"><b>⚠ WARNING</b></div> <div data-bbox="496 253 1374 360"> <p><b>Incorrect connection to the mains</b>  Damage to the power supply network, short circuit!</p> <ul style="list-style-type: none"> <li>▷ Observe the technical specifications of the local energy supply companies.</li> </ul> </div>
	<div data-bbox="507 398 638 436"><b>CAUTION</b></div> <div data-bbox="496 459 1043 604"> <p><b>Change of limit switch points</b>  Impairment of the functional reliability!  Damage to the actuator!</p> <ul style="list-style-type: none"> <li>▷ Never change the pre-set limit switch points.</li> </ul> </div>


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

	<div data-bbox="507 902 683 947"><b>⚠ DANGER</b></div> <div data-bbox="496 965 1442 1142"> <p><b>Work on valves with energy storage, e.g. spring mechanisms or compressed air storage</b>  Danger to life resulting from incorrect assembly</p> <ul style="list-style-type: none"> <li>▷ Ensure that work on the actuator is performed by qualified specialist personnel.</li> <li>▷ Observe the actuator's operating manual.</li> </ul> </div>
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#### 5.6 Insulation

	<div data-bbox="507 1254 702 1299"><b>⚠ WARNING</b></div> <div data-bbox="496 1317 828 1467"> <p><b>Cold/hot piping and/or valve</b>  Risk of thermal injury!</p> <ul style="list-style-type: none"> <li>▷ Insulate the valve.</li> <li>▷ Fit warning signs.</li> </ul> </div>
	<div data-bbox="507 1503 638 1541"><b>CAUTION</b></div> <div data-bbox="496 1563 1355 1673"> <p><b>Outdoor installation</b>  Damage due to corrosion!</p> <ul style="list-style-type: none"> <li>▷ Provide weather-proof protection to protect the valve against moisture.</li> </ul> </div>




For any insulation fitted on the valve observe the following:

- The valve's function must not be impaired.
- The sealing areas at the bonnet/cover joint and at the stem passage (gland packing) must be directly accessible and visible.

## 6 Commissioning/Start-up/Shutdown

### 6.1 Commissioning/Start-up




#### 6.1.1 Prerequisites for commissioning/start-up

	<div style="background-color: #f4a460; padding: 5px;"><b>! DANGER</b></div> <p><b>Surge pressure/water hammer potentially occurring at high temperatures</b>            Danger to life caused by burns or scalds!</p> <ul style="list-style-type: none"> <li>▷ Do not exceed the valve's maximum permissible pressure.</li> <li>▷ Use valves made of nodular cast iron or steel.</li> <li>▷ The operator shall provide general safety measures for the system.</li> </ul>
	<div style="background-color: #f4d03f; padding: 5px;"><b>CAUTION</b></div> <p><b>Overloading of valve</b>            Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ The nominal pressure classes only apply at room temperature. Refer to the pressure/temperature ratings tables for higher temperature values. . Using the valve in conditions deviating from those specified will lead to overload which the valve cannot withstand.</li> </ul>
	<div style="background-color: #f4d03f; padding: 5px;"><b>CAUTION</b></div> <p><b>Aggressive flushing liquids and pickling agents</b>            Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Ensure that cleaning procedure and duration match the valve body materials and seal materials when performing flushing and pickling.</li> <li>▷ Responsibility for the compatibility of the pickling media used and the pickling procedure itself lies with the pickling company.</li> </ul>

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 13 has been checked for leakage before it is subjected to load conditions for the first time. If gland follower 16 has loosened, evenly re-tighten nuts 17 crosswise.
- Studs 5 and 26 as well as gaskets 6 and 11 have to be checked for any leakage after the first rise in temperature. If any leakage has occurred, evenly re-tighten the studs crosswise. Prior to re-tightening studs 5 and 26, slightly open the valve to prevent jamming of the seat.
- 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 20)
- The material's chemical resistance and stability under load have been checked.

