

ECOLINE GLF/GTF/PTF/SCF/FYF
ECOLINE GLB/GTB
ECOLINE GLV/GTV/SCV
ECOLINE GLC/GTC/SCC/FYC

Operating Manual



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Operating Manual

Original operating manual

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Glossary

PED

The 97/23/EC or 2014/68/EU directive, also known as the Pressure Equipment Directive, sets out the requirements to be met by pressure equipment intended to be placed on the market in the European economic area.

Technical literature

Refer to the product catalogue for the technical literature on our products at www.ksb.com.

1 General

1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

In the event of damage, immediately contact the KSB sales organisation responsible in order 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	Description of the valve
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.



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 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 CAUTION	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 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.

2.2 General

This manual contains general installation, operating and maintenance instructions that must be observed to ensure safe valve operation and prevent personal injury and damage to property.

The safety information in all sections of this manual must be complied with.

The operating manual must be read and fully understood by the specialist personnel/operators responsible prior to installation and commissioning.

The contents of this operating manual must be available to the specialist personnel at the site at all times.

Instructions and information attached directly to the valve must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example: flow direction arrow, manufacturer, type designation, nominal pressure, nominal size, year of construction and material.

The operator is responsible for ensuring compliance with all local regulations not taken into account in this manual.

The design, manufacture and the testing of the valves are subject to a QM system to DIN EN ISO 9001 as well as the European Pressure Equipment Directive 97/23/EC. Compliance with these requirements, however, is based on normal, predominantly static loading.

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. Please refer to the relevant sales literature for this information.

This operating manual does not take into account:

- Any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.
- Local regulations; the operator must ensure that such regulations are strictly observed by all, including the personnel called in for installation.

2.3 Intended use

- Only operate valves which are in perfect technical condition.
- Do not operate partially assembled valves.
- The valve must only be used for fluids specified in the product literature.
- Only operate the valve within the permissible operating range specified for pressure and temperature.
- 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.

2.3.1 Prevention of foreseeable misuse

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

2.4 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.

Hands-on training at the valve must always be supervised by specialist technical personnel.

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

- Non-compliance with this operating manual 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

2.6 Safety awareness

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

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

2.7 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.

- The operator shall fit contact guards for hot, cold and moving parts and check that the guards function properly.
- Do not remove any contact guards during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain leakages (e.g. at the stem seal) 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.)

2.8 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 authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation is 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.
- As soon as the work has been completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.

2.9 Unauthorised modes of operation

Never operate the valve outside the limits stated in the data sheet and in this operating manual.

The warranty relating to the operating reliability and safety of the valve supplied is only valid if the valve is used in accordance with its intended use.

(⇒ Section 2.3, Page 8)

Shut-off valves are not suitable for regulating volume flow.

Gate valves are used in such a way that they are either fully open or fully closed. An intermediate position (throttling function) is not permitted.

3 Transport/Temporary 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 (as applicable) and the insurer about the damage in writing immediately.

3.2 Transport

Always close the valve manually before transporting it. The valve is delivered ready for operation and its line connection ports may still be closed with caps, if applicable. Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

	 DANGER The valve could slip out of the suspension arrangement Danger to life from falling parts! ▷ Only transport the valve in the specified position. ▷ Never suspend the valve from its handwheel. ▷ Pay attention to the weight data and the centre of gravity. ▷ Observe the applicable local accident prevention regulations. ▷ Use suitable, permitted lifting accessories. ▷ Transport devices (if any) on the actuator may not be suitable for being attached to a suspension arrangement in order to transport the valve/actuator assembly. Refer to the actuator operating manual for the permissible loads.
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To transport the valve, suspend it from the lifting tackle as illustrated.

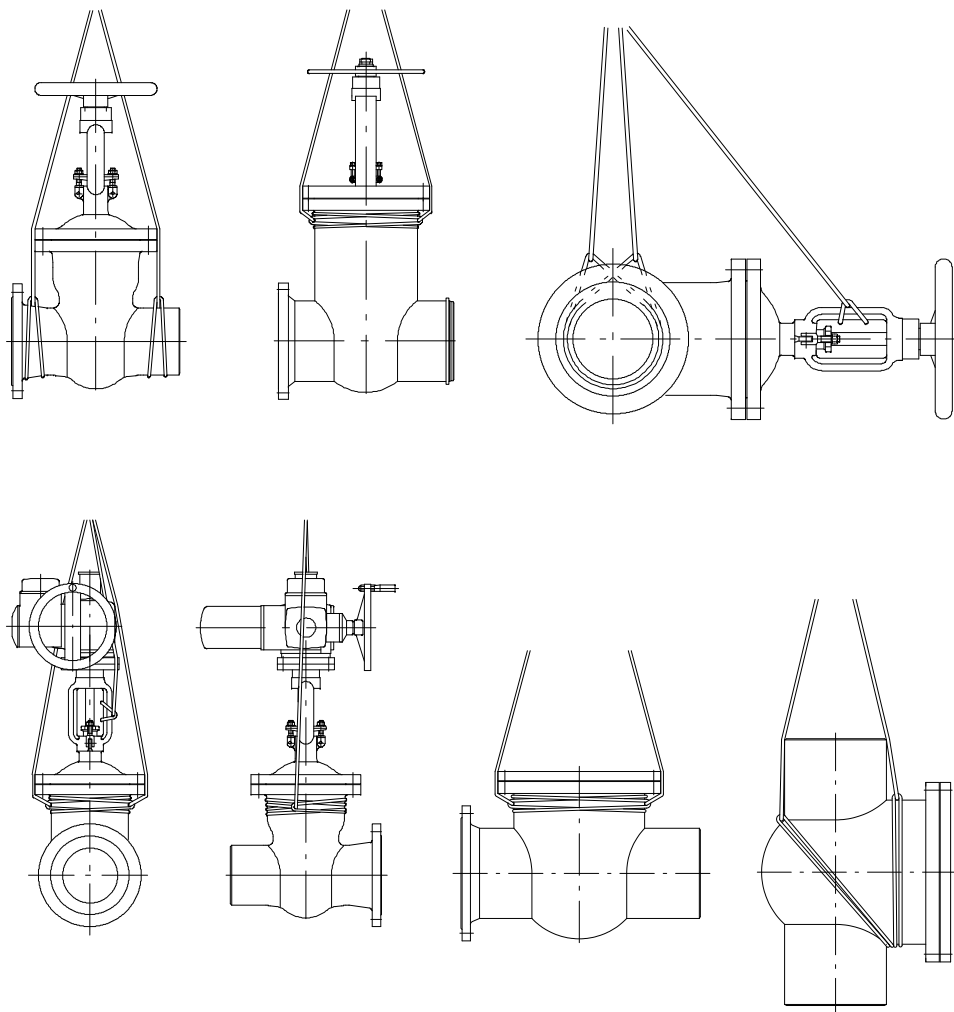


Fig. 1: Transporting the valve

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
	Incorrect storage Damage to the valve due to dirt, corrosion, moisture and/or frost! ▷ Store the valve in a dust- and vibration-free, frost-proof room where the atmospheric humidity is as constant as possible (use suitable caps or film for protection). ▷ Close the valve using little force and store in the closed position. ▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals.

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

	NOTE
	For actuated valves, also observe the actuator's operating manual.

3.4 Return to supplier

1. Drain the valve as described in the manual.
2. Always flush and clean the valve, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the fluids handled by the system leave residues which might lead to corrosion damage when coming into contact with atmospheric humidity, or which might ignite when coming into contact with oxygen, the valve must also be neutralised and blown through with anhydrous inert gas for drying purposes.
4. When returning valves used for handling Fluids in Group 1 always complete and enclose a certificate of decontamination.
Always indicate any safety and decontamination measures taken.

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

3.5 Disposal

	 WARNING
Fluids, consumables and supplies which are hot and/or pose a health hazard Hazard to persons and the environment!	
▷ 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 current regulations or in another controlled manner.

4 Valve Description

4.1 General description

The sectional drawings below provide examples of the general design/configuration of the valve. For additional and more detailed information, refer to the respective type series booklet.

4.2 Marking

Table 4: General marking

Parameter	Value/Marking
Nominal size	NPS (inch) ...
Nominal pressure class	Class ...
Manufacturer	KSB
Type series/Model	ECOLINE...
Year of construction	20..
Material	
Flow direction arrow	→
Traceability of the material	
CE markingPED	
Identification number of the notified body	0036
Customer's marking	e.g. plant/system No., etc.

The CE marking on the valve indicates that it is in conformity with the European Pressure Equipment Directive 97/23/EC.

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										

Fluid groups Group 1 comprises fluids defined as

- Explosive
- Extremely flammable
- Highly flammable
- Flammable: The maximum allowable temperature is above flashpoint
- Very toxic
- Toxic
- Oxidising

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

4.3 Globe Valves to ANSI/ASME with Gland Packing

4.3.1 ECOLINE GLC 150-600



4.3.1.1 Operating data

Table 5: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS 2" - 12"
Max. permissible pressure	106 bar / 1500 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.3.1.4, Page 16)

4.3.1.2 Fluids handled

- Steam
- Fluids containing gas
- Fluids containing mineral oils
- Gas
- High-temperature hot water
- Feed water
- Oil

4.3.1.3 Design details

Design

- Globe valve to BS 1873
- Tested to API 598
- Body made of cast steel or stainless steel
- Bolted bonnet
- Outside screw
- Rotating stem
- Non-rotating stem (8" and 10" Class 300/600)
- Rising stem
- Stem with burnished shank
- Solid flat disc (plug-type valve disc for 8" and 10" Class 600)
- Stem sealed by gland packing
- Two-piece self-aligning gland follower
- Stem nut made of nickel steel
- Valve seat made of wear-resistant and corrosion-proof materials
- Back seat
- Hardened back seat bush
- Die-moulded graphite gland packing, packing end rings made of braided graphite
- Stainless steel/graphite gaskets
- Outside yoke
- Yoke head suitable for mounting electric and pneumatic actuators (DIN ISO 5210)
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Position indicator
- Limit switch(es)
- Locking device
- Throttling plug
- Hard-faced back seat
- Drain plug
- Bypass
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Version with free stem end and top flange to ISO 5210
- Gearboxes
- Electric actuators
- Non-destructive testing, e.g. radiographic testing
- Inspections to technical codes such as AD2000 or IBR
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Larger nominal sizes and other variants on request

4.3.1.4 Pressure/temperature ratings

Table 6: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816	
150	A 216 WCB ^a	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	-	-	-	-	-	-	-	-	-	-	
300		51,0	46,9	45,2	43,8	41,7	39,3	37,9	36,5	34,8	28,3	22,1	15,9	9,3	5,9	-	-	-	-	-	-	-	-	-	-	
600		102,0	93,8	90,3	87,2	83,1	78,3	75,8	73,1	70,0	56,9	44,1	31,7	19,0	11,7	-	-	-	-	-	-	-	-	-	-	-
150	A 217 WC6 ^b	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	-	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-	
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-	-
150	A 217 WC9	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	-	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-	
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-	-
150	A 217 C5	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	1,4 ^b	1,0 ^a	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	25,9	19,0	13,8	10,0	6,9	4,1	2,4	-	-	-	-	-	-	
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	51,4	37,9	27,6	20,0	13,8	8,6	4,8	-	-	-	-	-	-	-
150	A 217 C12	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	25,9	17,6	11,7	7,9	5,2	3,4	-	-	-	-	-	-	
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	34,8	23,8	15,5	10,3	7,2	-	-	-	-	-	-	-
150	A 352 LCB ^a	18,3	17,6	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		47,9	45,5	44,1	42,4	40,3	37,9	36,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		96,2	91,0	87,9	84,8	81,0	76,2	73,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352 LCC	20,0	17,9	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	96,6	91,7	83,4	81,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ^a	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,0 ^a	
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8	
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9	
150	A 351 CF8M ^a	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,4 ^b	1,0 ^a	
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8	
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9	

Table 7: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
150	A 216 WCB ^{a)}	285	260	230	200	170	140	125	110	95	80	65	50	35	20	-	-	-	-	-	-	-	-	-	-	
300		740	680	655	635	605	570	550	530	505	410	320	230	135	85	-	-	-	-	-	-	-	-	-	-	
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640	460	275	170	-	-	-	-	-	-	-	-	-	-	-
150	A 217 WC6 ^{a)}	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	-	-	-	-	-	-	-	-	
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	-	
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-	-
150	A 217 WC9	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	-	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-	-
150	A 217 C5	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	20 ^{b)}	15 ^{d)}	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	375	275	200	145	100	60	35	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	745	550	400	290	200	125	70	-	-	-	-	-	-	-
150	A 217 C12	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	375	255	170	115	75	50	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	505	345	225	150	105	-	-	-	-	-	-	-
150	A 352 LCB ^{b)}	265	255	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
300		695	660	640	615	585	550	535	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1395	1320	1275	1230	1175	1105	1065	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352 LCC	290	260	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
300		750	750	730	705	665	605	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1500	1500	1455	1405	1330	1210	1175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ^{a)}	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	15 ^{d)}	
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40	
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85	85
150	A 351 CF8M ^{a)}	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	20 ^{b)}	15 ^{d)}	
300		720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40	

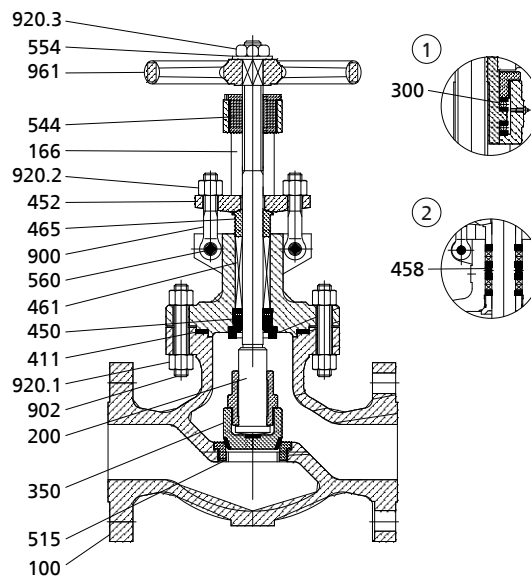
- 4) Permissible but not recommended for prolonged use above 427 °C (800 °F).
- 5) Cannot be used for temperatures above 593 °C (1100 °F).
- 6) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).
- 7) Cannot be used for temperatures above 343 °C (650 °F).
- 8) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
600	A 351 CF8M [®]	1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85

Table 8: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125	153	2225
Leak test (back seat)		23	315	56	815	112	1630
Leak test (seat)		23	315	56	815	112	1630

4.3.1.5 Materials



① Bearing (8"-12" Class 300, 6"-12" Class 600)

② Lantern ring (optional)

Table 9: Parts list

Part No.	Description	Material								
		A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A 352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
100	Body	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
166	Yoke	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
350	Lower valve disc section	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
515	Seat ring	A 105	A 182 F11	A 182 F22	A 182 F5	A 182 F9	A 182 LF2	A 350 LF2	A 182 F304	A 182 F316
200	Stem	See "Trim materials" table								
450	Back seat bush	See "Trim materials" table								
465	Lower gland section	13Cr	13Cr	13Cr	13Cr	13Cr	304	304	304	316
452	Gland follower	A 216 WCB	A 216 WCB	A 216 WCB	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8
544	Threaded bush	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C	A 439 D2C
902	Stud	A 193 B7	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
920.1	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
461	Gland packing	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite
411	Joint ring	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel
900	Eyebolt	A 307 B	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
920.2	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
560	Pin	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel

Part No.	Description	Material								
		A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A 352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
961	Handwheel	Nodular cast iron or malleable cast iron or cast steel								
920.3	Handwheel nut	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
554	Washer	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
300	Bearing	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
458	Lantern ring	13Cr	13Cr	13Cr	13Cr	13Cr	304	304	304	316

Table 10: Trim materials

Part No.	Description	Trim 1	Trim 2	Trim 5	Trim 8	Trim 10
		13% chrome steel (Cr) / 13% chrome steel (Cr)	304 / 304	Stellite / Stellite	Stellite / 13% chrome steel (Cr)	316 / 316
350	Lower valve disc section	13% chrome steel (Cr)	304 stainless steel	Stellite	13% chrome steel (Cr)	316 stainless steel
515	Seat ring	13% chrome steel (Cr)	304 stainless steel	Stellite	Stellite	316 stainless steel
200	Stem	13% chrome steel (Cr)	304 stainless steel	13% chrome steel (Cr)	13% chrome steel (Cr)	316 stainless steel
450	Back seat bush	13% chrome steel (Cr)	304 stainless steel	13% chrome steel (Cr)	13% chrome steel (Cr)	316 stainless steel

4.3.1.6 Function

The main components of the globe valves are the body (100), the yoke (166), the valve disc (350), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of eyebolts (900) and nuts (920.2). The yoke (166) is equipped with a back seat bush (450) which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The hard-faced seat ring (515) is welded into the body (100). The seating surface of the valve disc (350) is hard-faced.

Bonnet/cover seal The body (100) and the yoke (166) are connected by studs (902) and nuts (920.1). The joint is sealed by means of a joint ring (411).

