

CHECK VALVES

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1. Swing check valve types ET-000L10.1EX & ET-000L10.2EX

1.1 Application

Swing check valves are self-acting valves preventing the back flow of the fluid. It is used especially in power engineering, chemical industry as well as other industries depending on material selection. Swing check valves are not shut-off valves.

1.2 Technical description

The body is made of forged material. The disc is inserted into the valve body through the pressure seal cover joint or through the self-sealing body-cover joint. The seat ring is welded in the body and its seating surface and disc surface of the disc are hard faced. The cover is sealed by a special graphite gasket. Upon request, the valves may be equipped with a bypass.

1.3 Working medium

- Water
- Steam
- Gas
- Other fluids

1.4 Operation

Self-acting

1.5 Sizes

DN 50 up to DN 400

1.6 Pressure classes

Type ET-000L10.1EX PN 63 up to PN 250

Type ET-000L10.2EX PN160 up to PN 420

*Maximum operating temperature: 450°C (optional 650°C)

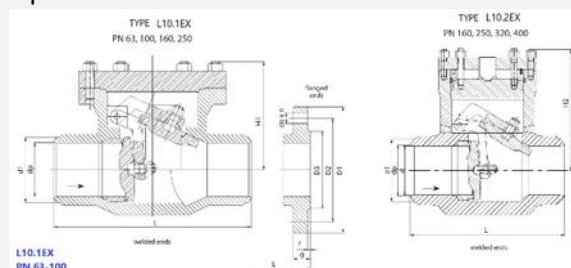
*Body design: forged

1.7 Operation temperature

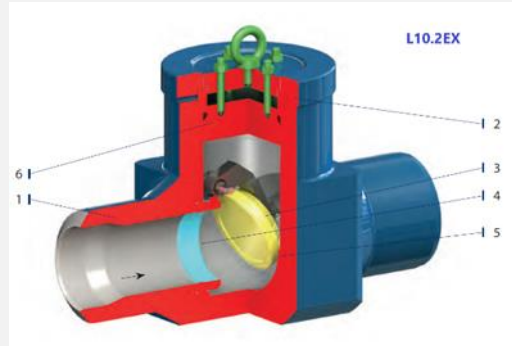
Range: from - 20°C up to 650 °C

1.8 Design configurations

- ET-000L10.1EX with bolted cover
- ET-000L10.2EX with pressure sealed cover



1.9 Materials



Pos	Component	450°C	450°C	530°C	560°C	570°C	600°C	650°C
1	Body	1.0460	1.6368	1.5415	1.7335	1.7715	1.7383	1.4903
2	Bonnet							
3	Disc							
4	Seat + overlay	1.0460 +	1.6368 +	1.5415 +	1.7335 +	1.7715 +	1.7383 +	1.4903 +
5	Disc + overlay	stellite	stellite	stellite	stellite	stellite	stellite	stellite
6	Gasket	L10.1EX: graphite + stainless steel / L10.2: graphite						

1.10 Connection to the pipe

Valve with flanged ends according to EN 1092-1, ISO 7005-1

Valves with weld ends according to EN 12627

1.11 Testing

Valves are subject to following tests according to EN 12266 performed with water:

- Shell strength test
- Shell tightness test
- Shell seat tightness test
- Functional test
- Other tests on request

*API 598 with water as a standard

1.12 Installation

Swing check valves may be installed into horizontal piping with the cover upwards or into vertical piping, but the flow direction is bottom up. The flow direction shall correspond to the arrow on the valve body. If the valve is to be mounted in a vertical piping, the fluid direction must be upwards.

2. Swing check valves types ET-000L10.31EX & ET-000L10.32EX

2.1 Application

The check valves are self-acting valves which prevent a working medium from flowing back in a pipeline.

2.2 Technical description

The check valves are made from cast steel with full port. The sealing surface of the disc bears on the overlay of seat (austenitic stainless steel). The disc with an arm rotates on hinge and is pushed to the seat by its own weight. Connection flanges are integral part of the body. The cover is connected with body by bolts with graphite gasket. They consist of a body, a cover, a seat, a disc and an arm. The allowed maximum working pressure in dependence on temperature is noted in pressure-temperature table.