### 6.1.2 Valve actuation

	<b>NOTE</b>  Viewed from above, the valve is closed by turning the handwheel in clockwise direction, and opened by turning the handwheel in counter-clockwise direction. Direction symbols are marked on the top of the handwheel.
	<b>CAUTION</b>  <b>Excessively long idle periods</b> Damage to the valve! <ul style="list-style-type: none"> <li>▸ Check the function by opening and closing the valve at least once or twice a year.</li> </ul>
	<b>CAUTION</b>  <b>Use of levers</b> Damage to the valve as a result of excessive forces! <ul style="list-style-type: none"> <li>▸ Only actuate handwheel-operated valves by hand.</li> <li>▸ Levers may only be used in exceptional cases and in compliance with the following tables.</li> <li>▸ Do not use levers in the area of the position indicator.</li> </ul>

## 6.2 Operating limits

### 6.2.1 Pressure/temperature ratings

**Table 5:** Permissible operating pressures [bar] (to ASME B16.34 Standard Class)

Class	Material	[°C]									
		0 to +38	93	149	204	260	316	343	371	399	427
150	A216 WCB	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5
300		51,0	46,9	45,2	43,8	41,7	39,3	37,9	36,5	34,8	28,3
600		102,0	93,8	90,3	87,2	83,1	78,3	75,8	73,1	70,0	56,9
150	A351 CF8	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9
600		99,6	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8
150	A351 CF8M	19,6	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3

**Table 6:** Test pressure

	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125	153	2225
Leak test (seat) <sup>3)</sup>		23	315	56	815	112	1630
Leak test (seat)	Air	5,5	80	5,5	80	5,5	80

<sup>3)</sup> Optional seat leak test with water upon customer request


## 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.

## 6.4 Returning to service


	CAUTION
	<p><b>Residual salt crystals in the valve</b> Jamming or straining of check disc!</p> <ul style="list-style-type: none"> <li>▷ Thermally heat the valve before operation. The temperature must be higher than the melting point of the salt.</li> <li>▷ Ensure that the crystals have fully liquefied.</li> </ul>


For returning the equipment to service, observe the sections on commissioning/start-up (⇒ Section 6.1, Page 19) and the operating limits (⇒ Section 6.2, Page 20) .


In addition, carry out all servicing/maintenance operations before returning the valve to service. (⇒ Section 7, Page 22)

## 7 Servicing/Maintenance


### 7.1 Safety regulations

	<div style="background-color: #e67e22; color: white; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Valve under pressure</b> Risk of injury! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> <li>▷ Depressurise the valve and its surrounding system prior to any maintenance work and installation work.</li> <li>▷ If there is fluid leakage, depressurise the valve.</li> <li>▷ Allow the valve to cool down until the temperature of the fluid in all the valve's chambers is lower than the fluid's vaporisation temperature.</li> <li>▷ Never vent the valve by removing the bonnet bolting or gland packing.</li> <li>▷ Use original spare parts and appropriate tools, even in emergencies.</li> </ul>
---	--

	<div style="background-color: #e67e22; color: white; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Removing/dismantling actuators</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe the actuator's operating manual.</li> </ul>
---	---

	<div style="background-color: #f1c40f; color: white; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe all relevant laws.</li> <li>▷ When draining the fluid take appropriate measures to protect persons and the environment.</li> <li>▷ Decontaminate valves used in fluids posing a health hazard.</li> </ul>
---	--

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.

	<div style="background-color: #2980b9; color: white; padding: 5px;"><b>NOTE</b></div> <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>
---	--



	<div style="background-color: #2980b9; color: white; padding: 5px;"><b>NOTE</b></div> <p>All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. For contact details refer to the enclosed "Addresses" booklet or visit "<a href="http://www.ksb.com/contact">www.ksb.com/contact</a>" 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.

## 7.2 Dismantling the valve

### 7.2.1 General information/Safety regulations

	<p><b>! WARNING</b></p> <p><b>Hot surface</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Allow the valve to cool down to ambient temperature.</li> </ul>
	<p><b>! WARNING</b></p> <p><b>Unqualified personnel performing work on the valve</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.</li> </ul>

Always observe the safety instructions and information. (⇒ Section 7, Page 22)

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

### 7.2.2 Preparing the valve


1. Move the valve to the open position.
2. For valves with actuators, interrupt energy supply and make sure it cannot be switched on again unintentionally.
3. Depressurise and drain the valve.

### 7.2.3 Removing the valve from the piping

- ✓ The notes and steps stated in (⇒ Section 7.2.1, Page 23) to (⇒ Section 7.2.2, Page 23) have been observed or carried out.
1. Attach the valve to lifting equipment but do not lift it up.
  2. Undo the bolts connecting the flange to the piping.
  3. Remove the valve from the piping.
  4. Safely store the valve.