4.3.2 ECOLINE GLF 150-600



4.3.2.1 Operating data

Table 11: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS ½" - 2"
Max. permissible pressure	104 bar / 1480 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.3.2.4, Page 20)

4.3.2.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Fluids containing mineral oils
- Oil
- Feed water

4.3.2.3 Design details

Design

- Globe valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted bonnet
- Outside screw
- Outside yoke
- Rotating stem
- Rising handwheel
- Stem sealed by gland packing
- Reduced bore
- Two-piece self-aligning gland follower
- Graphite gland packing
- Stem with burnished shank
- Fully confined bonnet gasket
- Back seat
- Solid valve disc
- Integral seat - ST6 (HF)
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Seal-welded body/bonnet joint
- Full bore
- Hard-faced back seat
- Extended bonnet
- Locking device
- Position indicator
- Electric actuators
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Butt weld ends
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Other trims

4.3.2.4 Pressure/temperature ratings

Table 12: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 105	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	A 182 F11 ⁹⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁰⁾	1,4 ¹⁰⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 182 F304 ¹⁰⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,0 ¹⁰⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 182 F22	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁰⁾	1,4 ¹⁰⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 182 F316 ¹⁰⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,4 ¹⁰⁾	1,0 ¹⁰⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9
150	A 182 F304L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	30,0	27,2	25,5	25,2	24,8	24,5	23,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	4,5	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	29,0	27,2	25,5	25,2	24,8	24,5	23,8	23,4	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	46,5	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 13: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

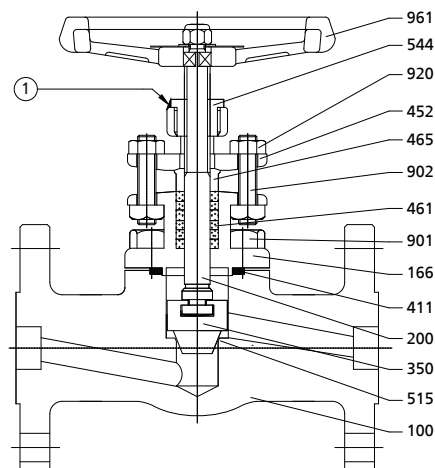
Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 105	285	260	230	200	170	140	125	110	95	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		740	680	655	635	605	570	550	530	505	410	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F11 ⁹⁾	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ¹⁰⁾	20 ¹⁰⁾	-	-	-	-	-	-	-	-
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-
150	A 182 F304 ¹⁰⁾	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	15 ¹⁰⁾
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 182 F22	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ¹⁰⁾	20 ¹⁰⁾	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-
150	A 182 F316 ¹⁰⁾	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	20 ¹⁰⁾	15 ¹⁰⁾
300		720	620	560	515	480	450	440	435	425	420	410	385	365	360	305	235	185	145	115	95	75	60	40	
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85
150	A 182 F304L	230	195	175	160	150	140	125	110	110	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	230	195	175	160	150	140	125	110	110	80	65	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	340	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	675	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 14: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225
Leak test (back seat)		22,4	325	56,9	825	113,8	1650
Leak test (seat)		22,4	325	56,9	825	113,8	1650
Leak test (seat)	Air	5,5	80	5,5	80	5,5	80

- 9) Use normalised and tempered materials only.
10) Flanged end ratings terminate at 538 °C (1000 °F).
11) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.3.2.5 Materials



① Tack-welded

Table 15: Parts list

Part No.	Description	Material				
		A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10
100	Body	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
166	Yoke	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
200	Stem	A 182 F6a	A 182 F6a	A 182 F6a	A 182 F304	A 182 F316
350	Valve disc	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316
411	Joint ring	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite
452	Gland follower	A 105	A 105	A 105	A 182 F304	A 182 F316
465	Lower gland section	A 276 410	A 276 410	A 276 410	A 276 304	A 276 316
461	Gland packing	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite
515	Seat ring	STL6 (integral)	STL6 (integral)	STL6 (integral)	304 (integral)	316 (integral)
544	Threaded bush	A 276 410	A 276 410	A 276 410	A 276 410	A 276 410
901	Bolt	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M
902	Stud	A 193 B8	A 193 B16	A 193 B16	A 193 B8	A 193 B8
920	Nut	A 194 2H	A 194 8	A 194 8	A 194 8	A 194 8M
961	Handwheel	A 197	A 197	A 197	A 197	A 197

4.3.2.6 Function

The main components of the globe valves are the body (100), the yoke (166), the valve disc (351), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of studs (902) and nuts (920). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The valve disc (351) is connected to the stem (200) by a "T" joint.

Bonnet/cover seal The yoke (166) is bolted to the body (100). The joint is sealed by a joint ring (411).

4.3.3 ECOLINE GLF 800-2500



4.3.3.1 Operating data

Table 16: Operating properties

Characteristic	Value
Nominal pressure	Class 800 - 2500
Nominal size	NPS ½" - 2"
Max. permissible pressure	431 bar / 6250 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	+538 °C / +1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.3.3.4, Page 24)

4.3.3.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Fluids containing mineral oils
- Oil
- Feed water

4.3.3.3 Design details

Design

- Globe valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted bonnet (Class 800)
- Welded bonnet
- Outside screw
- Outside yoke
- Rotating stem
- Rising handwheel
- Stem sealed by gland packing
- Reduced bore
- Two-piece self-aligning gland follower
- Graphite gland packing
- Stem with burnished shank
- Fully confined bonnet gasket (Class 800)
- Back seat
- Solid valve disc
- Integral seat - ST6 (HF)
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Full bore
- Hard-faced back seat
- Extended bonnet
- Locking device
- Position indicator
- Electric actuators
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Butt weld ends
- NACE standard
- Other threaded ends or butt weld ends to ASME B16.25
- Other trims
- Other material variants

4.3.3.4 Pressure/temperature ratings

Table 17: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 105	136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		255,3	233,0	225,4	219,0	209,7	193,6	187,8	181,8	173,6	143,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		425,5	388,3	375,6	365,0	349,5	322,6	313,0	303,1	289,3	239,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11 ^(a)	137,9	137,9	132,7	127,4	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	58,6	39,8	26,4	17,7	-	-	-	-	-	-	-	-
1500		258,6	257,4	248,7	239,8	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	128,6	74,5	44,0	30,5	-	-	-	-	-	-	-	-
2500		430,9	429,0	414,5	399,6	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	214,4	124,1	73,4	50,9	-	-	-	-	-	-	-	-
800	A 182 F22	137,9	137,9	133,9	129,6	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	70,7	49,1	32,2	20,2	-	-	-	-	-	-	-	-
1500		258,6	257,4	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	92,2	52,6	34,4	-	-	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	153,7	87,7	57,4	-	-	-	-	-	-	-	-
800	A 182 F304 ^(a)	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5	72,9	71,5	70,2	65,3	59,8	47,2	37,7	30,3	24,5	20,8	17,1	13,8	10,7	7,7
1500		248,2	204,3	185,0	172,4	162,4	151,1	148,1	145,2	142,2	140,0	137,0	134,7	132,4	122,1	104,2	84,4	68,9	56,3	46,7	40,1	33,8	28,9	17,4	14,1
2500		413,7	340,4	308,4	287,3	270,7	251,9	246,9	241,9	237,0	233,3	228,4	224,5	220,7	203,6	173,7	140,7	114,9	93,8	77,9	66,9	56,3	48,1	29,2	23,8
800	A 182 F316 ^(a)	132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6	76,9	76,3	71,2	66,7	66,2	56,1	43,6	34,0	27,0	21,5	17,7	13,8	10,7	7,7
1500		248,2	211,0	192,5	178,3	166,9	154,4	151,6	149,4	147,2	145,7	144,2	143,4	140,9	125,5	119,7	99,5	79,1	63,3	51,6	41,9	34,9	29,3	17,4	14,1
2500		413,7	351,6	320,8	297,2	278,1	257,4	252,7	249,0	245,3	242,9	240,4	238,9	235,0	208,9	199,5	165,9	131,8	105,5	86,0	69,8	58,2	48,9	29,2	23,8
800	A 182 F304L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	62,2	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	117,1	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	195,1	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	125,5	119,7	97,5	73,0	49,6	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	208,9	199,5	162,5	121,7	82,7	-	-	-	-	-	-

Table 18: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
800	A 105	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3705	3395	3270	3170	3015	2840	2745	2665	2535	2055	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		6170	5655	5450	5280	5025	4730	4575	4425	4230	3430	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11 ^(a)	2000	2000	1925	1848	1773	1613	1568	1515	1418	1355	1298	1200	850	577	383	257	-	-	-	-	-	-	-	-
1500		3750	3750	3610	3465	3325	3025	2940	2840	2660	2540	2435	2245	1595	1080	720	480	-	-	-	-	-	-	-	-
2500		6250	6250	6015	5775	5540	5040	4905	4730	4430	4230	4060	3745	2655	1800	1200	800	-	-	-	-	-	-	-	-
800	A 182 F22	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1025	712	467	293	-	-	-	-	-	-	-	-
1500		3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1335	875	550	-	-	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	2230	1455	915	-	-	-	-	-	-	-	-
800	A 182 F304 ^(a)	1920	1600	1435	1325	1240	1178	1152	1125	1102	1080	1057	1037	1018	947	867	685	547	440	355	302	248	200	155	112
1500		3600	3000	2690	2485	2330	2210	2160	2110	2065	2030	1980	1945	1910	1770	1630	1285	1030	825	670	565	465	380	290	205
2500		6000	5000	4480	4140	3880	3680	3600	3520	3440	3380	3300	3240	3180	2950	2715	2145	1715	1370	1115	945	770	630	485	345
800	A 182 F316 ^(a)	1920	1653	1493	1368	1275	1203	1178	1160	1138	1125	1115	1107	1032	968	960	813	632	493	392	312	257	200	155	112
1500		3600	3095	2795	2570	2390	2255	2210	2170	2135	2110	2090	2075	1930	1820	1800	1525	1185	925	735	585	480	380	290	205
2500		6000	5160	4660	4280	3980	3760	3680	3620	3560	3520	3480	3460	3220	3030	3000	2545	1970	1545	1230	970	800	630	485	345
800	A 182 F304L	1600	1363	1217	1120	1048	992	973	960	942	920	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	1600	1363	1217	1120	1048	992	973	960	942	920	902	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	1690	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	2820	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1820	1800	1510	1115	720	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	3030	3000	2515	1855	1200	-	-	-	-	-	-

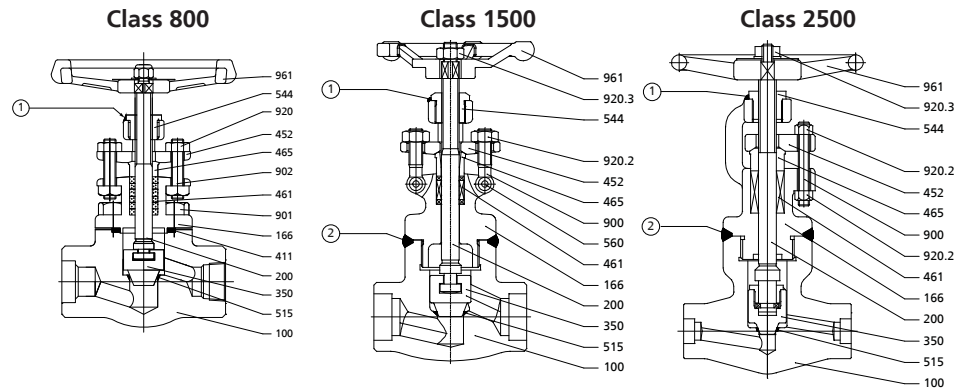
12) Use normalised and tempered materials only.

13) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

Table 19: Test pressures

Test	Test medium	Class 800		Class 1500		Class 2500	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	205,1	2975	396	5625	660	9375
Leak test (back seat)		149,8	2173	291	4125	484	6875
Leak test (seat)		149,8	2173	291	4125	484	6875
Optional leak test (seat)	Air	5,5	80	4 to 7	58 to 100	4 to 7	58 to 100

4.3.3.5 Materials



① Tack-welded

② Seal-welded

Table 20: Parts list

Part No.	Description	Class	Material					
			A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10	A 182 F91 Trim 5
100	Body		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
166	Yoke		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
200	Stem	800	A 182 F6a	A 182 F6a	A 182 F6a	A 182 F304	A 182 F316	
		1500/2500	A 479-410-2	A 479-410-2	A 479-410-2	A 182 F304	A 182 F316	A 479-XM19
350	Valve disc	800	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-304/ A 276-304+ST6	A 276-410/ A 276-410+ST6
411	Joint ring		304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite	
452	Gland follower	800	A 105	A 105	A 105	A 182 F304	A 182 F316	
		1500/2500	A 105	A 105	A 105	A 182 F304	A 182 F304	A 182 F22
465	Lower gland section	800	A 276-410	A 276-410	A 276-410	A 276-304	A 276-316	
		1500/2500	A 276-420	A 276-420	A 276-420	A 276-304	A 276-316	A 276-420
461	Gland packing		Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite
515	Seat ring	800	A 276-410 + ST6	A 276-410 + ST6	A 276-410 + ST6	A 276-304	A 276-316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-304/ A 276-304+ST6	A 276-410/ A 276-410+ST6
544	Threaded bush		A 276-410	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410
560	Pin	1500/2500	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410
900	Eyebolt	1500/2500	A 193 B8	A 193 B8	A 193 B8	A 193 B8	A 193 B8	A 193 B8
901	Bolt	800	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M	
902	Stud	800	A 193 B8	A 193 B16	A 193 B16	A 193 B8	A 193 B8	
920	Nut	800	A 194 2H	A 194 8	A 194 8	A 194 8	A 194 8M	
920.2	Nut	1500/2500	A 194 2H	A 194 2H	A 194 2H	A 194 8	A 194 8	A 194 4/7
920.3	Handwheel nut	1500/2500	A 194 2H	A 194 2H	A 194 2H	A 194 8	A 194 8	A 194 2H
961	Handwheel		A 197	A 197	A 197	A 197	A 197	A 197

4.3.3.6 Function

The main components of the globe valves are the body (100), the yoke (166), the valve disc (351), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of studs (902) and nuts (920). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The valve disc (351) is connected to the stem (200) by a "T" joint.

Bonnet/cover seal On Class 800 valves, the yoke (166) is bolted to the body (100). The joint is sealed by a joint ring (411). On Class 1500 and Class 2500 valves, the yoke (166) is screwed into the body (100) and the joint is seal-welded.

4.3.4 ECOLINE GLV 150-300



4.3.4.1 Operating data

Table 21: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 300
Nominal size	NPS 2" - 12"
Max. permissible pressure	50 bar / 720 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.3.4.4, Page 29)

4.3.4.2 Fluids handled

- Steam
- Gas
- Fluids containing gas
- High-temperature hot water
- Fluids containing mineral oils
- Oil
- Feed water

4.3.4.3 Design details

Design

- Globe valve to ASME B16.34
- Tested to API 598
- Compact design to API 603
- Valve made of corrosion-resistant materials
- Body made of stainless steel
- Bolted bonnet
- Outside screw
- Rotating stem
- Stem with burnished shank
- Stem nut made of nickel steel
- Rising handwheel
- Outside yoke
- Yoke head suitable for mounting electric and pneumatic actuators (DIN ISO 5210)
- Fully confined bonnet gasket
- Stem sealed by gland packing
- Two-piece self-aligning gland follower
- Die-moulded graphite gland packing, packing end rings made of braided graphite
- Stainless steel/graphite gaskets
- Back seat
- Integrated seat ring
- Minimum wall thickness as per ASME B16.34
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Hard-faced back seat
- Hard-faced sealing surface (single or double)
- PTFE packing
- PTFE gasket
- Drain plug
- Locking device
- Position indicator
- Limit switches
- Grease-free version
- Version with free stem end and top flange to ISO 5210
- Gearboxes
- Electric actuators
- Non-destructive testing, e.g. radiographic testing
- NACE standard
- Other flange designs
- Larger nominal sizes and other variants on request

4.3.4.4 Pressure/temperature ratings

Table 22: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 351 CF8 ¹⁴⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,0 ¹⁵⁾
300	A 351 CF8 ¹⁴⁾	49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
150	A 351 CF8M ¹⁴⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,4 ¹⁵⁾	1,0 ¹⁵⁾
300	A 351 CF8M ¹⁴⁾	49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8

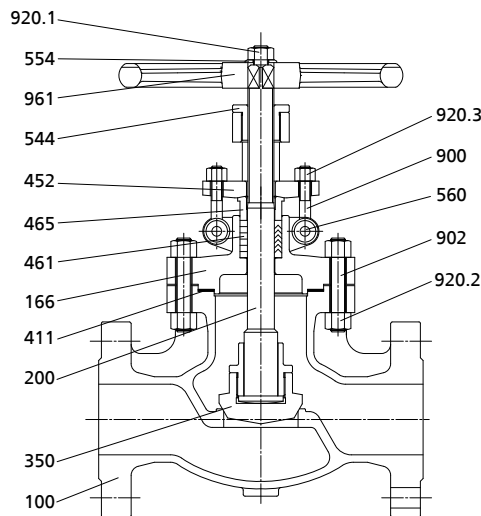
Table 23: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 351 CF8 ¹⁴⁾	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	15 ¹⁵⁾
300	A 351 CF8 ¹⁴⁾	720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
150	A 351 CF8M ¹⁴⁾	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	20 ¹⁵⁾	15 ¹⁵⁾
300	A 351 CF8M ¹⁴⁾	720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40

Table 24: Test pressures

Test	Test medium	Class 150		Class 300	
		[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125
Leak test (seat)		23	315	56	815
Leak test (back seat)		23	315	56	815
Leak test (seat)	Air	4 to 7	60 to 100	4 to 7	60 to 100

4.3.4.5 Materials


Table 25: Parts list

Part No.	Description	Material	
		A 351 CF8	A 351 CF8M
100	Body	A 351 CF8	A 351 CF8M
350	Valve disc	A 276 304	A 276 304
200	Stem	A 276 304	A 276 316
411	Joint ring	Stainless steel/graphite	Stainless steel/graphite
166	Yoke	A 351 CF8	A 351 CF8M
461	Gland packing	Graphite	Graphite
465	Lower gland section	A 276 304	A 276 316

14) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

15) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

Part No.	Description	Material	
		A 351 CF8	A 351 CF8M
452	Gland follower	A 351 CF8	A 351 CF8
544	Threaded bush	A 439 D2	A 439 D2
961	Handwheel	A 395 65 45 15	A 395 65 45 15
554	Washer	A 276 420	A 276 420
920.1	Handwheel nut	A 194 8	A 194 8
920.2	Nut	A 194 8	A 194 8
902	Stud	A 193 B8	A 193 B8
560	Pin	A 276 304	A 276 304
900	Eyebolt	A 193 B8	A 193 B8
920.3	Nut	A 194 8	A 194 8

Table 26: Trim materials

Part No.	Description	Trim 2	Trim 10
		304 / 304	316 / 316
100	Body	304 stainless steel	316 stainless steel
350	Valve disc	304 stainless steel	316 stainless steel
200	Stem	304 stainless steel	316 stainless steel

4.3.4.6 Function

The main components of the globe valves are the body (100), the yoke (166), the valve disc (350), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of eyebolts (900) and nuts (920.3). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The seat ring is an integral part of the body (100). The seating surface of the valve disc (350) is machined.

Bonnet/cover seal The body (100) and the yoke (166) are connected by studs (902) and nuts (920.2). The joint is sealed by means of a joint ring (411).

4.4 Bellows-type Globe Valves to ANSI/ASME

4.4.1 ECOLINE GLB 150-600



4.4.1.1 Operating data

Table 27: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS 2" - 12"
Max. permissible pressure	106 bar
Min. permissible temperature	0 °C
Max. permissible temperature	427 °C

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.4.1.4, Page 32)

4.4.1.2 Fluids handled

- Steam
- Thermal oil
- Explosive fluids
- Combustible fluids
- Fluids containing gas
- Gas
- Fluids posing a health hazard
- Toxic fluids
- High-temperature hot water
- Highly aggressive fluids
- Condensate
- Corrosive fluids
- Valuable fluids
- Volatile fluids
- Fluids containing mineral oils
- Oil
- Feed water
- Other fluids on request.