2.3 Working medium:

- Water
- Sea water
- Water steam
- Air
- Oil
- Other fluids

2.4 Operation

Self-acting

2.5 Sizes

ET-000L10.31EX	DN 50 up to DN 600 (NPS 2" up to 30")
ET-000L10.32EX	DN 300 up to DN 900 (NPS 12" up to 28")

2.6 Pressure class

ET-000L10.31EX	PN 16 up to PN 100 (ANSI Class 150# up to 600#)
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*Maximum operating temperature: 570°C

*Body design: cast

ET-000L10.32EX	PN 40 up to PN 100 (ANSI Class 150# up to 600#)
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*Maximum operating temperature: 425°C

*Body design: cast

* Design in accordance with the standard EN 14141 and ISO 14313. Full bore valve

2.7 Working temperature

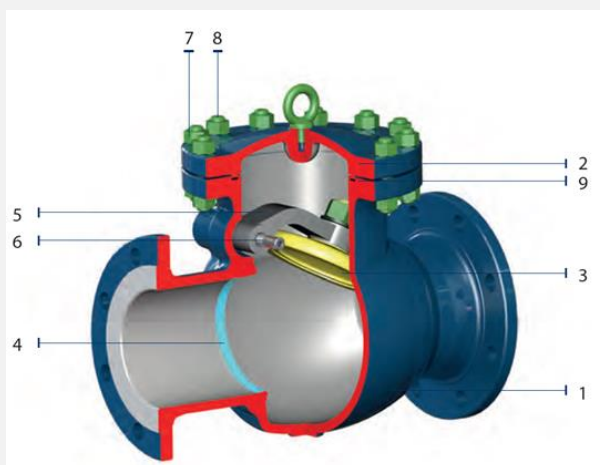
The working temperature is in dependence on material design in range from - 50°C up to 570 °C

2.8 Design configurations

- With lever
- With bypass
- With lever and bypass

* Design for oil and gas applications and pigable. Valve in the open position allows free mixing of the pressure, cleaning or measuring.

2.9 Materials



European materials

Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
		-20°C / 450°C	-10°C / 570°C	-40°C / 300°C	-50°C / 550°C
1	Body	1.0619	1.7357	1.6220	1.4408
2	Bonnet	1.0619	1.7357	1.6220	1.4408
3	Disc + overlay	1.0619 + 13Cr	1.7357 + stellite 6	1.6220 + F304	1.4408
4	Seat ring + overlay	1.0460 + 13Cr	1.7335 + stellite 6	1.0566 + stellite 6	1.4408
5	Arm	1.0619	1.7357	1.6220	1.4408
6	Arm pin	1.4006	1.4301	1.4401	1.4401
7	Bonnet nut	1.1191	1.7709	1.7225	1.4401
8	Bonnet bolt	1.7218	1.7709	1.7225	1.4401
9	Bonnet sealing	Graphite with stainless steel inserts			

Materials according to ASME/ASTM

Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
		-29°C / 425°C	-29°C / 595°C	-46°C / 345°C	-50°C / 538°C
1	Body	A216 WCB	A217 WC6	A352 LCC	A351 CF8M
2	Bonnet	A216 WCB	A216 WC6	A352 LCC	A351 CF8M
3	Disc + overlay	A216 WCB + 13Cr	A217 WC6 + stellite	A352 LCC + F304	A351 CF8M
4	Seat ring + overlay	A105 + 13Cr	A182 F11 + stellite6	A350 LF2 + stellite 6	A351 CF8M
5	Arm	A216 WCB	A217 WC6	A352 LCC	A351 CF8M
6	Arm pin	A276 420	A182 F304	A182 F316	A182 F316
7	Bonnet nut	194 2H	A194 4	A194 7M	A194 8M
8	Bonnet bolt	193 B7	A193 B16	A320 L7M	A193 B8M
9	Bonnet sealing	Graphite with stainless steel inserts			

2.10 Connection to the pipe

Valve with flanged ends according to EN 1092-1, ISO 7005-1

Valves with weld ends according to EN 12627, face to face dimensions are acc. to EN 12 982

2.11 Test

Valves are subject to following tests according to EN 12266, API 598 for strength, leakage of body and leakage of a cover

2.12 Installation

The check valves can be mounted into a horizontal (with top side bonnet) and a vertical piping so that the arrow on the valve stamped in the valve body corresponds to the flow direction of the working medium. If the valve is to be mounted in a vertical piping, the fluid direction must be upwards.