## 7.3 Assembling the valve

### 7.3.1 General information/Safety regulations

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

- Gland packing** Always use new sealing elements and gland packings when-reinstalling the valve.
- Tightening torques** Use an appropriate tool to tighten the fasteners crosswise.

### 7.3.2 General information/Safety regulations

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


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

### 7.3.3 Leak testing

After assembling the valve, carry out shell and leak testing according to DIN 3230, Part 3I or API 598 and ASME B16.34, Section 8.



## 8 Trouble-shooting

	<b>⚠ WARNING</b>
	<b>Improper remedial work on the valve</b> Risk of injury! <p>► For any work performed in order to remedy faults on the valve observe the relevant information given in this operating manual and/or the product literature provided by the accessories manufacturers.</p>

If problems occur that are not described in the following table, consultation with the KSB service is required.

**Table 7:** Trouble-shooting

Problem	Possible cause	Remedy
Leakage at the seat/disc interface	<ul style="list-style-type: none"> <li>Contaminated fluid or solids in the fluid</li> <li>Erosion, corrosion or abrasion</li> <li>Excessive loads from piping forces or thermal stresses</li> </ul>	<ol style="list-style-type: none"> <li>1. Dismantle the valve.</li> <li>2. Rework the seating faces of the wedge and body using a suitable re-seating tool.</li> <li>3. Continue re-seating until the seating faces exhibit a consistently smooth and even ring.</li> </ol>
Leakage at the gland packing	Unevenly tightened gland packing	1. Evenly tighten the nuts crosswise.
	Defective gland packing	<ol style="list-style-type: none"> <li>1. Undo the nuts.</li> <li>2. Lift the gland follower and the lower gland section.</li> <li>3. Clean the gland packing chamber.</li> <li>4. Insert new packing rings in such a manner that the cut ends of the rings are offset by between 120° and 180°.</li> </ol>
	Defective bellows	1. Replace the bellows assembly.
	Defective weld between stem and bellows	1. Replace the bellows assembly.
Leakage at jointing between bonnet/bonnet extension and yoke	Unevenly tightened bonnet/cover bolts	1. Tighten the bonnet/cover bolting.
	Defective bonnet/cover gasket	<ol style="list-style-type: none"> <li>1. Remove the bonnet and bonnet extension.</li> <li>2. Clean the sealing surfaces.</li> <li>3. Replace the joint ring.</li> <li>4. Fit the bonnet and bonnet extension.</li> </ol>
Valve sluggish	Gland follower is installed at an angle.	1. Align the gland follower and the lower gland section.
	Stem is warped.	1. Align the stem.
	Thread of the stem nut is damaged.	1. Replace the stem nut.
	Thread of the stem is damaged or dirty.	1. Clean the stem and repair it if necessary.