4.4.1.3 Design details

Design

- Valve design to BS 1873 and MSS SP-117
- On/off disc
- Bolted bonnet
- Outside screw
- Outside yoke
- Integrated seat ring
- Metal-seated
- Rising stem
- Non-rising handwheel
- Graphite gland packing
- Stainless steel/graphite gaskets
- Travel stop
- Stem sealed by double-walled bellows and back-up gland packing
- Positive anti-rotation feature between stem and bellows
- Position indicator
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Locking device
- Limit switch(es)
- Version with free stem end and top flange to ISO 5210
- NACE standard
- Electric actuators
- Seal-welded body/bonnet joint
- Leakage monitoring hole in the gland packing area
- Replaceable seat ring
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Other flanged end designs or butt weld ends to ASME B16.25

4.4.1.4 Pressure/temperature ratings

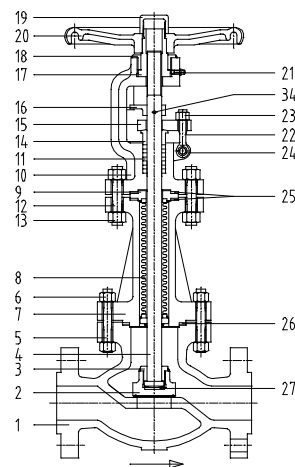
Table 28: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427
150	A 216 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	A 351 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		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8
150	A 351 CF8M	19,0	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

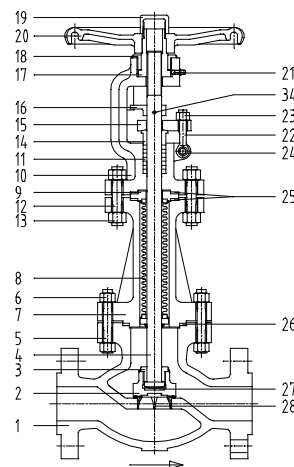
Table 29: Test pressures

Test	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)		23	315	56	815	112	1630
Leak test (seat) ¹⁶⁾	Air	5,5	80	5,5	80	5,5	80

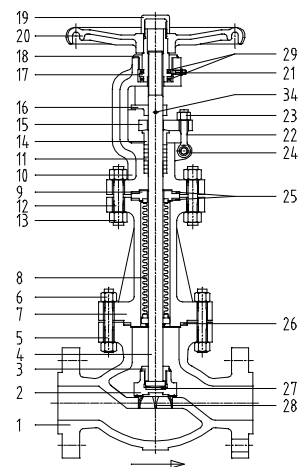
4.4.1.5 Materials



Class 150: 2" - 4"
Class 300: 2" - 4"
Class 600: 2" - 3"

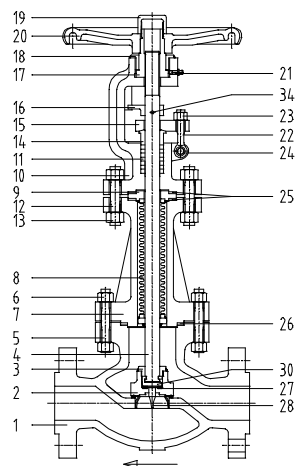


Class 150: 6"

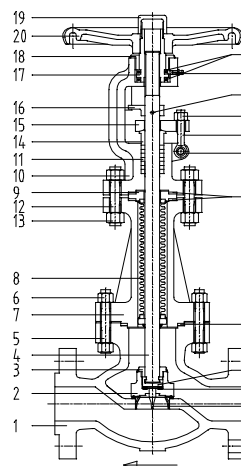


Class 150: 8"

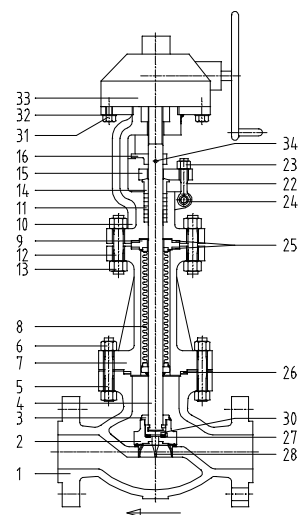
16) Optional for globe valves



Class 300: 6"
Class 600: 4"



Class 300: 8"
Class 600: 6"



Class 150: 10" - 12"
Class 300: 10" - 12"
Class 600: 8"

Table 30: Parts list

Part No.	Description	Material			
		Bellows: A 182 F316L ¹⁷⁾			
		A 216 WCB/ Trim 8	A 216 WCB/ Trim 5	A 351 CF8/Trim 2	A 351 CF8M/ Trim 10
1	Body	A 216 WCB + ST6	A 216 WCB + ST6	A 351 CF8	A 351 CF8M
2	Valve disc	A 105 + 13 % chrome (Cr)	A 105 + ST6	A 182 F304	A 182 F316
3	Nut	A 105	A 105	A 182 F304	A 182 F316
4 ¹⁸⁾	Stem	2 Cr 13	2 Cr 13	A 182 F304	A 182 F316
5	Stud	A 193 B7	A 193 B7	A 193 B8	A 193 B8
6	Nut	A 194 2H	A 194 2H	A 194 Gr. 8	A 194 Gr. 8
7	Bonnet	A 216 WCB	A 216 WCB	A 351 CF8	A 351 CF8M
8 ¹⁸⁾	Bellows	SS 316L	SS 316L	SS 316L	SS 316L
9 ¹⁸⁾	End plate ¹⁹⁾	SS 316L	SS 316L	SS 316L	SS 316L
10	Yoke	A 216 WCB	A 216 WCB	A 351 CF8	A 351 CF8M
11 ¹⁸⁾	Gland packing	Graphite	Graphite	Graphite	Graphite
12	Stud	A 193 B7	A 193 B7	A 193 B8	A 193 B8
13	Nut	A 194 2H	A 194 2H	A 194 Gr. 8	A 194 Gr. 8
14	Lower gland section	1 Cr 13	1 Cr 13	SS 304	SS 316
15	Gland follower	Carbon steel	Carbon steel	Stainless steel	Stainless steel
16 ¹⁸⁾	Stop	Carbon steel	Carbon steel	Stainless steel	Stainless steel
17	Stem nut	D-2	D-2	D-2	D-2
18	Threaded ring	Carbon steel	Carbon steel	Stainless steel	Stainless steel
19	Cap	Carbon steel	Carbon steel	Stainless steel	Stainless steel
20	Handwheel	Nodular cast iron	Nodular cast iron	Nodular cast iron	Nodular cast iron
21	Lubricating nipple	Stainless steel	Stainless steel	Stainless steel	Stainless steel
22	Eyebolt	A 193 B7	A 193 B7	A 193 B8	A 193 B8
23	Nut	A 194 2H	A 194 2H	A 194 Gr. 8	A 194 Gr. 8
24	Pin	Carbon steel	Carbon steel	Stainless steel	Stainless steel
25 ¹⁸⁾	Gasket	SS 316 + graphite	SS 316 + graphite	SS 316 + graphite	SS 316 + graphite

17) Other bellows materials on request, e.g. SS316Ti.

18) Recommended spare parts

19) Welded to bellows

Part No.	Description	Material			
		Bellows: A 182 F316L ¹⁷⁾			
		A 216 WCB/ Trim 8	A 216 WCB/ Trim 5	A 351 CF8/Trim 2	A 351 CF8M/ Trim 10
26 ¹⁸⁾	Gasket	SS 316 + graphite	SS 316 + graphite	SS 316 + graphite	SS 316 + graphite
27	Thrust plate	1 Cr 13	1 Cr 13	SS 304	SS 316
28	Valve disc guide	Carbon steel	Carbon steel	Stainless steel	Stainless steel
29	Bearing	-	-	-	-
30	Pilot plug	A 105 + 13 % chrome (Cr)	A 105 + ST6	A 182 F304	A 182 F316
31	Bolt	Carbon steel	Carbon steel	Stainless steel	Stainless steel
32	Washer	Carbon steel	Carbon steel	Stainless steel	Stainless steel
33	Gearbox	-	-	-	-
34 ¹⁸⁾	Pin	Carbon steel	Carbon steel	Stainless steel	Stainless steel

4.4.1.6 Function

The main components of the globe valves are the pressure-retaining parts, i.e. the body (1) and the bonnet (7), and the functional unit.

The body (1) and the bonnet (7) are connected by studs (5), and the joint is sealed to atmosphere by the gasket (26).

The functional unit consists of the valve disc (2), the stem (4) and the bellows (8). The actuating unit is a handwheel (20) or actuator.

The stem (4) passage through the bonnet (7) is sealed off by the bellows (8). The back-up gland packing (11) is tightened by means of two eyebolts (22) and nuts (23). The bellows-type stem seal is maintenance-free.

The seating surfaces of the body seat and the valve disc (30) are made of stainless materials. The handwheel (20) is mounted on the square or hexagon of the stem nut (17) and secured with a threaded ring (18).

4.4.2 ECOLINE GLB 800



4.4.2.1 Operating data

Table 31: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 800
Nominal size	NPS ½" - 2"
Max. permissible pressure	136 bar
Min. permissible temperature	0 °C
Max. permissible temperature	427 °C

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.4.2.4, Page 37)

4.4.2.2 Fluids handled

- Steam
- Explosive fluids
- Combustible fluids
- Liquids containing gas or vapour
- Gas
- Fluids posing a health hazard
- Toxic fluids
- High-temperature hot water
- Highly aggressive fluids
- Condensate
- Corrosive fluids
- Valuable fluids
- Volatile fluids
- Fluids containing mineral oils
- Oil
- Feed water
- Thermal oil
- Other fluids on request.

4.4.2.3 Design details

Design

- Valve design to ASME B16.34, API 602 and MSS SP-117
- Bolted bonnet
- Outside screw
- Outside yoke
- Reduced bore
- Tapered valve disc
- Integrated seat ring
- Metal-seated
- Rising stem
- Graphite gland packing
- Stainless steel/graphite gaskets
- Travel stop
- Guided valve disc
- Stem sealed by double-walled bellows and back-up gland packing
- Positive anti-rotation feature between stem and bellows
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Throttling plug
- Needle valve disc
- Full bore
- PTFE gasket (up to 200 °C)
- PTFE gland packing (up to 200 °C)
- Locking device
- Limit switch(es)
- Position indicator
- Seal-welded body/bonnet joint
- Stellite seat/disc interface
- Version with free stem end and top flange to ISO 5210
- Y-pattern
- Body extension with nipple
- NACE standard
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Electric actuators
- Other flanged end designs or butt weld ends to ASME B16.25

4.4.2.4 Pressure/temperature ratings

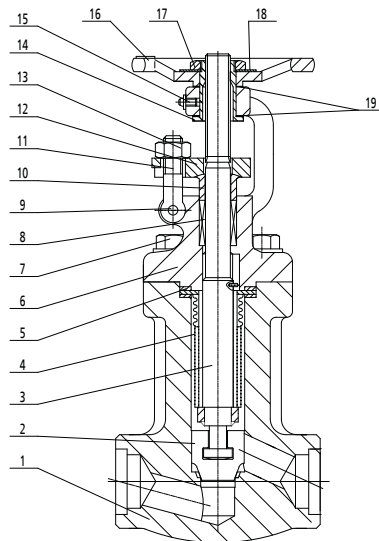
Table 32: Permissible operating pressures in bar at temperatures in °C (to API 602 and ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427
150	A 105	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
800		136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7
150	A 182 F304	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		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8
800		132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5
150	A 182 F316	19,0	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
800		132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6

Table 33: Test pressures

Test	Test medium	Class 150		Class 300		Class 600		Class 800	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225	205,1	2975
Leak test (seat)		22,4	325	56,9	825	113,8	1650	149,8	2173
Leak test (seat) ²⁰⁾	Air	5,5	80	5,5	80	5,5	80	5,5	80

4.4.2.5 Materials


Table 34: Parts list

Part No.	Description	Material		
		Trim 8	Trim 2	Trim 10
1	Body	A 105 + ST6	A 182 F304	A 182 F316
2	Valve disc	A 276 420	A 276 304	A 276 316
3 ²¹⁾	Stem	A 182 F6a	A 182 F304	A 182 F316
4 ²²⁾²¹⁾	Bellows	SS304	SS316L	SS316L
5 ²¹⁾	Bonnet gasket	SS316 + graphite	SS316 + graphite	316 + graphite
6	Bonnet	A 105	A 182 F304	A 182 F316
7	Bolt	A 193 B7	A 193 B8	A 193 B8M
8 ²¹⁾	Gland packing	Graphite	Graphite	Graphite

20) Optional for globe valves

21) Recommended spare parts

22) Other bellows materials on request.

Part No.	Description	Material		
		Trim 8	Trim 2	Trim 10
9	Pin	A 276 410	A 276 304	A 276 316
10	Lower gland section	A 276 420	A 276 304	A 276 316
11	Eyebolt	A 193 B7	A 193 B8	A 193 B8
12	Gland follower	A 105	A 182 F304	A 182 F316
13	Nut	A 194 2H	A 194 8	A 194 8
14	Stem nut	A 276 410	A 276 410	A 276 410
15	Lubricating nipple	Brass	Brass	Brass
16	Handwheel	A 197	A 197	A 197
17	Nut	A 194 2H	A 194 8	A 194 8
18	Name plate	SS304	SS304	SS304
19	Washer	A 276 410	A 276 410	A 276 410

4.4.2.6 Function

The main components of the globe valves are the pressure-retaining parts, i.e. the body (1) and the bonnet (6), and the functional unit.

The body (1) and the bonnet (6) are connected by bolts (7), and the joint is sealed to atmosphere by the gasket (5).

The functional unit consists of the valve disc (2), the stem (3) and the bellows (4). The actuating unit is a handwheel (16) or actuator.

The stem (3) passage through the bonnet (6) is sealed off by the bellows (4). The back-up gland packing (8) is tightened by means of two eyebolts (11) and nuts (13). The bellows-type stem seal is maintenance-free.

The seating surfaces of the body seat and the valve disc (2) are made of stainless materials. The handwheel (16) is mounted on the square or hexagon of the stem nut (14) and secured with a nut (17).

4.5 Gate Valves to ANSI/ASME

4.5.1 ECOLINE GTC 150-600



4.5.1.1 Operating data

Table 35: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS 2" - 36"
Max. permissible pressure	106 bar / 1500 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.5.1.4, Page 40)

4.5.1.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Feed water

4.5.1.3 Design details

Design

- Gate valve to API 600-2009
- Tested to API 598
- Body made of cast steel or stainless steel
- Flexible wedge
- Bolted bonnet
- Non-rotating stem
- Non-rising handwheel
- Stem sealed by gland packing
- Two-piece self-aligning gland follower
- Die-moulded graphite gland packing, packing end rings made of braided graphite
- Stainless steel/graphite gaskets
- Stem with burnished shank
- Stem nut made of nickel steel
- Outside screw
- Sealing surfaces made of wear and corrosion resistant materials
- Back seat
- Hardened back seat bush
- Outside yoke
- Yoke head suitable for mounting electric and pneumatic actuators (DIN ISO 5210)
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Limit switch(es)
- Locking device
- Stem protecting tube
- Stem protecting tube with position indicator
- Drain plug
- Hard-faced back seat
- Pressure relief arrangement
- Bypass
- Version with free stem end and top flange to ISO 5210
- Gearboxes
- Electric actuators
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Non-destructive testing, e.g. radiographic testing
- Inspections to technical codes such as AD2000 or IBR
- Gate valve to API 600-2015
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Larger nominal sizes and other variants on request

4.5.1.4 Pressure/temperature ratings

Table 36: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 216 WCB ²³⁾	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	-	-	-	-	-	-	-	-	-	-
300		51,0	46,9	45,2	43,8	41,7	39,3	37,9	36,5	34,8	28,3	22,1	15,9	9,3	5,9	-	-	-	-	-	-	-	-	-	-
600		102,0	93,8	90,3	87,2	83,1	78,3	75,8	73,1	70,0	56,9	44,1	31,7	19,0	11,7	-	-	-	-	-	-	-	-	-	-
150	A 217 WC6 ²⁴⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 217 WC9	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 217 C5	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,0 ²⁵⁾	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	25,9	19,0	13,8	10,0	6,9	4,1	2,4	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	51,4	37,9	27,6	20,0	13,8	8,6	4,8	-	-	-	-	-	-
150	A 217 C12	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	25,9	17,6	11,7	7,9	5,2	3,4	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	34,8	23,8	15,5	10,3	7,2	-	-	-	-	-	-
150	A 352 LCB ²⁶⁾	18,3	17,6	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		47,9	45,5	44,1	42,4	40,3	37,9	36,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		96,2	91,0	87,9	84,8	81,0	76,2	73,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352 LCC	20,0	17,9	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	96,6	91,7	83,4	81,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ²⁵⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,0 ²⁵⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 351 CF8M ²⁵⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,4 ²⁵⁾	1,0 ²⁵⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9

23) Permissible but not recommended for prolonged use above 427 °C (800 °F).

24) Cannot be used for temperatures above 593 °C (1100 °F).

25) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

26) Cannot be used for temperatures above 343 °C (650 °F).

27) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

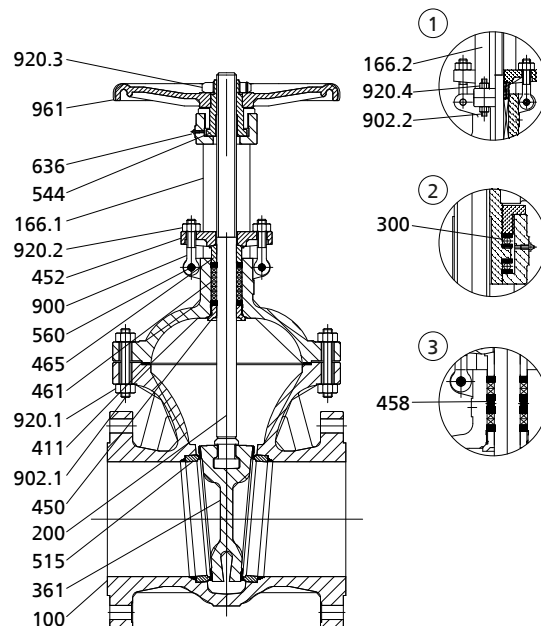
Table 37: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 216	285	260	230	200	170	140	125	110	95	80	65	50	35	20	-	-	-	-	-	-	-	-	-	-
300	WCB ²⁰⁾	740	680	655	635	605	570	550	530	505	410	320	230	135	85	-	-	-	-	-	-	-	-	-	-
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640	460	275	170	-	-	-	-	-	-	-	-	-	
150	A 217	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	-	-	-	-	-	-	-	-
300	WC6 ²⁰⁾	750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	-
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-
150	A 217	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	-	-	-	-	-	-	-	-
300	WC9	750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-
150	A 217 C5	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	15 ²⁰⁾	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	375	275	200	145	100	60	35	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	745	550	400	290	200	125	70	-	-	-	-	-	-
150	A 217 C12	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	375	255	170	115	75	50	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	505	345	225	150	105	-	-	-	-	-	-
150	A 352	265	255	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	LCB ²⁰⁾	695	660	640	615	585	550	535	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		1395	1320	1275	1230	1175	1105	1065	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352	290	260	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	LCC	750	750	730	705	665	605	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		1500	1500	1455	1405	1330	1210	1175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	15 ²⁰⁾
300	CF8 ²⁰⁾	720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 351	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	15 ²⁰⁾
300	CF8M ²⁰⁾	720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85

Table 38: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125	153	2225
Leak test (back seat)		23	315	56	815	112	1630
Leak test (seat)	Air	4-7	60-100	4-7	60-100	4-7	60-100

4.5.1.5 Materials



① Yoke (14\"-36\" Class 150, 14\"-36\" Class 300)

② Bearing (6"-36" Class 600)

③ Lantern ring (optional)

Table 39: Parts list

Part No.	Description	Material								
		A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A 352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
100	Body	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
166.1	Yoke	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
166.2	Yoke	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
361	Flexible wedge	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
515	Seat ring	A 105	A 182 F11	A 182 F22	A 182 F5	A 182 F9	A 182 LF2	A 350 LF2	A 182 F304	A 182 F316
200	Stem	See "Trim materials" table								
450	Back seat bush	See "Trim materials" table								
465	Lower gland section	13Cr	13Cr	13Cr	13Cr	13Cr	304	304	304	304
452	Gland follower	A 216 WCB	A 216 WCB	A 216 WCB	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8
544	Threaded bush	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2	A 439 D-2
902.1	Stud	A 193 B7	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
920.1	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
461	Gland packing	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite
411	Joint ring	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel
900	Eyebolt	A 307 B	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
920.2	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
560	Pin	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
961	Handwheel	Nodular cast iron or malleable cast iron								
920.3	Handwheel nut	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
300	Bearing	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
458	Lantern ring	13Cr	13Cr	13Cr	13Cr	13Cr	304	304	304	316
636	Lubricating nipple	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Stainless steel	Stainless steel
902.2	Stud	A 193 B7	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
920.4	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8

Table 40: Trim materials

Part No.	Description	Trim 1	Trim 2	Trim 5	Trim 8	Trim 10
		13% chrome steel (Cr) / 13% chrome steel (Cr)	304 / 304	Stellite / Stellite	Stellite / 13% chrome steel (Cr)	316 / 316
361	Flexible wedge	13% chrome steel (Cr)	304 stainless steel	Stellite	13% chrome steel (Cr)	316 stainless steel
515	Seat ring	13% chrome steel (Cr)	304 stainless steel	Stellite	Stellite	316 stainless steel
200	Stem	13% chrome steel (Cr)	304 stainless steel	13% chrome steel (Cr)	13% chrome steel (Cr)	316 stainless steel
450	Back seat bush	13% chrome steel (Cr)	304 stainless steel	13% chrome steel (Cr)	13% chrome steel (Cr)	316 stainless steel

4.5.1.6 Function

The main components of the gate valves are the body (100), the yoke (166), the flexible wedge (361), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of eyebolts (900) and nuts (920.2). The yoke (166) is equipped with a back seat bush (450) which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The hard-faced seat rings (515) are welded into the body (100). The seating surfaces of the flexible wedge (361) are hard-faced. The flexible wedge (361) is fastened to the stem (200) by a "T" joint and guided by lateral guide bars in the body (100).

Bonnet/cover seal The body (100) and the yoke (166) are connected by studs (902.1) and nuts (920.1). The joint is sealed by means of a joint ring (411).

4.5.2 ECOLINE GTF 150-600



4.5.2.1 Operating data

Table 41: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS ½" - 2"
Max. permissible pressure	104 bar / 1480 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.5.2.4, Page 44)

4.5.2.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Feed water

4.5.2.3 Design details

Design

- Gate valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted bonnet
- Outside screw
- Outside yoke
- Non-rotating stem
- Stem sealed by gland packing
- Non-rising handwheel
- Reduced bore
- Two-piece self-aligning gland follower
- Graphite gland packing
- Stem with burnished shank
- Fully confined bonnet gasket
- Back seat
- Solid wedge
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Seal-welded body/bonnet joint
- Full bore
- Hard-faced back seat
- Extended bonnet
- Locking device
- Position indicator
- Electric actuators
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Butt weld ends
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Other trims

4.5.2.4 Pressure/temperature ratings

Table 42: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 105	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	A 182 F11 ²⁸⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁹⁾	-	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-

28) Use normalised and tempered materials only.

29) Flanged end ratings terminate at 538 °C (1000 °F).

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
600	A 182 F11 ³⁰⁾	103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 182 F304 ³⁰⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,0 ²⁰⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 182 F22	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁰⁾	1,4 ²⁰⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 182 F316 ³⁰⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,4 ²⁰⁾	1,0 ²⁰⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9
150	A 182 F304L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	30,0	27,2	25,5	25,2	24,8	24,5	23,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	4,5	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	29,0	27,2	25,5	25,2	24,8	24,5	23,8	23,4	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	46,5	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 43: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 105	285	260	230	200	170	140	125	110	95	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		740	680	655	635	605	570	550	530	505	410	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F11 ³⁰⁾	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	-	-	-	-	-	-	-	-
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-
150	A 182 F304 ³⁰⁾	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	15 ²⁰⁾
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 182 F22	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-
150	A 182 F316 ³⁰⁾	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	20 ²⁰⁾	15 ²⁰⁾
300		720	620	560	515	480	450	440	435	425	420	415	385	365	360	305	235	185	145	115	95	75	60	40	
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85
150	A 182 F304L	230	195	175	160	150	140	125	110	110	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	230	195	175	160	150	140	125	110	110	80	65	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	340	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	675	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 44: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225
Leak test (back seat)		22,4	325	56,9	825	113,8	1650
Leak test (seat)		22,4	325	56,9	825	113,8	1650
Leak test (seat)	Air	5,5	80	5,5	80	5,5	80

30) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.5.2.5 Materials

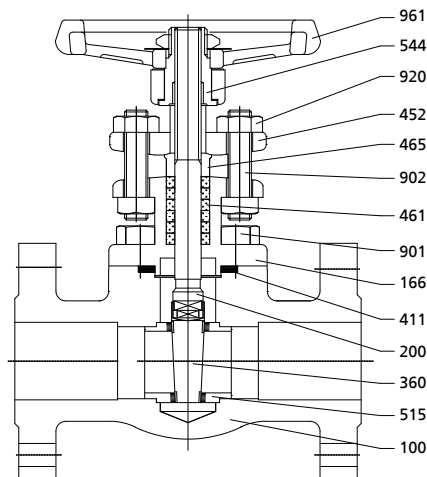


Table 45: Parts list

Part No.	Description	Material				
		A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10
100	Body	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
166	Yoke	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
200	Stem	A 182 F6a	A 182 F6a	A 182 F6a	A 182 F304	A 182 F316
360	Wedge	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316
411	Joint ring	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite
452	Gland follower	A 105	A 105	A 105	A 182 F304	A 182 F316
465	Lower gland section	A 276 410	A 276 410	A 276 410	A 276 304	A 276 316
461	Gland packing	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite
515	Seat ring	A 276 410 + STL6	A 276 410 + STL6	A 276 410 + STL6	A 276 304	A 276 316
544	Threaded bush	A 276 410	A 276 410	A 276 410	A 276 410	A 276 410
901	Bolt	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M
902	Stud	A 193 B8	A 193 B16	A 193 B16	A 193 B8	A 193 B8
920	Nut	A 194 2H	A 194 8	A 194 8	A 194 8	A 194 8M
961	Handwheel	A 197	A 197	A 197	A 197	A 197

4.5.2.6 Function

The main components of the gate valves are the body (100), the yoke (166), the wedge (360), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of studs (902) and nuts (920). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The wedge (360) is connected to the stem (200) by a "T" joint.

Bonnet/cover seal The yoke (166) is bolted to the body (100). The joint is sealed by a joint ring (411).

4.5.3 ECOLINE GTF 800-2500



4.5.3.1 Operating data

Table 46: Operating properties

Characteristic	Value
Nominal pressure	Class 800 - 2500
Nominal size	NPS ½" - 2"
Max. permissible pressure	431 bar / 6250 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	+538 °C / +1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.5.3.4, Page 48)

4.5.3.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Feed water

4.5.3.3 Design details

Design

- Gate valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted bonnet (Class 800)
- Welded bonnet (Class 1500 / 2500)
- Outside screw
- Outside yoke
- Non-rotating stem
- Stem sealed by gland packing
- Non-rising handwheel
- Reduced bore
- Two-piece self-aligning gland follower
- Graphite gland packing
- Stem with burnished shank
- Fully confined bonnet gasket (Class 800)
- Back seat
- Solid wedge
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Full bore
- Hard-faced back seat
- Extended bonnet
- Locking device
- Position indicator
- Electric actuators
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Butt weld ends
- NACE standard
- Other threaded ends or butt weld ends to ASME B16.25
- Other trims
- Other material variants

4.5.3.4 Pressure/temperature ratings

Table 47: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 105	136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		255,3	233,0	225,4	219,0	209,7	193,6	187,8	181,8	173,6	143,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		425,5	388,3	375,6	365,0	349,5	322,6	313,0	303,1	289,3	239,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 182 F11 ³¹⁾	137,9	137,9	132,7	127,4	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	58,6	39,8	26,4	17,7	-	-	-	-	-	-	-	-
1500		258,6	257,4	248,7	239,8	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	128,6	74,5	44,0	30,5	-	-	-	-	-	-	-	-
2500		430,9	429,0	414,5	399,6	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	214,4	124,1	73,4	50,9	-	-	-	-	-	-	-	-
800	A 182 F22	137,9	137,9	133,9	129,6	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	70,7	49,1	32,2	20,2	-	-	-	-	-	-	-	-
1500		258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	92,2	52,6	34,4	-	-	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	153,7	87,7	57,4	-	-	-	-	-	-	-	-
800	A 182 F304 ³¹⁾	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5	72,9	71,5	70,2	65,3	59,8	47,2	37,7	30,3	24,5	20,8	17,1	13,8	10,7	7,7
1500		248,2	204,3	185,0	172,4	162,4	151,1	148,1	145,2	142,2	140,0	137,0	134,7	132,4	122,1	104,2	84,4	68,9	56,3	46,7	40,1	33,8	28,9	17,4	14,1
2500		413,7	340,4	308,4	287,3	270,7	251,9	246,9	241,9	237,0	233,3	228,4	224,5	220,7	203,6	173,7	140,7	114,9	93,8	77,9	66,9	56,3	48,1	29,2	23,8
800	A 182 F316 ³¹⁾	132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6	76,9	76,3	71,2	66,7	66,2	56,1	43,6	34,0	27,0	21,5	17,7	13,8	10,7	7,7
1500		248,2	211,0	192,5	178,3	166,9	154,4	151,6	149,4	147,2	145,7	144,2	143,4	140,9	125,5	119,7	99,5	79,1	63,3	51,6	41,9	34,9	29,3	17,4	14,1
2500		413,7	351,6	320,8	297,2	278,1	257,4	252,7	249,0	245,3	242,9	240,4	238,9	235,0	208,9	199,5	165,9	131,8	105,5	86,0	69,8	58,2	48,9	29,2	23,8
800	A 182 F304L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	62,2	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	117,1	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	195,1	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	125,5	119,7	97,5	73,0	49,6	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	208,9	199,5	162,5	121,7	82,7	-	-	-	-	-	-

Table 48: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
800	A 105	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3705	3395	3270	3170	3015	2840	2745	2665	2535	2055	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		6170	5655	5450	5280	5025	4730	4575	4425	4230	3430	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11 ³¹⁾	2000	2000	1925	1848	1773	1613	1568	1515	1418	1355	1298	1200	850	577	383	257	-	-	-	-	-	-	-	-
1500		3750	3750	3610	3465	3325	3025	2940	2840	2660	2540	2435	2245	1595	1080	720	480	-	-	-	-	-	-	-	-
2500		6250	6250	6015	5775	5540	5040	4905	4730	4430	4230	4060	3745	2655	1800	1200	800	-	-	-	-	-	-	-	-
800	A 182 F22	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1025	712	467	293	-	-	-	-	-	-	-	-
1500		3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1335	875	550	-	-	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	2230	1455	915	-	-	-	-	-	-	-	-
800	A 182 F304 ³¹⁾	1920	1600	1435	1325	1240	1178	1152	1125	1102	1080	1057	1037	1018	947	867	685	547	440	355	302	248	200	155	112
1500		3600	3000	2690	2485	2330	2210	2160	2110	2065	2030	1980	1945	1910	1770	1630	1285	1030	825	670	565	465	380	290	205
2500		6000	5000	4480	4140	3880	3680	3600	3520	3440	3380	3300	3240	3180	2950	2715	2145	1715	1370	1115	945	770	630	485	345
800	A 182 F316 ³¹⁾	1920	1653	1493	1368	1275	1203	1178	1160	1138	1125	1115	1107	1032	968	960	813	632	493	392	312	257	200	155	112
1500		3600	3095	2795	2570	2390	2255	2210	2170	2135	2110	2090	2075	1930	1820	1800	1525	1185	925	735	585	480	380	290	205
2500		6000	5160	4660	4280	3980	3760	3680	3620	3560	3520	3480	3460	3220	3030	3000	2545	1970	1545	1230	970	800	630	485	345
800	A 182 F304L	1600	1363	1217	1120	1048	992	973	960	942	920	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	1600	1363	1217	1120	1048	992	973	960	942	920	902	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	1690	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	2820	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1820	1800	1510	1115	720	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	3030	3000	2515	1855	1200	-	-	-	-	-	-

Table 49: Test pressures

Test	Test medium	Class 800		Class 1500		Class 2500	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	205,1	2975	396	5625	660	9375
Leak test (back seat)		149,8	2173	291	4125	484	6875
Optional leak test (seat)		149,8	2173	291	4125	484	6875
Leak test (seat)	Air	5,5	80	4 to 7	58 to 100	4 to 7	58 to 100

31) Use normalised and tempered materials only.

32) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.5.3.5 Materials

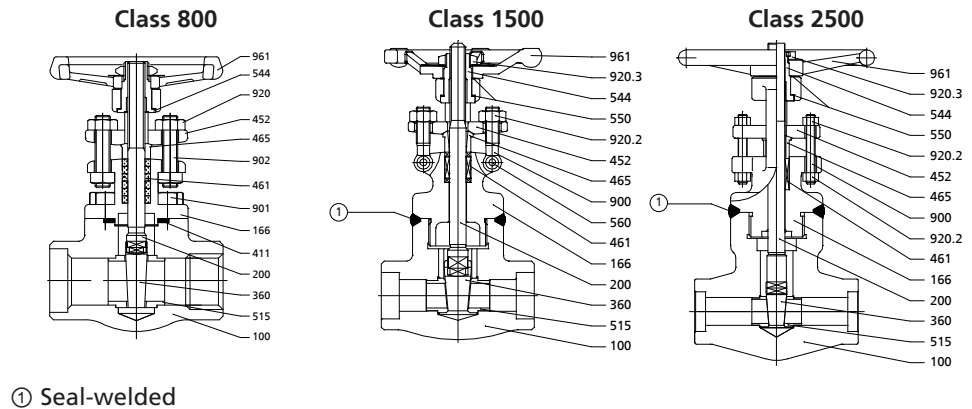


Table 50: Parts list

Part No.	Description	Class	Material					
			A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10	A 182 F91 Trim 5
100	Body		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
166	Yoke		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
200	Stem	800	A 182 F6a	A 182 F6a	A 182 F6a	A 182 F304	A 182 F316	
		1500/2500	A 479-410-2	A 479-410-2	A 479-410-2	A 182 F304	A 182 F316	A 479-XM19
360	Wedge	800	A 182 F6a	A 182 F6a + ST6	A 182 F6a + ST6	A 182 F304	A 182 F316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-304/ A 276-304+ST6	A 276-410/ A 276-410+ST6
411	Joint ring		304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite	
452	Gland follower		A 105	A 105	A 105	A 182 F304	A 182 F316	A 182 F22
465	Lower gland section	800	A 276-410	A 276-410	A 276-410	A 276-304	A 276-316	
		1500/2500	A 276-420	A 276-420	A 276-420	A 276-304	A 276-316	A 276-420
461	Gland packing		Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite	Flexible graphite
515	Seat ring	800	A 276-410 + ST6	A 276-410 + ST6	A 276-410 + ST6	A 276-304	A 276-316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-304/ A 276-304+ST6	A 276-410/ A 276-410+ST6
544	Threaded bush		A 276-410	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410
550	Disc	1500/2500	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410
560	Pin	1500/2500	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410	A 276-410
900	Eyebolt	1500/2500	A 193 B8	A 193 B8	A 193 B8	A 193 B8	A 193 B8	A 193 B8
901	Bolt	800	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M	
902	Stud	800	A 193 B8	A 193 B16	A 193 B16	A 193 B8	A 193 B8	
920	Nut	800	A 194 2H	A 194 8	A 194 8	A 194 8	A 194 8M	
920.2	Nut	1500/2500	A 194 2H	A 194 2H	A 194 2H	A 194 8	A 194 8	A 194 4/7
920.3	Handwheel nut	1500/2500	A 194 2H	A 194 2H	A 194 2H	A 194 8	A 194 8	A 194 2H
961	Handwheel		A 197	A 197	A 197	A 197	A 197	A 197

4.5.3.6 Function

The main components of the gate valves are the body (100), the yoke (166), the wedge (360), the stem (200) and the actuating unit.

Stem seal The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of studs (902) and nuts (920). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The wedge (351) is connected to the stem (200) by a "T" joint.

Bonnet/cover seal On Class 800 valves, the yoke (166) is bolted to the body (100). The joint is sealed by a joint ring (411). On Class 1500 and Class 2500 valves, the yoke (166) is screwed into the body (100) and the joint is seal-welded.