2.13 Advantages

- Wide range of working parameters
- Possibility to repair sealing surface without uninstallation of swing check valves pipeline.

3. Extraction swing check valves types ET-000L10.61EX, ET-000L.62EX & ET-000L.63EX

3.1 Application

Extraction swing check valves are special valves used to prevent the back flow of the service fluid in extraction and bleed lines.

3.2 Technical description

Bodies of extraction swing check valves ET-000L10.6EX are made of forged, cast or welded semi-finished products depending on parameters specified by the customer. The seat ring is pressed into the body and secured by welding. Its seating surface is hard-faced. The shaft is carried in plain bearings and holds the disc arm with the disc which is secured by a pin. The seating surfaces of the seat and the disc have a plane contact surface. The welded design of the extraction swing check valves meets the requirements of EN ISO 15614-1, PED 97/23/EC or, if required by the customer, ASME CODE, Section IX.

3.3 Working medium

Steam

3.4 Operation

Self-acting, the safe closing of the disc is realized by the ancillary actuator (pneumatic, hydraulic actuator). Actuator type as specified by the customer.

Possible valve equipment

- Hand lever
- Electric position sensor



Forged design with quarter turn actuator

Cast design with quarter turn actuator

Welded design with linear actuator

3.5 Sizes

Type ET-000L10.61EX in forged material:	DN 80 up to DN 350, NPS 3" up to 14"
Type ET-000L10.62EX in cast material:	DN 350 up to DN 900, NPS 14" up to 36"
Type ET-000L10.62EX with welded body:	DN 200 up to DN 1000, NPS 8" up to 40"

3.6 Pressure classes

Type ET-000L10.61EX	PN 100 up to PN 320, ANSI Class 300# up to 1500#
Type ET-000L10.62EX	PN 100 / PN 150, ANSI Class 300# / 600#
Type ET-000L10.63EX	PN 10 up to PN 40

3.7 Temperature range

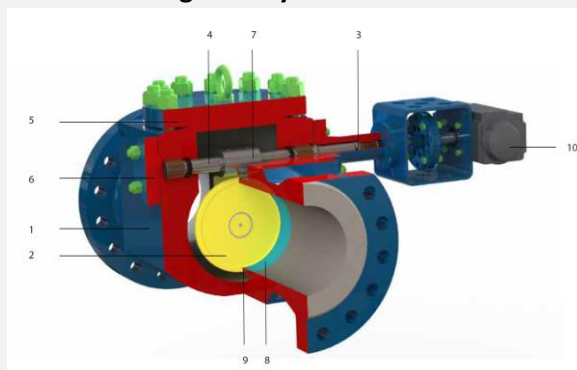
Type ET-000L10.61EX	maximum operating temperature 530°C
Type ET-000L10.62EX	maximum operating temperature 530°C
Type ET-000L10.63EX	maximum operating temperature 300°C

3.8 Design configurations

- ET-000L10.61EX in forged materials for pressure classes up to PN320 (ANSI 1500#)
- ET-000L10.62EX in cast material for pressure classes up to PN 150 (ANSI 600#)
- ET-000L10.63EX with welded body for pressure classes up to PN 40

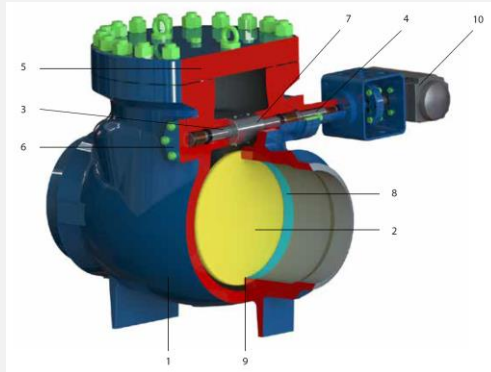
3.9 Materials

Materials for type ET-000L10.61EX – Forged body



Pos	Component	EN	ASTM
		DN 80 / DN 500	NPS 3" / 14"
1	Body	1.0425 1.7335 1.7380	A386 Gr 22
2	Disc		A105
5,6	Cover		A516 Gr 60
7	Arm		A182 F12
8	Seat		A182 F22
3,4	Shaft	1.4021 / 1.4923	A387 Gr 12
9	Seat hard facing	Stellite 6	
10	Actuator	Quarter turn	