## 9 Related Documents

### 9.1 General assembly drawing with list of components

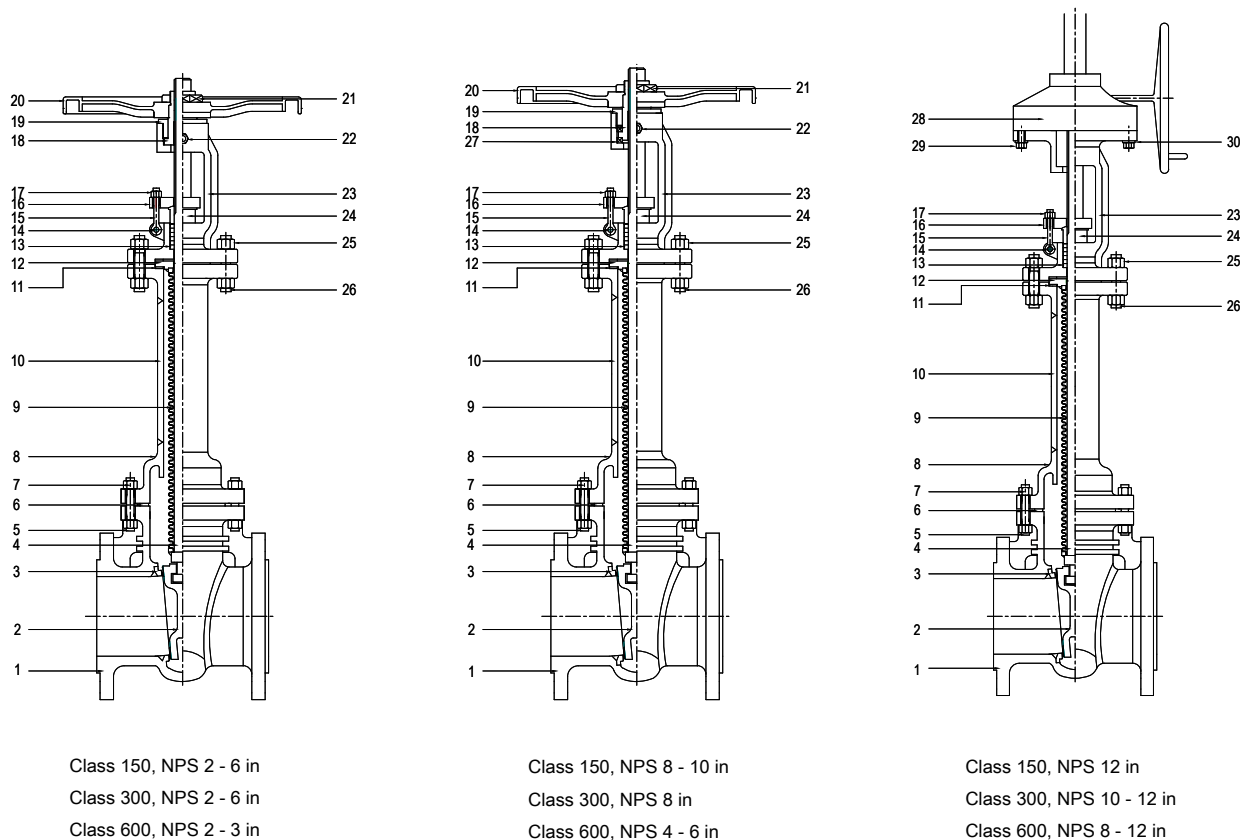


Fig. 2: ECOLINE GTB 150-600

Table 8: Parts list

Part No.	Description	Material <sup>4)</sup>		
		A216 WCB - Trim 8	A351 CF8/304 + HF	A351 CF8M - Trim 12
1	Body	A216 WCB	A351 CF8 + STL6	A351 CF8M + STL6
2	Wedge	A216 WCB + 13 % Cr	A351 CF8	A351 CF8M
3	Seat ring	A105 + STL6	Integrated in the body	
4 <sup>5)</sup>	Stem <sup>6)</sup>	A479 410	A182 F304	A182 F316
5	Stud	A193 B7	A193 B8	A193 B8M
6 <sup>5)</sup>	Gasket	304 + graphite	304 + graphite	316 + graphite
7	Nut	A194 2H	A194 8	A194 8M
8	Bonnet	A216 WCB	A351 CF8	A351 CF8M
9 <sup>5)</sup>	Bellows <sup>6)</sup>	SS304	SS304	SS316L
10	Bonnet extension	A216 WCB	A351 CF8	A351 CF8M
11 <sup>5)</sup>	Gasket	304 + graphite	304 + graphite	316 + graphite
12 <sup>5)</sup>	End fitting <sup>6)</sup>	A276 304	A276 316	A276 316
13 <sup>5)</sup>	Gland packing	Graphite	Graphite	Graphite

<sup>4</sup> Other materials on request.

<sup>5</sup> Recommended spare parts

<sup>6</sup> The bellows and its end fitting are welded to the stem.

Part No.	Description	Material <sup>4)</sup>		
		A216 WCB - Trim 8	A351 CF8/304 + HF	A351 CF8M - Trim 12
14	Pin	SS304	SS304	SS304
15	Eyebolt	A193 B7	A193 B8	A193 B8M
16	Gland follower	A216 WCB	A351 CF8	A351 CF8
17	Nut	A194 2H	A194 8	A194 8M
18	Stem nut	A439 D-2	A439 D-2	A439 D-2
19	Retaining ring	Carbon steel	SS304	SS304
20	Handwheel	QT400-18	QT400-18	QT400-18
21	Nut	Carbon steel	Carbon steel	Carbon steel
22	Lubricating nipple	Brass	Brass	Brass
23	Yoke	A216 WCB	A351 CF8	A351 CF8M
24	Lower gland section	A479 410	A276 304	A 276 316
25	Nut	A194 2H	A194 8	A194 8M
26	Stud	A193 B7	A193 B8	A193 B8M
27	Bearing	-	-	-
28	Gearbox	-	-	-
29	Bolt/screw	Carbon steel	Stainless steel	Stainless steel
30	Washer	Carbon steel	Stainless steel	Stainless steel