4.5.4 ECOLINE GTV 150-300



4.5.4.1 Operating data

Table 51: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 300
Nominal size	NPS 2" - 12"
Max. permissible pressure	50 bar / 720 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.5.4.4, Page 53)

4.5.4.2 Fluids handled

- Steam
- Gas
- Fluids containing gas
- High-temperature hot water
- Oil
- Feed water

4.5.4.3 Design details

Design

- Gate valve to API 603
- Tested to API 598
- Compact design to API 603
- Valve made of corrosion-resistant materials
- Body made of stainless steel
- Bolted bonnet
- Outside screw
- Outside yoke
- Yoke head suitable for mounting electric and pneumatic actuators (DIN ISO 5210)
- Non-rotating stem
- Stem with burnished shank
- Stem nut made of nickel steel
- Non-rising handwheel
- Flexible wedge
- Stem sealed by gland packing
- Two-piece self-aligning gland follower
- Die-moulded graphite gland packing, packing end rings made of braided graphite
- Stainless steel/graphite gaskets
- Back seat
- Integrated seat ring
- Minimum wall thickness to API 603
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Hard-faced back seat
- Hard-faced sealing surface (single or double)
- PTFE packing
- PTFE gasket
- Drain plug
- Pressure relief arrangement
- Locking device
- Limit switches
- Stem protecting tube
- Stem protecting tube with position indicator
- Gearboxes
- Electric actuators
- Grease-free version
- Version with free stem end and top flange to ISO 5210
- Non-destructive testing, e.g. radiographic testing
- NACE standard
- Other flange designs
- Larger nominal sizes and other variants on request

4.5.4.4 Pressure/temperature ratings

Table 52: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 351 CF8 ³³⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,0 ³⁴⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
150	A 351 CF8M ³³⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,4 ³⁴⁾	1,0 ³⁴⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8

Table 53: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 351	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	15 ⁽³⁴⁾
300	CF8 ⁽³³⁾	720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
150	A 351	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	20 ⁽³⁴⁾	15 ⁽³⁴⁾
300	CF8M ⁽³³⁾	720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40

Table 54: Test pressures

Test	Test medium	Class 150		Class 300	
		[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125
Leak test (seat)		23	315	56	815
Leak test (back seat)		23	315	56	815
Leak test (seat)	Air	4 to 7	60 to 100	4 to 7	60 to 100

33) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

34) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

4.5.4.5 Materials

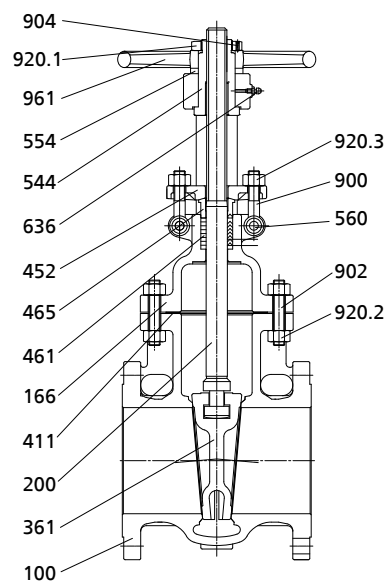


Table 55: Parts list

Part No.	Description	Material	
		A 351 CF8	A 351 CF8M
100	Body	A 351 CF8	A 351 CF8M
361	Flexible wedge	A 351 CF8	A 351 CF8M
200	Stem	A 276 304	A 276 316
411	Joint ring	Stainless steel/graphite	Stainless steel/graphite
166	Yoke	A 351 CF8	A 351 CF8M
461	Gland packing	Graphite	Graphite
465	Lower gland section	A 276 304	A 276 316
452	Gland follower	A 351 CF8	A 351 CF8
636	Lubricating nipple	Copper + nickel coating	Copper + nickel coating
544	Threaded bush	A 439 D2	A 439 D2
961	Handwheel	A 395 65 45 15	A 395 65 45 15
554	Washer	A 395 65 45 15	A 395 65 45 15
920.1	Handwheel nut	A 276 304	A 276 304
904	Grub screw	A 276 304	A 276 304
920.2	Nut	A 194 8	A 194 8
902	Stud	A 193 B8	A 193 B8
560	Pin	A 276 304	A 276 304
900	Eyebolt	A 193 B8	A 193 B8
920.3	Nut	A 194 8	A 194 8

Table 56: Trim materials

Part No.	Description	Trim 2	Trim 10
		304 / 304	316 / 316
100	Body	304 stainless steel	316 stainless steel
361	Flexible wedge	304 stainless steel	316 stainless steel
200	Stem	304 stainless steel	316 stainless steel

4.5.4.6 Function

The main components of the gate valves are the body (100), the yoke (166), the flexible wedge (361), the stem (200) and the actuating unit.

- Stem seal** The gland packing (461), which seals off the stem (200), is tightened via the gland follower (452) by means of eyebolts (900) and nuts (920.3). The yoke (166) features an integral back seat which seals off the valve when the stem (200) is fully retracted.
- Seat/disc interface** The seat ring is an integral part of the body (100). The flexible wedge (361) is fastened to the stem (200) by a "T" joint and guided by lateral guide bars in the body (100).
- Bonnet/cover seal** The body (100) and the yoke (166) are connected by studs (902) and nuts (920.2). The joint is sealed by means of a joint ring (411).

4.5.5 ECOLINE GTB 800



4.5.5.1 Operating data

Table 57: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 800
Nominal size	NPS ½" - 2"
Max. permissible pressure	136 bar
Min. permissible temperature	0 °C
Max. permissible temperature	427 °C

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.5.5.4, Page 56)

4.5.5.2 Fluids handled

- Steam
- Explosive fluids
- Combustible fluids
- Liquids containing gas or vapour
- Gas
- Fluids posing a health hazard
- Toxic fluids
- High-temperature hot water
- Highly aggressive fluids
- Condensate
- Corrosive fluids
- Valuable fluids
- Volatile fluids
- Fluids containing mineral oils
- Oil
- Feed water
- Thermal oil
- Other fluids on request.

4.5.5.3 Design details

Design

- Valve design to ASME B16.34, API 602 and MSS SP-117
- Bolted bonnet
- Outside screw
- Outside yoke
- Reduced bore
- Single-piece wedge
- Rolled-in seat ring
- Metal-seated
- Rising stem
- Non-rotating stem
- Non-rising handwheel
- Graphite gland packing
- Stainless steel/graphite gaskets
- Travel stop
- Wedge guided in the body
- Stem sealed by double-walled bellows and back-up gland packing
- Positive anti-rotation feature between stem and bellows
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Full bore
- PTFE gasket (up to 200 °C)
- PTFE gland packing (up to 200 °C)
- Locking device
- Limit switch(es)
- Position indicator
- Seal-welded body/bonnet joint
- Stellite seat/disc interface
- Version with free stem end and top flange to ISO 5210
- Pressure relief hole in wedge inlet side
- Y-pattern
- Body extension with nipple
- NACE standard
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Electric actuators
- Other flanged end designs or butt weld ends to ASME B16.25

4.5.5.4 Pressure/temperature ratings

Table 58: Permissible operating pressures in bar at temperatures in °C (to API 602 and ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427
150	A 105	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427
300	A 105	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
800		136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7
150	A 182 F304	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		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8
800	A 182 F316	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5
150		19,0	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
800		132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6

Table 59: Test pressures

Test	Test medium	Class 150		Class 300		Class 600		Class 800	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225	205,1	2975
Leak test (seat) ³⁵⁾		22,4	325	56,9	825	113,8	1650	149,8	2173
Leak test (seat)	Air	5,5	80	5,5	80	5,5	80	5,5	80

4.5.5.5 Materials

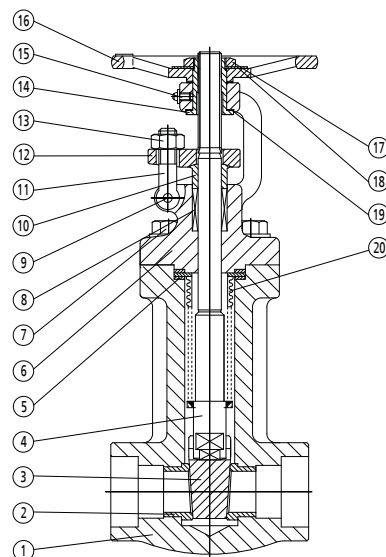


Table 60: Parts list

Part No.	Description	Material		
		Trim 8	Trim 2	Trim 10
1	Body	A 105	A 182 F304	A 182 F316
2	Seat ring	A 276 410 + STL6	A 276 304	A 276 316
3	Wedge	A 182 F6a	A 182 F304	A 182 F316
4 ³⁶⁾	Stem	A 182 F6a	A 182 F304	A 182 F316
5 ³⁶⁾	Bonnet gasket	SS316 + graphite	SS316 + graphite	316 + graphite
6	Bonnet	A 105	A 182 F304	A 182 F316
7	Bolt	A 193 B7	A 193 B8	A 193 B8M
8 ³⁶⁾	Gland packing	Graphite	Graphite	Graphite
9	Pin	A 276 410	A 276 304	A 276 316
10	Lower gland section	A 276 420	A 276 304	A 276 316
11	Eyebolt	A 193 B7	A 193 B8	A 193 B8
12	Gland follower	A 105	A 182 F304	A 182 F316

35) Optional for gate valves

36) Recommended spare parts

Part No.	Description	Material		
		Trim 8	Trim 2	Trim 10
13	Nut	A 194 2H	A 194 8	A 194 8
14	Stem nut	A 276 410	A 276 410	A 276 410
15	Lubricating nipple	Brass	Brass	Brass
16	Handwheel	A 197	A 197	A 197
17	Nut	A 194 2H	A 194 8	A 194 8
18	Name plate	SS304	SS304	SS304
19	Washer	A 276 410	A 276 410	A 276 410
20 ³⁷⁾³⁶⁾	Bellows	SS304	SS316L	SS316L

4.5.5.6 Function

The main components of the gate valves are the pressure-retaining parts, i.e. the body (1) and the bonnet (6), and the functional unit.

The body (1) and the bonnet (6) are connected by bolts (7), and the joint is sealed to atmosphere by the gasket (5).

The functional unit consists of the wedge (3), the stem (4) and the bellows (20). The actuating unit is a handwheel (16) or actuator.

The stem (4) passage through the bonnet (6) is sealed off by the bellows (20). The back-up gland packing (8) is tightened by means of two eyebolts (11) and nuts (13). The bellows-type stem seal is maintenance-free.

The seating surfaces of seat ring (2) and wedge (3) are made of stainless materials. The handwheel (16) is mounted on the square or hexagon of the stem nut (14) and secured with a nut (17).

4.6 Lift Check Valves to ANSI/ASME

4.6.1 ECOLINE PTF 150-600



4.6.1.1 Operating data

Table 61: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS ½" - 2"
Max. permissible pressure	104 bar / 1480 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.6.1.4, Page 60)

37) Other bellows materials on request.

4.6.1.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Volatile fluids
- Feed water

4.6.1.3 Design details

Design

- Lift check valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted cover
- Reduced bore
- Solid check disc
- Integral seat - ST6 (HF)
- Fully confined cover gasket
- Spring ensures reliable shut-off
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Seal-welded body/cover joint
- Full bore
- Butt weld ends
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Other trims

4.6.1.4 Pressure/temperature ratings

Table 62: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 105	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	A 182 F11 ³⁸⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁹⁾	1,4 ³⁹⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 182 F304 ⁴⁰⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,0 ³⁹⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 182 F22	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁹⁾	1,4 ³⁹⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 182 F316 ⁴⁰⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,4 ³⁹⁾	1,0 ³⁹⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9
150	A 182 F304L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	30,0	27,2	25,5	25,2	24,8	24,5	23,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	4,5	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	29,0	27,2	25,5	25,2	24,8	24,5	23,8	23,4	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	46,5	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 63: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 105	285	260	230	200	170	140	125	110	95	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		740	680	655	635	605	570	550	530	505	410	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F11 ^m	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^m	20 ^m	-	-	-	-	-	-	-	-
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-
150	A 182 F304 ^m	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	15 ^m
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 182 F22	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ^m	20 ^m	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-
150	A 182 F316 ^m	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	20 ^m	15 ^m
300		720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85
150	A 182 F304L	230	195	175	160	150	140	125	110	110	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	230	195	175	160	150	140	125	110	110	80	65	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	340	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	675	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 64: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225
Leak test (seat)		22,4	325	56,9	825	113,8	1650

38) Use normalised and tempered materials only.

39) Flanged end ratings terminate at 538 °C (1000 °F).

40) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.6.1.5 Materials

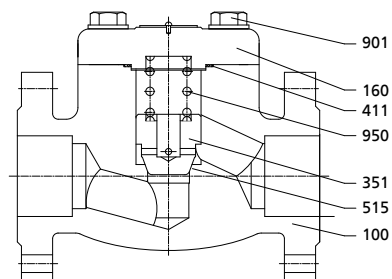


Table 65: Parts list

Part No.	Description	Material				
		A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10
100	Body	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
160	Cover	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
351	Check disc	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316
411	Joint ring	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite
515	Seat ring	STL6 (integral)	STL6 (integral)	STL6 (integral)	304 (integral)	316 (integral)
901	Bolt	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M
950	Spring	SS304	SS304	SS304	SS304	SS316

4.6.1.6 Function

The main components of the lift check valves are the body (100), the cover (160) and the check disc (351).

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The check disc (351) is spring-loaded.

Bonnet/cover seal The cover (160) is bolted to the body (100). The joint is sealed by a joint ring (411).

4.6.2 ECOLINE PTF 800-2500



4.6.2.1 Operating data

Table 66: Operating properties

Characteristic	Value
Nominal pressure	Class 800 - 2500
Nominal size	NPS ½" - 2"
Max. permissible pressure	431 bar / 6250 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	+538 °C / +1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.6.2.4, Page 63)

4.6.2.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Feed water

4.6.2.3 Design details**Design**

- Lift check valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted cover (Class 800)
- Welded cover (Class 1500/2500)
- Reduced bore
- Solid check disc
- Integral seat - ST6 (HF)
- Fully confined cover gasket (Class 800)
- Spring ensures reliable shut-off
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Full bore
- Butt weld ends
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- NACE standard
- Other threaded ends or butt weld ends to ASME B16.25
- Other trims

4.6.2.4 Pressure/temperature ratings

Table 67: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 105	136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		255,3	233,0	225,4	219,0	209,7	193,6	187,8	181,8	173,6	143,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		425,5	388,3	375,6	365,0	349,5	322,6	313,0	303,1	289,3	239,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11	137,9	137,9	132,7	127,4	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	58,6	39,8	26,4	17,7	-	-	-	-	-	-	-	-
1500	⁴¹⁾	258,6	257,4	248,7	239,8	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	128,6	74,5	44,0	30,5	-	-	-	-	-	-	-	-
2500		430,9	429,0	414,5	399,6	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	214,4	124,1	73,4	50,9	-	-	-	-	-	-	-	-
800	A 182 F22	137,9	137,9	133,9	129,6	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	70,7	49,1	32,2	20,2	-	-	-	-	-	-	-	-
1500		258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	92,2	52,6	34,4	-	-	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	153,7	87,7	57,4	-	-	-	-	-	-	-	-
800	A 182 F304 ⁴²⁾	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5	72,9	71,5	70,2	65,3	59,8	47,2	37,7	30,3	24,5	20,8	17,1	13,8	10,7	7,7
1500		248,2	204,3	185,0	172,4	162,4	151,1	148,1	145,2	142,2	140,0	137,0	134,7	132,4	122,1	104,2	84,4	68,9	56,3	46,7	40,1	33,8	28,9	17,4	14,1
2500		413,7	340,4	308,4	287,3	270,7	251,9	246,9	241,9	237,0	233,3	228,4	224,5	220,7	203,6	173,7	140,7	114,9	93,8	77,9	66,9	56,3	48,1	29,2	23,8
800	A 182 F316 ⁴²⁾	132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6	76,9	76,3	71,2	66,7	66,2	56,1	43,6	34,0	27,0	21,5	17,7	13,8	10,7	7,7
1500		248,2	211,0	192,5	178,3	166,9	154,4	151,6	149,4	147,2	145,7	144,2	143,4	140,9	125,5	119,7	99,5	79,1	63,3	51,6	41,9	34,9	29,3	17,4	14,1
2500		413,7	351,6	320,8	297,2	278,1	257,4	252,7	249,0	245,3	242,9	240,4	238,9	235,0	208,9	199,5	165,9	131,8	105,5	86,0	69,8	58,2	48,9	29,2	23,8
800	A 182 F304L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	62,2	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	117,1	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	195,1	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	125,5	119,7	97,5	73,0	49,6	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	208,9	199,5	162,5	121,7	82,7	-	-	-	-	-	-

Table 68: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
800	A 105	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3705	3395	3270	3170	3015	2840	2745	2665	2535	2055	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		6170	5655	5450	5280	5025	4730	4575	4425	4230	3430	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11 ⁴¹⁾	2000	2000	1925	1848	1773	1613	1568	1515	1418	1355	1298	1200	850	577	383	257	-	-	-	-	-	-	-	-
1500		3750	3750	3610	3465	3325	3025	2940	2840	2660	2540	2435	2245	1595	1080	720	480	-	-	-	-	-	-	-	-
2500		6250	6250	6015	5775	5540	5040	4905	4730	4430	4230	4060	3745	2655	1800	1200	800	-	-	-	-	-	-	-	-
800	A 182 F22	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1025	712	467	293	-	-	-	-	-	-	-	-
1500		3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1335	875	550	-	-	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	2230	1455	915	-	-	-	-	-	-	-	-
800	A 182 F304 ⁴²⁾	1920	1600	1435	1325	1240	1178	1152	1125	1102	1080	1057	1037	1018	947	867	685	547	440	355	302	248	200	155	112
1500		3600	3000	2690	2485	2330	2210	2160	2110	2065	2030	1980	1945	1910	1770	1630	1285	1030	825	670	565	465	380	290	205
2500		6000	5000	4480	4140	3880	3680	3600	3520	3440	3380	3300	3240	3180	2950	2715	2145	1715	1370	1115	945	770	630	485	345
800	A 182 F316 ⁴²⁾	1920	1653	1493	1368	1275	1203	1178	1160	1138	1125	1115	1107	1032	968	960	813	632	493	392	312	257	200	155	112
1500		3600	3095	2795	2570	2390	2255	2210	2170	2135	2110	2090	2075	1930	1820	1800	1525	1185	925	735	585	480	380	290	205
2500		6000	5160	4660	4280	3980	3760	3680	3620	3560	3520	3480	3460	3220	3030	3000	2545	1970	1545	1230	970	800	630	485	345
800	A 182 F304L	1600	1363	1217	1120	1048	992	973	960	942	920	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	1600	1363	1217	1120	1048	992	973	960	942	920	902	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	1690	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	2820	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1820	1800	1510	1115	720	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	3030	3000	2515	1855	1200	-	-	-	-	-	-

Table 69: Test pressures

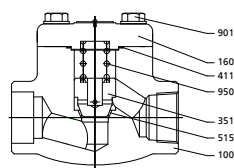
Test	Test medium	Class 800		Class 1500		Class 2500	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	205,1	2975	396	5625	660	9375
Leak test (seat)		149,8	2173	291	4125	484	6875

41) Use normalised and tempered materials only.

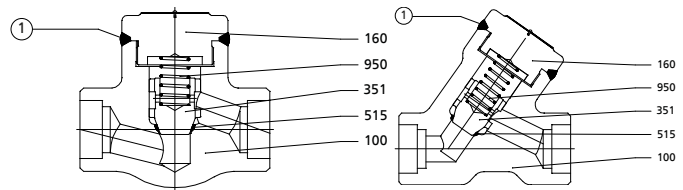
42) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.6.2.5 Materials

Class 800



Class 1500/2500, straight pattern Class 1500/2500, Y-pattern



① Seal-welded

Table 70: Parts list

Part No.	Description	Class	Material					
			A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10	A 182 F91 Trim 5
100	Body		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
160	Cover		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
351	Check disc	800	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-316/ A 276-316+ST6	A 276-410/ A 276-410+ST6
411	Joint ring	800	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite	
515	Seat ring		A 105 (integral)/ A 105+ST6	A 182 F11 (integral)/ A 182 F11+ST6	A 182 F22 (integral)/ A 182 F22+ST6	A 182 F304 (integral)/ A 182 F304+ST6	A 182 F316 (integral)/ A 182 F316+ST6	A 182 F91 (integral)/ A 182 F91+ST6
901	Bolt	800	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M	
950	Spring		SS304	SS304	SS304	SS304	SS316	Inconel X-750

4.6.2.6 Function

The main components of the lift check valves are the body (100), the cover (160) and the check disc (351).