Materials for type ET-000L10.62EX – Cast body



Pos	Component	EN	ASTM
		DN 400 / DN 900	NPS 16" / 36"
1	Body	1.0619 / 1.7357 / 1.0425 1.7335 / 1.7380 / 1.7383 1.7379	A216 WCB / A217 WC6 / A105 A515 Gr 60 / A182 F12 Cl 2 A182 F22 Cl 2 / A387 Gr 12 Cl 2 A387 Gr 22 Cl 2 / A217 WC9
2	Disc		
5,6	Cover		
7	Arm		
8	Seat	1.4021 / 1.4923	A276 420 T
3,4	Shaft		
9	Seat hard facing	Stellite 6	
10	Actuator	Quarter turn	

Materials for type ET-000L10.63EX – Welded body



Pos	Component	EN	ASTM
		SD 200 / DN 1000	NPS 8" / 40°
1	Body	1.0425	A105
2	Disc		
8	Counterweight cover		
5,6	Cover		
7	Arm		
9	Seat		
3,4	Shaft	1.4021	A276 420T
10	Seat hard facing	Cr13	
11	Actuator	Quarter turn or linear actuator	

3.10 Connection to the piping

- Flanged ends according to EN 1092-1, ASME B16.5, ASME B16.47
- Welding ends according to EN 12627, ASME B16.25

Face-to-face and end-to-end dimensions according to manufacturer's specification.

3.11 Testing

The valves are tested in accordance with:

- EN 12266-1 / ISO 5208
- API 598

3.12 Installation

The extraction check valves ET-000L10.6 may be installed into both horizontal and vertical piping. When installing the extraction valve into a vertical piping, the fluid must flow from under the disc (to lift it up), when installing it into a horizontal piping, the cover must be above the valve body ($\pm 10^\circ$).

3.13 Advantages

Possibility of use for high pressures PN 160, PN 250 and high temperatures exceeding 500 °C.

4. Extraction check valve type ET-000C09.6EX

4.1 Application

Extraction check valves are valves used to prevent the back flow of the service fluid in extraction and bleed lines of steam turbines. Each extraction check valve is designed exactly for the specified extraction parameters.

4.2 Technical description

The extraction check valve is designed as a check valve with double eccentricity. The disc with conical sealing surface is swinging on a shaft which is carried in plain bearings. In the „CLOSED” position, the sealing surface of the disc is in contact with the valve body seat. The shaft bears a counterweight to balance the mass of the disc. The balancing guarantees minimum pressure losses not exceeding 1%. This counterweight is situated, off the valve body bore, in a separated pressure-closed box. The extraction check valve can be equipped with an actuator which guarantees the quick acting function of the valve and a lever to test the valve function as a standard. Both the actuator and the lever are carried on a separate shaft so that their passive resistances do not affect the valve function. The welded design of the extraction check valves meets the requirements of EN ISO 15614-1, PED 97/23/EC or, if required by the customer, ASME CODE, Section IX.

4.3 Working medium

Working medium: steam

4.4 Operation

Self-acting, the safe closing of the disc is realized by the ancillary actuator (pneumatic, hydraulic actuator). Actuator type as specified by the customer.

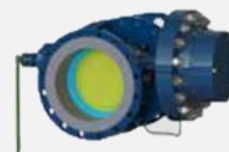
The valves can be supplied with the defined actuator and the necessary automation components.