## 9.2 Dimensions and weights

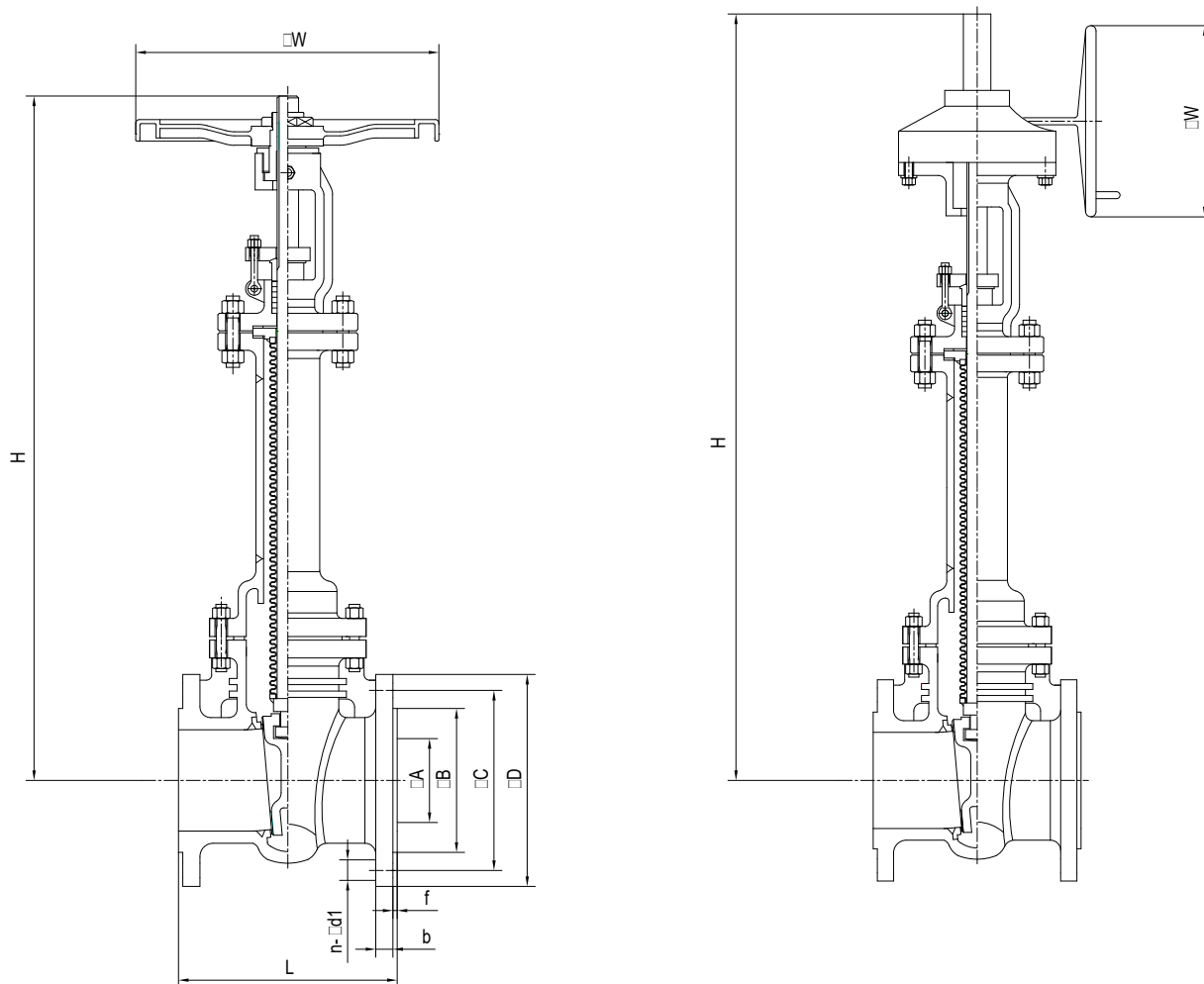


Fig. 3: Sectional drawings of ECOLINE GTB 150-600

Table 9: Dimensions [mm] and weights [kg]