Seat/disc interface The integral seating surfaces in the body (100) are hard-faced. The check disc (351) is spring-loaded.

Bonnet/cover seal On Class 800 valves, the cover (160) is bolted to the body (100). The joint is sealed by a joint ring (411). On Class 1500 and Class 2500 valves, the cover (160) is screwed into the body (100) and the joint is seal-welded.

4.7 Swing Check Valves to ANSI/ASME

4.7.1 ECOLINE SCC 150-600



4.7.1.1 Operating data

Table 71: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS 2" - 24"
Max. permissible pressure	106 bar / 1500 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.7.1.4, Page 66)

4.7.1.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Volatile fluids
- Feed water

4.7.1.3 Design details

Design

- Swing check valve to BS 1868
- Tested to API 598
- Body made of cast steel or stainless steel
- Bolted cover
- Internally mounted hinge pin up to 12"
- Externally mounted hinge pin for 14" and above
- Stainless steel/graphite gaskets
- Fully confined cover gasket
- Valve seat made of wear-resistant and corrosion-proof materials
- Disc protected against rotation
- Anti-rotation pin up to 12"
- Adjusting bolt up to 12"
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Counterweight and dampening device
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- Non-destructive testing, e.g. radiographic testing
- Inspections to technical codes such as AD2000 or IBR
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Larger nominal sizes and other variants on request

4.7.1.4 Pressure/temperature ratings

Table 72: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 216 WCB ⁴³⁾	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	-	-	-	-	-	-	-	-	-	-
300		51,0	46,9	45,2	43,8	41,7	39,3	37,9	36,5	34,8	28,3	22,1	15,9	9,3	5,9	-	-	-	-	-	-	-	-	-	-
600		102,0	93,8	90,3	87,2	83,1	78,3	75,8	73,1	70,0	56,9	44,1	31,7	19,0	11,7	-	-	-	-	-	-	-	-	-	-
150	A 217 WC6 ⁴⁴⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 217 WC9	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 217 C5	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,0 ⁴⁶⁾	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	25,9	19,0	13,8	10,0	6,9	4,1	2,4	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	51,4	37,9	27,6	20,0	13,8	8,6	4,8	-	-	-	-	-	-
150	A 217 C12	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	25,9	17,6	11,7	7,9	5,2	3,4	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	34,8	23,8	15,5	10,3	7,2	-	-	-	-	-	-
150	A 352 LCB ⁴⁵⁾	18,3	17,6	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		47,9	45,5	44,1	42,4	40,3	37,9	36,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		96,2	91,0	87,9	84,8	81,0	76,2	73,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352 LCC	20,0	17,9	15,9	13,8	11,7	9,7	8,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	96,6	91,7	83,4	81,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ⁴⁶⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,0 ⁴⁶⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 351 CF8M ⁴⁷⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,4 ⁴⁵⁾	1,0 ⁴⁶⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9

Table 73: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 216 WCB ⁴³⁾	285	260	230	200	170	140	125	110	95	80	65	50	35	20	-	-	-	-	-	-	-	-	-	-
300		740	680	655	635	605	570	550	530	505	410	320	230	135	85	-	-	-	-	-	-	-	-	-	-
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640	460	275	170	-	-	-	-	-	-	-	-	-	-
150	A 217 WC6 ⁴⁴⁾	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁴⁵⁾	20 ⁴⁵⁾	-	-	-	-	-	-	-	-
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	-
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-
150	A 217 WC9	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁴⁵⁾	20 ⁴⁵⁾	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-
150	A 217 C5	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁴⁵⁾	20 ⁴⁵⁾	20 ⁴⁵⁾	15 ⁴⁵⁾	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	375	275	200	145	100	60	35	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	745	550	400	290	200	125	70	-	-	-	-	-	-

43) Permissible but not recommended for prolonged use above 427 °C (800 °F).

44) Cannot be used for temperatures above 593 °C (1100 °F).

45) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

46) Cannot be used for temperatures above 343 °C (650 °F).

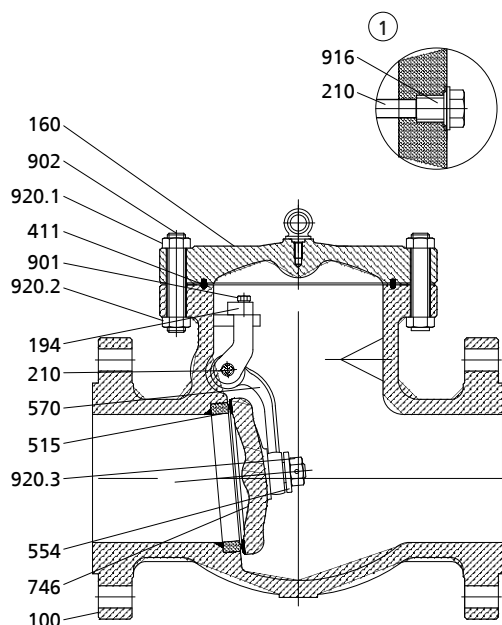
47) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 217 C12	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	375	255	170	115	75	50	-	-	-	-	-	-
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	505	345	225	150	105	-	-	-	-	-	-
150	A 352 LCB ⁽⁴⁾	265	255	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		695	660	640	615	585	550	535	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		1395	1320	1275	1230	1175	1105	1065	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 352 LCC	290	260	230	200	170	140	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		1500	1500	1455	1405	1330	1210	1175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ⁽⁴⁾	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	15 ⁽⁴⁾
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 351 CF8M ⁽⁴⁾	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	15 ⁽⁴⁾
300		720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85

Table 74: Test pressures

Test	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)		23	315	56	815	112	1630

4.7.1.5 Materials



① Externally mounted hinge pin (NPS 14" and above)

Table 75: Parts list

Part No.	Description	Material									
		A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A 352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	
100	Body	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	
160	Cover	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	
746	Valve disc	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	
515	Seat ring	A 105	A 182 F11	A 182 F22	A 182 F5	A 182 F9	A 182 LF2	A 350 LF2	A 182 F304	A 182 F316	
554	Washer	304	304	304	304	304	304	304	304	316	
920.3	Nut	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	
570	Hanger arm	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	
210	Hinge pin	See "Trim materials" table									
194	Bracket	A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M	

Part No.	Description	Material								
		A 216 WCB	A 217 WC6	A 217 WC9	A 217 C5	A 217 C12	A 352 LCB	A 352 LCC	A 351 CF8	A 351 CF8M
901	Bolt	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
411	Joint ring	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel
920.2	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
920.1	Nut	A 194 2H	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 7	A 194 Gr. 8	A 194 Gr. 8
902	Stud	A 193 B7	A 193 B16	A 193 B16	A 193 B16	A 193 B16	A 320 L7	A 320 L7	A 193 B8	A 193 B8
916	Plug	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel

Table 76: Trim materials

Part No.	Description	Trim 1	Trim 2	Trim 5	Trim 8	Trim 10
		13% chrome steel (Cr) / 13% chrome steel (Cr)	304 / 304	Stellite / Stellite	Stellite / 13% chrome steel (Cr)	316 / 316
746	Valve disc	13% chrome steel (Cr)	304 stainless steel	Stellite	13% chrome steel (Cr)	316 stainless steel
515	Seat ring	13% chrome steel (Cr)	304 stainless steel	Stellite	Stellite	316 stainless steel
210	Hinge pin	13% chrome steel (Cr)	304 stainless steel	13% chrome steel (Cr)	13% chrome steel (Cr)	316 stainless steel

4.7.1.6 Function

The main components of the swing check valves are the body (100), the cover (160) and the valve disc (746).

Seat/disc interface The hard-faced seat ring (515) is welded into the body (100). The seating surface of the valve disc (746) is hard-faced. The valve disc (746) is mounted on the hanger arm (570) by means of a nut (920.3) and pin. The hanger arm (570) pivots on a hinge pin (210) mounted inside the body (100).

Bonnet/cover seal The body (100) and the cover (160) are connected by studs (902.1) and nuts (920.1). The joint is sealed by means of a joint ring (411).

4.7.2 ECOLINE SCF 150-600



4.7.2.1 Operating data

Table 77: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS ½" - 2"
Max. permissible pressure	104 bar / 1480 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.7.2.4, Page 70)

4.7.2.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Volatile fluids
- Feed water

4.7.2.3 Design details

Design

- Swing check valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted cover
- Reduced bore
- Fully confined cover gasket
- Seat ring ST6(HF) swaged
- Solid disc
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Seal-welded body/cover joint
- Full bore
- Butt weld ends
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Other trims

4.7.2.4 Pressure/temperature ratings

Table 78: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 105	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	A 182 F11 ⁴⁸⁾	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	49,6	47,9	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	22,1	14,8	10,0	6,6	-	-	-	-	-	-	-	-
600		103,4	103,4	99,6	95,5	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	44,1	29,6	20,0	13,1	-	-	-	-	-	-	-	-
150	A 182 F304 ⁴⁹⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,0 ⁴⁹⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 182 F22	20,0	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	-	-	-	-	-	-	-	-
300		51,7	51,7	50,3	48,6	45,9	41,7	40,7	39,3	36,5	35,2	33,4	31,0	26,5	18,3	12,1	7,6	-	-	-	-	-	-	-	-
600		103,4	103,4	100,3	97,2	91,7	83,4	81,0	78,3	73,4	70,0	67,2	62,1	52,1	36,9	24,1	15,2	-	-	-	-	-	-	-	-
150	A 182 F316 ⁴⁹⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,4 ⁴⁹⁾	1,0 ⁴⁹⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9
150	A 182 F304L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	30,0	27,2	25,5	25,2	24,8	24,5	23,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	15,9	13,4	12,1	11,0	10,3	9,7	8,6	7,6	7,6	5,5	4,5	-	-	-	-	-	-	-	-	-	-	-	-	-
300		41,4	35,2	31,4	29,0	27,2	25,5	25,2	24,8	24,5	23,8	23,4	-	-	-	-	-	-	-	-	-	-	-	-	-
600		82,7	70,3	62,7	57,9	54,1	51,4	50,3	49,6	48,6	47,6	46,5	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 79: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
150	A 105	285	260	230	200	170	140	125	110	95	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
300		740	680	655	635	605	570	550	530	505	410	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F11 ⁽⁴⁾	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	-	-	-	-	-	-	-	-	-
300		750	750	720	695	665	605	590	570	530	510	485	450	320	215	145	95	-	-	-	-	-	-	-	-	
600		1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	-	-	-	-	-	-	-	-	-
150	A 182 F304 ⁽⁴⁾	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	15 ⁽⁴⁾
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40	
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85	
150	A 182 F22	290	260	230	200	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	-	-	-	-	-	-	-	-	-
300		750	750	730	705	665	605	590	570	530	510	485	450	385	265	175	110	-	-	-	-	-	-	-	-	
600		1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	535	350	220	-	-	-	-	-	-	-	-	-
150	A 182 F316 ⁽⁴⁾	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	20 ⁽⁴⁾	15 ⁽⁴⁾
300		720	620	560	515	480	450	440	435	425	420	420	415	385	365	360	305	235	185	145	115	95	75	60	40	
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85	
150	A 182 F304L	230	195	175	160	150	140	125	110	110	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	A 182 F316L	230	195	175	160	150	140	125	110	110	80	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300		600	510	455	420	395	370	365	360	355	345	340	-	-	-	-	-	-	-	-	-	-	-	-	-	
600		1200	1020	910	840	785	745	730	720	705	690	675	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 80: Test pressures

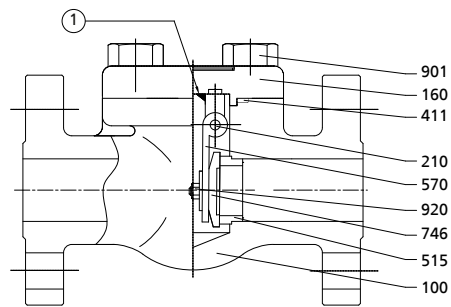
Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	31,0	450	77,6	1125	153,4	2225
Leak test (seat)		22,4	325	56,9	825	113,8	1650

48) Use normalised and tempered materials only.

49) Flanged end ratings terminate at 538 °C (1000 °F).

50) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.7.2.5 Materials



① Tack-welded

Table 81: Parts list

Part No.	Description	Material				
		A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10
100	Body	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
160	Cover	A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316
746	Valve disc	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316
411	Joint ring	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite
515	Seat ring	A 276 410 + STL6	A 276 410 + STL6	A 276 410 + STL6	A 276 304	A 276 316
210	Hinge pin	A 276 304	A 276 304	A 276 304	A 276 304	A 276 316
570	Hanger arm	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8M
901	Bolt	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M
920	Nut	A 194 8	A 194 8	A 194 8	A 194 8	A 194 8M

4.7.2.6 Function

The main components of the swing check valves are the body (100), the cover (160) and the valve disc (746).

Seat/disc interface The integral seating surfaces in the body are hard-faced. The valve disc (746) is mounted on the hanger arm (570) by means of a nut (920). The hanger arm (570) pivots on a hinge pin (210) mounted inside the body (100).

Bonnet/cover seal The body (100) and the cover (160) are connected by bolts (901). The joint is sealed by means of a joint ring (411).

4.7.3 ECOLINE SCF 800-2500



4.7.3.1 Operating data

Table 82: Operating properties

Characteristic	Value
Nominal pressure	Class 800 - 2500
Nominal size	NPS ½" - 2"
Max. permissible pressure	431 bar / 6250 PSI

Characteristic	Value
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	+538 °C / +1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.7.3.4, Page 72)

4.7.3.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Volatile fluids
- Feed water

4.7.3.3 Design details

Design

- Swing check valve to API 602
- Tested to API 598
- Body made of forged steel
- Bolted cover (Class 800)
- Welded cover (Class 1500/2500)
- Reduced bore
- Fully confined cover gasket (Class 800)
- Integral seat - ST6 (HF)
- Solid disc
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Full bore
- Butt weld ends
- Version in compliance with TA-Luft (German Clean Air Act) to VDI 2440 for temperatures up to 400 °C
- NACE standard
- Other threaded ends or butt weld ends to ASME B16.25
- Other trims

4.7.3.4 Pressure/temperature ratings

Table 83: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 105	136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		255,3	233,0	225,4	219,0	209,7	193,6	187,8	181,8	173,6	143,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		425,5	388,3	375,6	365,0	349,5	322,6	313,0	303,1	289,3	239,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 182 F11	137,9	137,9	132,7	127,4	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	58,6	39,8	26,4	17,7	-	-	-	-	-	-	-	-
1500	⁵¹⁾	258,6	257,4	248,7	239,8	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	128,6	74,5	44,0	30,5	-	-	-	-	-	-	-	-
2500		430,9	429,0	414,5	399,6	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	214,4	124,1	73,4	50,9	-	-	-	-	-	-	-	-
800	A 182 F22	137,9	137,9	133,9	129,6	122,2	111,2	108,1	104,5	97,8	93,4	89,5	82,7	70,7	49,1	32,2	20,2	-	-	-	-	-	-	-	-
1500		258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	92,2	52,6	34,4	-	-	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	153,7	87,7	57,4	-	-	-	-	-	-	-	-
800	A 182 F304 ⁵²⁾	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5	72,9	71,5	70,2	65,3	59,8	47,2	37,7	30,3	24,5	20,8	17,1	13,8	10,7	7,7
1500		248,2	204,3	185,0	172,4	162,4	151,1	148,1	145,2	142,2	140,0	137,0	134,7	132,4	122,1	104,2	84,4	68,9	56,3	46,7	40,1	33,8	28,9	17,4	14,1
2500		413,7	340,4	308,4	287,3	270,7	251,9	246,9	241,9	237,0	233,3	228,4	224,5	220,7	203,6	173,7	140,7	114,9	93,8	77,9	66,9	56,3	48,1	29,2	23,8
800	A 182 F316 ⁵²⁾	132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6	76,9	76,3	71,2	66,7	66,2	56,1	43,6	34,0	27,0	21,5	17,7	13,8	10,7	7,7
1500		248,2	211,0	192,5	178,3	166,9	154,4	151,6	149,4	147,2	145,7	144,2	143,4	140,9	125,5	119,7	99,5	79,1	63,3	51,6	41,9	34,9	29,3	17,4	14,1
2500		413,7	351,6	320,8	297,2	278,1	257,4	252,7	249,0	245,3	242,9	240,4	238,9	235,0	208,9	199,5	165,9	131,8	105,5	86,0	69,8	58,2	48,9	29,2	23,8
800	A 182 F304L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	110,3	94,0	83,9	77,2	72,3	68,4	67,1	66,2	64,9	63,4	62,2	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		206,8	173,9	157,0	145,8	137,3	127,4	125,4	123,8	121,5	119,3	117,1	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		344,7	289,9	261,6	243,0	228,9	212,3	208,9	206,3	202,5	198,8	195,1	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	258,6	257,6	250,8	243,4	231,8	206,6	201,1	194,1	183,1	175,1	169,0	158,2	140,9	125,5	119,7	97,5	73,0	49,6	-	-	-	-	-	-
2500		430,9	429,4	418,2	405,4	386,2	344,3	335,3	323,2	304,9	291,6	281,8	263,9	235,0	208,9	199,5	162,5	121,7	82,7	-	-	-	-	-	-

Table 84: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
800	A 105	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3705	3395	3270	3170	3015	2840	2745	2665	2535	2055	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		6170	5655	5450	5280	5025	4730	4575	4425	4230	3430	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F11 ⁵¹⁾	2000	2000	1925	1848	1773	1613	1568	1515	1418	1355	1298	1200	850	577	383	257	-	-	-	-	-	-	-	-
1500		3750	3750	3610	3465	3325	3025	2940	2840	2660	2540	2435	2245	1595	1080	720	480	-	-	-	-	-	-	-	-
2500		6250	6250	6015	5775	5540	5040	4905	4730	4430	4230	4060	3745	2655	1800	1200	800	-	-	-	-	-	-	-	-
800	A 182 F22	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1025	712	467	293	-	-	-	-	-	-	-	-
1500		3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1335	875	550	-	-	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	2230	1455	915	-	-	-	-	-	-	-	-
800	A 182 F304 ⁵²⁾	1920	1600	1435	1325	1240	1178	1152	1125	1102	1080	1057	1037	1018	947	867	685	547	440	355	302	248	200	155	112
1500		3600	3000	2690	2485	2330	2210	2160	2110	2065	2030	1980	1945	1910	1770	1630	1285	1030	825	670	565	465	380	290	205
2500		6000	5000	4480	4140	3880	3680	3600	3520	3440	3380	3300	3240	3180	2950	2715	2145	1715	1370	1115	945	770	630	485	345
800	A 182 F316 ⁵²⁾	1920	1653	1493	1368	1275	1203	1178	1160	1138	1125	1115	1107	1032	968	960	813	632	493	392	312	257	200	155	112
1500		3600	3095	2795	2570	2390	2255	2210	2170	2135	2110	2090	2075	1930	1820	1800	1525	1185	925	735	585	480	380	290	205
2500		6000	5160	4660	4280	3980	3760	3680	3620	3560	3520	3480	3460	3220	3030	3000	2545	1970	1545	1230	970	800	630	485	345
800	A 182 F304L	1600	1363	1217	1120	1048	992	973	960	942	920	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F316L	1600	1363	1217	1120	1048	992	973	960	942	920	902	-	-	-	-	-	-	-	-	-	-	-	-	-
1500		3000	2555	2280	2100	1970	1860	1825	1800	1765	1730	1690	-	-	-	-	-	-	-	-	-	-	-	-	-
2500		5000	4260	3800	3500	3280	3100	3040	3000	2940	2880	2820	-	-	-	-	-	-	-	-	-	-	-	-	-
1500	A 182 F91	3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1930	1820	1800	1510	1115	720	-	-	-	-	-	-
2500		6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3220	3030	3000	2515	1855	1200	-	-	-	-	-	-

Table 85: Test pressures

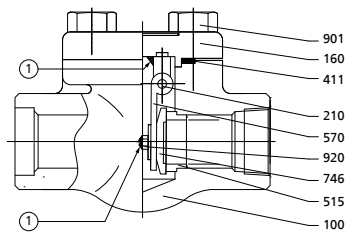
Test	Test medium	Class 800		Class 1500		Class 2500	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	205,1	2975	396	5625	660	9375
Leak test (seat)		149,8	2173	291	4125	484	6875

51) Use normalised and tempered materials only.

52) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.7.3.5 Materials

Class 800



① Tack-welded

② Seal-welded

Class 1500/2500

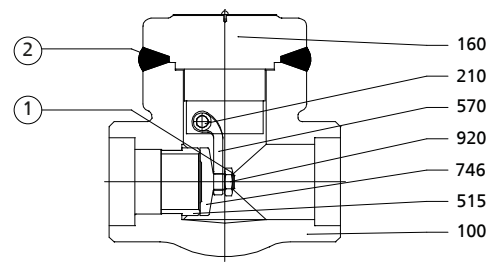


Table 86: Parts list

Part No.	Description	Class	Material					
			A 105 Trim 8	A 182 F11 Trim 5	A 182 F22 Trim 5	A 182 F304 Trim 2	A 182 F316 Trim 10	A 182 F91 Trim 5
100	Body		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
160	Cover		A 105	A 182 F11	A 182 F22	A 182 F304	A 182 F316	A 182 F91
210	Hinge pin		A 276-304	A 276-304	A 276-304	A 276-304	A 276-316	A 276-304
746	Valve disc	800	A 182 F6a	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-316/ A 276-316+ST6	A 276-410/ A 276-410+ST6
411	Joint ring	800	304 + graphite	304 + graphite	304 + graphite	304 + graphite	316 + graphite	
515	Seat ring	800	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F6a + STL6	A 182 F304	A 182 F316	
		1500/2500	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-410/ A 276-410+ST6	A 276-304/ A 276-304+ST6	A 276-316/ A 276-316+ST6	A 276-410/ A 276-410+ST6
570	Hanger arm		A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8	A 351 CF8M	A 351 CF8
901	Bolt	800	A 193 B7	A 193 B16	A 193 B16	A 193 B8	A 193 B8M	
920	Nut	800	A 194 8	A 194 8	A 194 8	A 194 8	A 194 8M	
		1500/2500	A 276-304	A 276-304	A 276-304	A 276-304	A 276-316	A 276-304

4.7.3.6 Function

The main components of the swing check valves are the body (100), the cover (160) and the valve disc (746).

Seat/disc interface The integral seating surfaces in the body are hard-faced. The valve disc (746) is mounted on the hanger arm (570) by means of a nut (920). The hanger arm (570) pivots on a hinge pin (210) mounted inside the body (100).

Bonnet/cover seal On Class 800 valves, the cover (160) is bolted to the body (100). The joint is sealed by a joint ring (411). On Class 1500 and Class 2500 valves, the cover (160) is screwed into the body (100) and the joint is seal-welded.

4.7.4 ECOLINE SCV 150-300



4.7.4.1 Operating data

Table 87: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 300
Nominal size	NPS 2" - 12"
Max. permissible pressure	50 bar / 720 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.7.4.4, Page 76)

4.7.4.2 Fluids handled

- Steam
- Gas
- Fluids containing gas
- High-temperature hot water
- Volatile fluids
- Oil
- Feed water

4.7.4.3 Design details

Design

- Swing check valve to ASME B16.34
- Tested to API 598
- Compact design to API 603
- Valve made of corrosion-resistant materials
- Body made of stainless steel
- Bolted cover
- Stainless steel/graphite gaskets
- Fully confined cover gasket
- Internally mounted hinge pin
- Integrated seat ring
- Minimum wall thickness as per ASME B16.34
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- PTFE gasket
- Grease-free version
- Non-destructive testing, e.g. radiographic testing
- NACE standard
- Other flange designs
- Larger nominal sizes and other variants on request

4.7.4.4 Pressure/temperature ratings

Table 88: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 351 CF8 ⁵³⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,0 ⁵⁴⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
150	A 351 CF8M ⁵³⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,4 ⁵⁴⁾	1,0 ⁵⁴⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8

Table 89: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 351	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	15 ⁵⁴⁾
300	CF8 ⁵³⁾	720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
150	A 351	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	20 ⁵⁴⁾	15 ⁵⁴⁾
300	CF8M ⁵³⁾	720	620	560	515	480	450	440	435	425	420	415	385	365	360	360	305	235	185	145	115	95	75	60	40

Table 90: Test pressures

Test	Test medium	Class 150		Class 300	
		[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125
Leak test (seat)		23	315	56	815

4.7.4.5 Materials

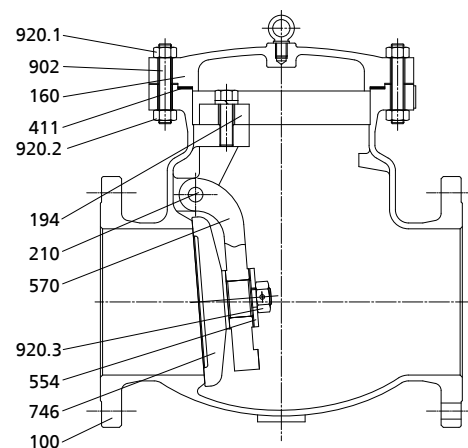


Table 91: Parts list

Part No.	Description	Material	
		A 351 CF8	A 351 CF8M
100	Body	A 351 CF8	A 351 CF8M
746	Valve disc	A 351 CF8	A 351 CF8M
554	Washer	A 276 304	A 276 316

53) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

54) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

Part No.	Description	Material	
		A 351 CF8	A 351 CF8M
920.3	Nut	A 194 8	A 194 8M
570	Hanger arm	A 351 CF8	A 351 CF8M
210	Hinge pin	A 276 304	A 276 316
194	Bracket	A 351 CF8	A 351 CF8M
920.2	Nut	A 194 8	A 194 8
411	Joint ring	Stainless steel/graphite	Stainless steel/graphite
160	Cover	A 351 CF8	A 351 CF8M
902	Stud	A 193 B8	A 193 B8
920.1	Nut	A 194 8	A 194 8

Table 92: Trim materials

Part No.	Description	Trim 2	Trim 10
		304 / 304	316 / 316
100	Body	304 stainless steel	316 stainless steel
746	Valve disc	304 stainless steel	316 stainless steel
210	Hinge pin	304 stainless steel	316 stainless steel

4.7.4.6 Function

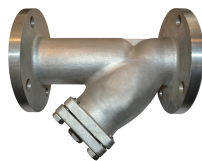
The main components of the swing check valves are the body (100), the cover (160) and the valve disc (746).

Seat/disc interface The seat ring is an integral part of the body (100). The seating surface of the valve disc (746) is machined. The valve disc (746) is mounted on the hanger arm (570) by means of a nut (920.3) and pin. The hanger arm (570) pivots on a hinge pin (210) mounted inside the body (100).

Bonnet/cover seal The body (100) and the cover (160) are connected by studs (902) and nuts (920.1). The joint is sealed by means of a joint ring (411).

4.8 Strainers to ANSI/ASME

4.8.1 ECOLINE FYC 150-600



4.8.1.1 Operating data

Table 93: Operating properties

Characteristic	Value
Nominal pressure	Class 150 - 600
Nominal size	NPS 2" - 12"
Max. permissible pressure	106 bar / 1500 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.8.1.4, Page 78)

4.8.1.2 Fluids handled

- Steam
- Fluids containing gas
- Fluids containing mineral oils
- Gas
- Oil

4.8.1.3 Design details

Design

- Strainer to ASME B16.34
- Tested to API 598
- Y-pattern strainer
- Body made of cast steel or stainless steel
- Bolted cover
- Fully confined cover gasket
- Cover made of wear and corrosion-resistant materials
- Stainless steel/graphite gaskets
- Cylindrical screen made of stainless steel
- Drain plug
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- Other mesh widths on request
- Other screen materials
- Other drain plug sizes
- Butt weld ends
- Non-destructive testing, e.g. radiographic testing
- NACE standard
- Other flanged end designs or butt weld ends to ASME B16.25
- Other material variants
- Larger nominal sizes and other variants on request

4.8.1.4 Pressure/temperature ratings

Table 94: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	-29 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
150	A 216 WCB ⁵⁵⁾	19,7	17,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	-	-	-	-	-	-	-	-	-	-
300		51,0	46,9	45,2	43,8	41,7	39,3	37,9	36,5	34,8	28,3	22,1	15,9	9,3	5,9	-	-	-	-	-	-	-	-	-	-
600		102,0	93,8	90,3	87,2	83,1	78,3	75,8	73,1	70,0	56,9	44,1	31,7	19,0	11,7	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ⁵⁶⁾	19,0	15,9	14,1	13,1	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,0 ⁵⁷⁾
300		49,6	41,4	37,2	34,1	32,1	30,3	29,6	29,0	28,6	27,9	27,2	26,9	26,2	24,5	22,4	17,6	14,1	11,4	9,3	7,9	6,6	5,2	4,1	2,8
600		99,3	82,7	74,1	68,6	64,1	61,0	59,6	58,3	56,9	55,8	54,5	53,8	52,7	49,0	44,8	35,5	28,3	22,8	18,3	15,5	12,8	10,3	7,9	5,9
150	A 351 CF8M ⁵⁶⁾	19,0	16,2	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	2,4	1,4	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,4 ⁵⁷⁾	1,0 ⁵⁷⁾
300		49,6	42,7	38,6	35,5	33,1	31,0	30,3	30,0	29,3	29,0	29,0	28,6	26,5	25,2	24,8	21,0	16,2	12,8	10,0	7,9	6,6	5,2	4,1	2,8
600		99,3	85,5	77,2	70,7	65,8	62,1	61,0	60,0	59,0	58,3	57,6	57,2	53,4	50,0	49,6	42,1	32,8	25,5	20,3	16,2	13,1	10,3	7,9	5,9

55) Permissible but not recommended for prolonged use above 427 °C (800 °F).

56) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

57) For butt weld end valves only. Flanged end ratings terminate at 538 °C (1000 °F).

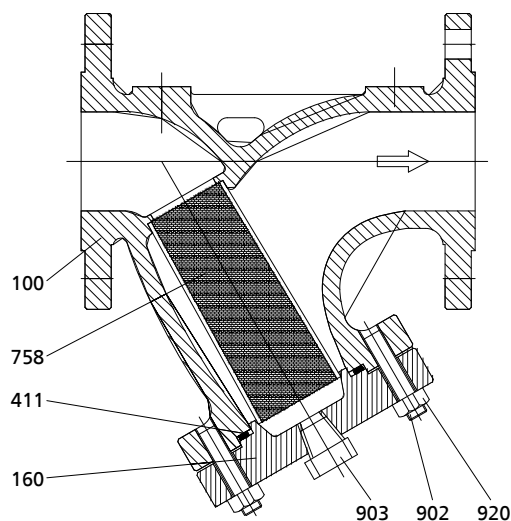
Table 95: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
150	A 216 WCB ^(a)	285	260	230	200	170	140	125	110	95	80	65	50	35	20	-	-	-	-	-	-	-	-	-	-
300		740	680	655	635	605	570	550	530	505	410	320	230	135	85	-	-	-	-	-	-	-	-	-	-
600		1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640	460	275	170	-	-	-	-	-	-	-	-	-	-
150	A 351 CF8 ^(a)	275	230	205	190	170	140	125	110	95	80	65	50	35	20	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	15 ^(b)
300		720	600	540	495	465	440	430	420	415	405	395	390	380	355	325	255	205	165	135	115	95	75	60	40
600		1440	1200	1075	995	930	885	865	845	825	810	790	780	765	710	650	515	410	330	265	225	185	150	115	85
150	A 351 CF8M ^(a)	275	235	215	195	170	140	125	110	95	80	65	50	35	20	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	20 ^(b)	15 ^(b)
300		720	620	560	515	480	450	440	435	425	420	415	415	385	365	360	305	235	185	145	115	95	75	60	40
600		1440	1240	1120	1025	955	900	885	870	855	845	835	830	775	725	720	610	475	370	295	235	190	150	115	85

Table 96: Test pressures

Test	Test medium	Class 150		Class 300		Class 600	
		[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
Shell	Water	32	450	78	1125	153	2225

4.8.1.5 Materials


Table 97: Parts list

Part No.	Description	Material		
		A 216 WCB	A 351 CF8	A 351 CF8M
100	Body	A 216 WCB	A 351 CF8	A 351 CF8M
758	Screen	See "Trim materials" table		
411	Joint ring	Graphite + stainless steel	Graphite + stainless steel	Graphite + stainless steel
160	Cover	A 216 WCB	A 351 CF8	A 351 CF8M
903	Drain plug	A 105	A 182 F304	A 182 F316
902	Stud	A 193 B7	A 193 B8	A 193 B8
920	Nut	A 194 2H	A 194 Gr. 8	A 194 Gr. 8

Table 98: Trim materials

Part No.	Description	Trim 2	Trim 10
		304 / 304	316 / 316
758	Screen	304 stainless steel	316 stainless steel

4.8.1.6 Function

The main components of the strainers are the body (100), the cover (160) and the screen (758).

Flow direction The screen (758) is clamped between the body (100) and the cover (160) by means of the studs (902) and nuts (920). The screen (758) is made of grade 304 stainless steel.

Bonnet/cover seal The body (100) and the cover (160) are connected by studs (902) and nuts (920). The joint is sealed by means of a joint ring (411).

4.8.2 ECOLINE FYF 800



4.8.2.1 Operating data

Table 99: Operating properties

Characteristic	Value
Nominal pressure	Class 800
Nominal size	NPS ½" - 2"
Max. permissible pressure	141 bar / 2000 PSI
Min. permissible temperature	0 °C / 32 °F
Max. permissible temperature	816 °C / 1500 °F

Temperatures < 0 °C on request

Selection as per pressure/temperature ratings (⇒ Section 4.8.2.4, Page 81)

4.8.2.2 Fluids handled

- Steam
- Fluids containing gas
- Gas
- High-temperature hot water
- Fluids containing mineral oils
- Oil
- Feed water

4.8.2.3 Design details

Design

- Strainer to ASME B16.34
- Tested to API 598
- Y-pattern strainer
- Body made of forged steel
- Bolted cover
- Reduced bore
- Fully confined cover gasket
- Cylindrical screen made of stainless steel
- Cover equipped with screw plug
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- 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.

Variants

- PTFE gasket
- Other mesh widths on request
- Other screen materials
- NACE standard

4.8.2.4 Pressure/temperature ratings

Table 100: Permissible operating pressures in bar at temperatures in °C (to ASME B16.34)

Class	Material	0 to 38	93	149	204	260	316	343	371	399	427	454	482	510	538	566	593	621	649	677	704	732	760	788	816
800	A 105	136,0	124,8	120,5	116,4	110,9	104,5	101,1	97,4	93,2	75,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F304 ⁵⁸⁾	132,4	110,3	98,9	91,4	85,5	81,2	79,4	77,6	76,0	74,5	72,9	71,5	70,2	65,3	59,8	47,2	37,7	30,3	24,5	20,8	17,1	13,8	10,7	7,7
800	A 182 F316 ⁵⁸⁾	132,4	114,0	102,9	94,3	87,9	82,9	81,2	80,0	78,5	77,6	76,9	76,3	71,2	66,7	66,2	56,1	43,6	34,0	27,0	21,5	17,7	13,8	10,7	7,7

Table 101: Permissible operating pressures in PSI at temperatures in °F (to ASME B16.34)

Class	Material	32 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
800	A 105	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	A 182 F304 ⁵⁸⁾	1920	1600	1435	1325	1240	1178	1152	1125	1102	1080	1057	1037	1018	947	867	685	547	440	355	302	248	200	155	112
800	A 182 F316 ⁵⁸⁾	1920	1653	1493	1368	1275	1203	1178	1160	1138	1125	1115	1107	1032	968	960	813	632	493	392	312	257	200	155	112

Table 102: Test pressures

Test	Test medium	Class 800	
		[bar]	[psi]
Shell	Water	205,1	2975

4.8.2.5 Materials

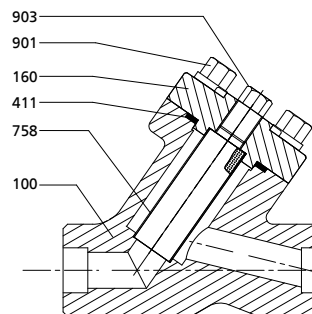


Table 103: Parts list

Part No.	Description	Material		
		A 105 Trim 2	A 182 F304 Trim 2	A 182 F316 Trim 10
903	Drain plug	A 105N	A 182 F304	A 182 F316
160	Cover	A 105N	A 182 F304	A 182 F316
411	Joint ring	SS 316 + graphite	SS 316 + graphite	SS 316 + graphite
758	Screen	AISI 304	AISI 304	AISI 316
100	Body	A 105N	A 182 F304	A 182 F316
901	Bolt	A 193-B7	A 193-B8	A 193-B8

58) At temperatures over 538 °C (1000 °F), use only when carbon content is 0.04% or higher.

4.8.2.6 Function

The main components of the strainers are the body (100), the cover (160) and the screen (758).

Flow direction The screen (758) is clamped between the body (100) and the cover (160) by means of the bolts (901).

Bonnet/cover seal The body (100) and the cover (160) are connected by bolts (901). The joint is sealed by means of a joint ring (411).

5 Installation at Site

5.1 General information/Safety regulations

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

Responsibility for positioning and installing the valve lies with the consultant, construction company or operator/user. Planning and installation errors may impair the reliable function of the valve and pose a substantial safety hazard.

	 DANGER Dead-end valve High-pressure hazard! Risk of burns! ▷ Protect the valve against unauthorised or unintentional opening.
	 WARNING Cold/hot piping and/or valve Risk of thermal injury! ▷ Insulate the valve. ▷ Attach warning signs.
	 WARNING Exposed rotating parts Risk of injury! ▷ Do not touch rotating parts. ▷ When the equipment is in operation, perform any work with utmost caution. ▷ Take suitable precautions, e.g. provide safety covers.
	 WARNING Impermissible loads resulting from operating conditions and/or valve-mounted components, e.g. actuators Leakage from or rupture of the valve body! ▷ Provide adequate support. ▷ Additional loads, e.g. traffic, wind or earthquakes are not taken into account for standard variants; these require a separate design.
	CAUTION Condensation water forming in air-conditioning, cooling and refrigerating systems Ice forming! Blockage of actuating element! Damage due to corrosion! ▷ Insulate the valve to prevent diffusion.

	CAUTION Improper installation Damage to the valve! ▷ Remove the caps prior to installation. ▷ Clean the mating flange faces. ▷ Protect the body and bonnet/cover from any impacts.
	CAUTION Outdoor installation Damage due to corrosion! ▷ Protect the valve appropriately against moisture.
	CAUTION Painting of pipes Impairment of the valve's function and loss of information! ▷ Protect stem and plastic components prior to applying paint. ▷ Protect printed name plates prior to applying paint.
	CAUTION Impermissible load Damage to the actuating element! ▷ Do not use the valve as a foothold.
	NOTE For the valves to reach the documented Kv values, the flow direction must correspond to the flow direction arrow.
	NOTE The mating flange faces must be clean and undamaged and the gaskets on the mating flanges must be properly centred.
	NOTE Use an appropriate tool to evenly tighten the bolts crosswise, applying the permissible torques.

5.2 Installation position and location

Valves marked with a flow direction arrow must be installed such that the flow direction of the fluid corresponds to the direction shown by the arrow on the valve body.

Gate valves Any installation position can be chosen for gate valves. For gate valves installed in horizontal pipes a vertical stem position is recommended (handwheel or actuator on top). Installation with the stem in a horizontal or inclined position (e.g. in a vertical pipe) is permitted; in this case, however, the actuator must be adequately supported.

Globe valves Globe valves can be installed in any position unless specified otherwise. The best installation position is with the stem pointing vertically upwards. Installation with the stem in a horizontal or inclined position (e.g. in a vertical pipe) is permitted; in this case, however, the actuator must be adequately supported.

- Swing check valves** Preferably install swing check valves in horizontal pipes. When installing them in vertical pipes, make sure that the flow direction is upward. In the unpressurised condition, the valve disc will then be closed by its own weight.
- Lift check valves** The valves must be installed in such a manner that the fluid enters the valve beneath valve disc 351 and flows out above the valve disc.
- Valves without a spring can only be installed in a vertical position, i.e. in horizontal pipes and with the cover pointing upwards.
- Strainers** Strainers can be installed in horizontal or vertical pipes. The fluid must always enter through the screen inlet. Flow through strainers installed in vertical pipes must always be downwards.
- Installation location** The valve must not be fitted downstream of tees and level and three-dimensional double bends.

5.3 Welding into the pipeline

Responsibility for welding the valve into the piping and for any heat treatment required lies with the commissioned construction company or the plant operator.

	CAUTION Weld beads, scale and other impurities Damage to the valve! ▷ Take suitable measures to protect the valve against impurities. ▷ Remove any impurities from the piping. ▷ If necessary, install a strainer.
	CAUTION Incorrect earthing during welding work on the piping Damage to the valve (scorching)! ▷ Open the valve during welding. ▷ Never earth the electric welding equipment on the valve's functional parts.
	CAUTION Non-compliance with the max. permissible application temperature Damage to the valve! ▷ Complete the weld seam in several steps to ensure that the temperature in the middle of the body does not exceed the max. permissible application temperature.
	NOTE For valves with socket weld ends, comply with the insertion depth given in the applicable technical code. A gap between the pipe end and the base of the weld socket prevents impermissible stress on the weld.

5.4 Valves with actuator

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

Mounted actuators are factory-set and ready for operation. Changes to these settings, e.g. changes to the set switching points of the limit positions, may impair the valve's function and result in damage to the actuator, valve or the system.

	 DANGER Unqualified personnel performing work on valves with actuator Danger of death from electric shock! ▷ 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.
	 DANGER Work on valves with energy storage, e.g. spring mechanisms or compressed air storage Danger to life resulting from incorrect assembly ▷ Ensure that work on the actuator is performed by qualified specialist personnel. ▷ Mount/remove the actuator in accordance with the operating manual.
	NOTE If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.

On valves with electric, pneumatic or hydraulic actuators, the actuator strokes/forces must be limited.

Electric actuators Electric actuators are ready for operation and wired as follows:

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

The wiring diagrams are located in the terminal boxes.

Pneumatic/hydraulic actuators For pneumatic or hydraulic actuators, the control pressures specified in the order confirmation must be observed. Non-observance may damage the actuator.

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

5.5 Insulation

	NOTE Any insulation fitted on the valve must not impair the valve's function. The sealing areas at the cover/bonnet joint and at the stem passage (gland packing) must be directly accessible and visible.
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6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

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

- The material, pressure and temperature data on the valve complies with the operating conditions of the piping. (⇒ Section 4, Page 13) .
- The material's chemical resistance and stability under load have been checked.

The nominal pressure classes only apply at room temperature. For values for higher temperatures, refer to the pressure/temperature ratings tables. (⇒ Section 4, Page 13) . Using the valve in conditions deviating from those specified will lead to overload which the valves cannot withstand.

	CAUTION Welding beads, scale and other impurities in the piping Damage to the valve! ▷ Remove any impurities from the piping. ▷ If necessary, install a strainer.
1. Thoroughly clean, flush and blow through all vessels, pipelines and connections (especially of new installations). 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.	
	 DANGER Surge pressure/water hammer potentially occurring at high temperatures Danger to life caused by burns or scalds! ▷ The max. permissible valve pressure must not be exceeded (⇒ Section 4, Page 13) . ▷ Use valves made of nodular cast iron or steel. ▷ Operator shall provide general safety measures for the system.
	CAUTION Aggressive flushing and pickling agents Damage to the valve! ▷ Match the cleaning operation mode and duration of flushing and pickling to the body and seal materials used. ▷ Responsibility for the compatibility of the pickling media used and the pickling procedure itself lies with the pickling company.

Functional check The following functions must be checked:

1. Check the shut-off function of the installed valve prior to commissioning/start-up by opening and closing it several times.
2. Check the gland packing (461) for leakage when it is subjected to full operating pressure and temperature for the first time.
3. If the gland follower (452) is loose, evenly re-tighten the nuts (920.1).

4. Check the bonnet/cover bolting (902.1/920.1) and the joint ring (411.1) for tightness after the valve has been subjected to load conditions or heated up for the first time.
5. To avoid stress or distortion, open the valve by several counter-clockwise handwheel turns.
6. If the bonnet/cover bolting (902.1/920.1) has loosened, evenly re-tighten it crosswise.

	NOTE Re-tightening the bonnet/cover bolting is particularly important for valves operated at temperatures exceeding 200 °C.
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Valves with actuator On valves with electric, pneumatic or hydraulic actuators, the actuator strokes/forces must be limited.

	⚠ DANGER Unqualified personnel performing work on valves with actuator Danger of death from electric shock! ▷ 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.
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	⚠ WARNING Incorrect connection to the mains Damage to the mains network, short circuit! ▷ Observe the technical specifications of the local energy supply companies.
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	NOTE If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.
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1. Check the available mains voltage against the data on the name plate of the actuator.
2. Select an appropriate start-up method.

Electric actuators are ready for operation and wired as follows:

- Valve "CLOSED": torque-dependent
- Valve "OPEN": travel-dependent

The wiring diagrams are located in the terminal boxes.

For pneumatic or hydraulic actuators, the control pressures specified in the order confirmation must be observed. Non-observance may damage the actuator.

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

6.1.2 Valve actuation

	NOTE 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 found on the top of the handwheel.
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	NOTE Globe valves are normally used in either "fully open" or "fully closed" position. For control functions, valves should be fitted with throttling plugs, unless throttling plugs are installed as standard.
	CAUTION Excessively long idle periods Damage to the valve! ▸ Check the function by opening and closing the valve at least once or twice a year.
	CAUTION Vibration Excessive wear or damage to the valve! ▸ Change the system parameters. ▸ Use throttling plugs or V-port plugs in throttling applications to minimise vibration.
	CAUTION Use of levers Damage to the valve as a result of excessive forces! ▸ Only actuate handwheel-operated valves by hand. ▸ Levers may only be used in exceptional cases and in compliance with the following tables. ▸ Do not use levers in the area of the position indicator.

6.2 Shutdown

6.2.1 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.

7 Servicing/Maintenance

7.1 Safety regulations

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

	 DANGER Valve under pressure High-pressure hazard! Leakage of hot and/or toxic fluids! Risk of burns! ▷ The valve and its surrounding system must be depressurised prior to any maintenance and installation work. ▷ If the bellows are defective or fluid escapes, ensure the valve is depressurised. ▷ Ensure the valve is depressurised before removing any drain, opening or vent plugs. ▷ Allow the valve to cool down so that the temperature is below the fluid's vaporisation temperature in all areas in contact with the fluid in order to effectively prevent any risk of scalding. ▷ Never vent the valve by removing the bonnet/cover bolting or gland packing. ▷ Use appropriate spare parts and tools, even in emergencies.
	 WARNING Fluids, consumables and supplies which are hot and/or pose a health hazard Risk of injury! ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate valves used for handling fluids posing a health hazard.
	NOTE Before removing the valve from the piping, ensure that the pipe has been taken out of service and released for repair/maintenance work.
	NOTE All maintenance, service 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.

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

Never use force when dismantling and reassembling the valve.

7.2 Maintenance

This valve has been designed to be largely maintenance-free. The materials of the sliding parts have been selected for minimum wear.

	NOTE The user is responsible for defining appropriate intervals for checks and maintenance, depending on the application of the valve.
	NOTE If several valves are serviced at the same time, take appropriate measures to prevent the dismantled parts from getting mixed up.

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

- Check the function by opening and closing the valve at least once or twice a year.
- Lubricate the moving parts such as stem (200) and gland bolts (not for oxygen valves) using appropriate lubricants (e.g. lubricants suitable for high temperatures).
- Add or replace packing rings in the gland packing (461) in a timely manner.
- Re-tighten or replace the bonnet/cover gasket (411.1) in a timely manner.

Testing overhauled valves After reassembly and prior to commissioning/start-up, the valves must be subjected to shell and leak testing to DIN EN 12266-1.

8 Trouble-shooting

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

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

Table 104: Trouble-shooting

Problem	Possible cause	Remedy
Leakage at the seat	- Contaminations or solids in the fluid - Erosion, corrosion or abrasion - Excessive loads from pipeline forces or thermal stresses	- Dismantle the bonnet/cover bolting (902.1/920.1). - Rework the seating faces of valve disc and body using a suitable re-seating tool. - Continue re-seating until the seating faces exhibit a consistently smooth and even ring.
Leakage at the gland packing	Unevenly tightened gland packing	Re-tighten the hexagon nuts (920/920.2) as specified in the manual.
	Defective gland packing	- Undo hexagon nuts (920/920.2). - Lift the gland follower (452). - Clean the gland packing chamber. - Insert split packing rings in such a manner that the cut ends of the rings are offset by between 120° and 180°.
Leakage at bonnet/body joint or cover/body joint (bolted bonnet/cover design)	Unevenly tightened bonnet/cover bolts	Re-tighten the bonnet/cover bolting (902.1/920.1) as specified in the manual.
	Defective bonnet/cover gasket	- Dismantle the bonnet/cover bolting (902.1/920.1). - Clean sealing surfaces. - Replace the joint ring (411). The tightening torques must be observed.
Leakage at the bonnet/body joint or cover/body joint (for pressure seal design)	Unevenly tightened hexagon head bolts.	Re-tighten the hexagon head bolts (901.1/920.1) as specified in the manual.
	Defective joint ring	- Remove pressure seal bonnet/cover. - Clean sealing surfaces. - Replace the joint ring (411.1). The tightening torques must be observed.

9 EU Declaration of Conformity

9.1 EU Declaration of Conformity for ECOLINE FYF 800, GLF 2500, GLB 800, GTF 2500, GTB 800, PTF 2500, SCF 2500

Hereby we,

KSB Valves (Changzhou) Co., Ltd.
No. 68 Huanbao Four Road,
Environment Protection Industrial Park,
Xinbei District, Changzhou City, Jiangsu Province
P. R. China

declare that **the product:**

Gate valves

ECOLINE GTF 2500	Class 2500	NPS ½" - 2"
ECOLINE GTB 800	Class 150 - 800	NPS ½" - 2"

Globe valves

ECOLINE GLF 2500	Class 2500	NPS ½" - 2"
ECOLINE GLB 800	Class 150 - 800	NPS ½" - 2"

Swing check valves

ECOLINE SCF 2500	Class 2500	NPS ½" - 2"
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Lift check valves

ECOLINE PTF 2500	Class 2500	NPS ½" - 2"
------------------	------------	-------------

Strainers

ECOLINE FYF 800	Class 800	NPS ½" - 2"
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satisfies the safety requirements laid down in the Pressure Equipment Directive 2014/68/EU.

Applicable standards:

Gate valves, globe valves, non-return valves:	API 602, ASME B16.34
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:

DET NORSKE VERITAS
Viale Colleoni, 9, Centro Direzionale Colleoni - Palazzo Sirio 2,
20864 Agrate Brianza MB (Italy)

Identification number of the notified body:

0496

Valves of nominal size ≤ 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, 7 September 2016



Jason Ji
Head of Quality Management

9.2 EU Declaration of Conformity for ECOLINE GTC, GLC, SCC, GLF, GTF, SCF, PTF

Hereby we,

KSB Valves (Changzhou) Co., Ltd.
No. 68 Huanbao Four Road,
Environment Protection Industrial Park,
Xinbei District, Changzhou City, Jiangsu Province
P. R. China

declare that **the product:**

Gate valves

ECOLINE GTC 150-600	Class 150 - 600	NPS 2" - 36"
---------------------	-----------------	--------------

Globe valves

ECOLINE GLC 150-600	Class 150 - 600	NPS 2" - 12"
---------------------	-----------------	--------------

Swing check valves

ECOLINE SCC 150-600	Class 150 - 600	NPS 2" - 24"
---------------------	-----------------	--------------

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

Applicable standards:

Gate valve:	API 600
Globe valve:	BS 1873
Non-return valve:	BS 1868
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

This Declaration of Conformity also confirms the conformity of the casting suppliers for ECOLINE with the requirements of Pressure Equipment Directive 2014/68/EU (PED) and "AD 2000-Merkblatt W 0" regarding the materials used for the pressure-retaining parts.

Materials inspected:

Standard	Grade
EN 10213-2007	1.0619
EN 10213-2007	1.4408
EN 10213-2007	1.4308

The EU Declaration of Conformity was issued in/on:

Changzhou, 7 September 2016



Jason Ji
Head of Quality Management

9.3 EU Declaration of Conformity for ECOLINE FYC

Hereby we,

KSB Valves (Changzhou) Co., Ltd.
No. 68 Huanbao Four Road,
Environment Protection Industrial Park,
Xinbei District, Changzhou City, Jiangsu Province
P. R. China

declare that **the product:**

Strainers

ECOLINE FYC 150-600

Class 150 - 600

NPS 2" - 12"

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

Applicable standards:

Strainers: ASME B16.34

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 Rheinland Industrie Service GmbH
 Am Grauen Stein
 51105 Köln (Germany)

Identification number of the notified body:

0035

This Declaration of Conformity also confirms the conformity of the casting suppliers for ECOLINE with the requirements of Pressure Equipment Directive 2014/68/EU (PED) and "AD 2000-Merkblatt W 0" regarding the materials used for the pressure-retaining parts.

Materials inspected:

Standard	Grade
EN 10213-2007	1.0619
EN 10213-2007	1.4408
EN 10213-2007	1.4308

The EU Declaration of Conformity was issued in/on:

Changzhou, 7 September 2016



Jason Ji
 Head of Quality Management

9.4 EU Declaration of Conformity for ECOLINE GLV, GTV, SCV

Hereby we,

KSB Valves (Changzhou) Co., Ltd.
No. 68 Huanbao Four Road,
Environment Protection Industrial Park,
Xinbei District, Changzhou City, Jiangsu Province
P. R. China

declare that **the product:**

Gate valves

ECOLINE GTV 150-300	Class 150 - 300	NPS ½" - 12"
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Globe valves

ECOLINE GLV 150-300	Class 150 - 300	NPS ½" - 12"
---------------------	-----------------	--------------

Swing check valves

ECOLINE SCV 150-300	Class 150 - 300	NPS ½" - 12"
---------------------	-----------------	--------------

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

Applicable standards:

Gate valve:	API 603
Globe valve:	ASME B16.34
Non-return valve:	ASME B16.34
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 Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln (Germany)

Identification number of the notified body:

0035

This Declaration of Conformity also confirms the conformity of the casting suppliers for ECOLINE with the requirements of Pressure Equipment Directive 2014/68/EU (PED) and "AD 2000-Merkblatt W 0" regarding the materials used for the pressure-retaining parts.

The EU Declaration of Conformity was issued in/on:

Changzhou, 7 September 2016



Jason Ji
Head of Quality Management

9.5 EU Declaration of Conformity for ECOLINE GLB 150-600

Hereby we,

KSB Valves (Changzhou) Co., Ltd.
No. 68 Huanbao Four Road,
Environment Protection Industrial Park,
Xinbei District, Changzhou City, Jiangsu Province
P. R. China

declare that **the product:**

Globe valves

ECOLINE GLB 150-600

Class 150 - 600

NPS 2" - 12"

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

Applicable standards:

Strainers: BS 1873

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:

HPi Verification Services Ltd.
The Manor House
Howbery Park, Wallingford
OX10 8BA, United Kingdom

Identification number of the notified body:

1521

This Declaration of Conformity also confirms the conformity of the casting suppliers for ECOLINE with the requirements of Pressure Equipment Directive 2014/68/EU (PED) and "AD 2000-Merkblatt W 0" regarding the materials used for the pressure-retaining parts.

The EU Declaration of Conformity was issued in/on:

Changzhou, 7 September 2016



Jason Ji

Head of Quality Management

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