Class	NPS	L	øA	øB	øC	øD	b	f	n-ød1	H <sup>7)</sup>	H <sup>8)</sup>	ØW	[kg]
	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
150	2	178	51	92,1	120,7	150	14,3	2	4-ø19	580	640	250	34
	2 1/2	190	64	104,8	139,7	180	15,9	2	4-ø19	620	695	250	44
	3	203	76	127,0	152,4	190	17,5	2	4-ø19	750	840	300	56
	4	229	102	157,2	190,5	230	22,3	2	8-ø19	870	980	350	85
	5	254	127	185,7	215,9	255	22,3	2	8-ø22	1000	1140	400	117
	6	267	152	215,9	241,3	280	23,9	2	8-ø22	1120	1285	400	154
	8	292	203	269,9	298,5	345	27,0	2	8-ø22	1420	1640	450	223
	10	330	254	323,8	362,0	405	28,6	2	12-ø25	1660	1920	500	323
	12	356	305	381,0	431,8	485	30,2	2	12-ø25	2370	2370	460	583
300	2	216	51	92,1	127,0	165	20,7	2	8-ø19	580	640	250	48
	2 1/2	241	64	104,8	149,2	190	23,9	2	8-ø22	620	695	250	67
	3	282	76	127,0	168,3	210	27,0	2	8-ø22	750	840	300	85
	4	305	102	157,2	200,0	255	30,2	2	8-ø22	870	980	350	126
	5	381	127	185,7	235,0	280	33,4	2	8-ø22	1000	1140	400	181

<sup>7)</sup> Closed

<sup>8)</sup> Open

Class	NPS	L	øA	øB	øC	øD	b	f	n-ød1	H <sup>7)</sup>	H <sup>8)</sup>	ØW	[kg]
	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
300	6	403	152	215,9	269,9	320	35,0	2	12-ø22	1120	1285	400	231
	8	419	203	269,9	330,2	380	39,7	2	12-ø25	1420	1640	450	342
	10	457	254	323,8	387,4	445	46,1	2	16-ø29	2170	2170	460	524
	12	502	305	381,0	450,8	520	49,3	2	16-ø32	2450	2450	460	673
600	2	292	51	92,1	127,0	165	25,4	7	8-ø19	620	680	300	62
	2 1/2	330	64	104,8	149,2	190	28,6	7	8-ø22	680	755	350	88
	3	356	76	127,0	168,3	210	31,8	7	8-ø22	790	875	400	112
	4	432	102	157,2	215,9	275	38,1	7	8-ø25	960	1070	400	186
	5	508	127	185,7	266,7	330	44,5	7	8-ø29	1100	1250	450	271
	6	559	152	215,9	292,1	355	47,7	7	12-ø29	1220	1385	500	352
	8	660	203	269,9	349,2	420	55,6	7	12-ø32	1990	1990	550	601
	10	787	254	323,8	431,8	510	63,5	7	16-ø35	2320	2320	550	846
	12	838	305	381,0	489,0	560	66,7	7	20-ø35	2790	2790	550	1110

#### Mating dimensions as per standard

Face-to-face lengths: ASME B16.10

Flanges: ASME B16.5

**10 EU Declaration of Conformity for ECOLINE GTB 150-600**

Hereby we,

KSB Valves (Changzhou) Co., Ltd.  
Registered Office: No. 68 Huanbao Four Road,  
Xinbei District, Changzhou City,  
213022 Jiangsu Province  
P. R. China

declare that the product:

**Gate valve**

ECOLINE GTB 150-600

Class 150 - 600

NPS 2 - 12

satisfies the safety requirements laid down in the European Pressure Equipment Directive 2014/68/EU.

**Applicable standards:**

Gate valve: API 600

Testing of valves: API 598

Material: ASTM

**Suitable for:**

Fluids in Groups 1 and 2

**Conformity assessment procedure:**

Module H

**Name and address of the notified body responsible for approval and surveillance:**

TÜV SÜD Industrie Service GmbH  
Westendstraße 199  
80686 München (Germany)

**Identification number of the notified body:**

0036

Valves of nominal size  $\leq 1$  inch fall under Article 4, Section 3, of the Pressure Equipment Directive 2014/68/EU. They must bear neither the CE marking nor the identification number of a notified body.

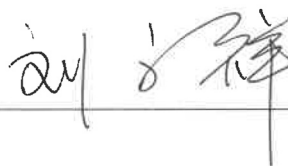
The EU Declaration of Conformity was issued in/on:

Changzhou, 4 April 2022



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Vincent Jia  
Head of Quality Management



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Allan Liu  
Head of unit having technical product responsibility

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