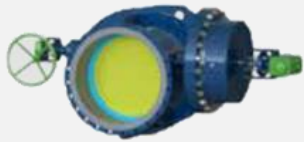
With top mounted actuator and hand lever



With side mounted actuator and hand lever



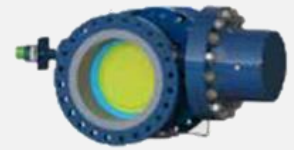
Without actuator with hand lever



With side mounted actuator and gear operation



With side mounted actuator and position indicator



Without actuator with position indicator

4.5 Sizes

DN 80 up to DN 1800 (NPS 3" up to 70")

4.6 Pressure classes

PN 6 up to PN 100 (ANSI Class 150# up to 600#)

4.7 Operating temperature

Maximum service temperature

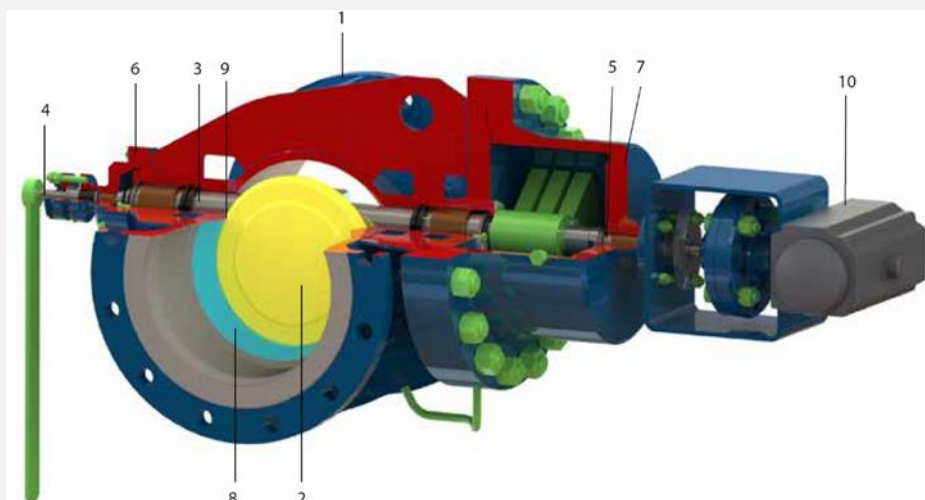
+450°C till diameters DN 1000, (NPS 40")

+350°C above diameters DN 1000, (NPS 40")

4.8 Design configurations

- ET-000C09.6EX in sizes up to DN 1800 (70")

4.9 Materials



Pos	Component	EN		ASTM	
		DN 80 / DN 1000	DN 1200 / DN 1800	NPS 3" / 40"	NPS 44" / 70"
		Up to 450°C	Up to 350°C	Up to 450°C	Up to 350°C
1	Body	1.0425 / 1.7335	1.0425	A387 Gr 22 / A105 A516 Gr60 A182 F12 A387 Gr 12	A516 Gr 60
2	Disc				
6	Cover				
7	Counterweight cover				
8	Seat				
3,4,5	Shaft	1.4021 / 1.4923	1.4021	A276 420T	A276 420T
9	Seat hard facing	Stellite 6	Cr13	Stellite 6	Cr13
10	Actuator	Quarter turn and linear actuators			

4.10 Connection to the piping

- Flanged ends according to EN 1092-1, ASME B16.5, ASME B16.47,
- Face-to-face dimensions according to EN 558, series 14,15
- Welding ends according to EN 12627, ASME B16.25,
- End-to-end dimensions according to EN 12982

4.11 Testing

The valves are tested in accordance with:

- EN 12266-1 / ISO 5208
- API 598

4.12 Installation

The extraction check valves ET-000C09.6 may be supplied with designs for either horizontal or vertical piping. The valve shall be positioned between the connecting ends of the piping in the direction in which the flow of the fluid from the turbine opens the disc. The main shaft of the valve (axis of disc rotation) must be in horizontal position.

The mounting, adjustment and testing of the actuators shall be performed by a trained person in accordance with instructions given by the manufacturer.

4.13 Advantages

- Possibility of installation into both vertical and horizontal pipes
- Unique design for the specified extraction parameters
- Guaranteed tightness class
- Low pressure loss
- Low passive resistances
- No axial forces
- No castings are used
- Maintenance-free valves with long service life
- Design variability

5. Butterfly swing check valve type ET-000C09.5EX

5.1 Application

Butterfly swing check valves are self-acting and fast-closing valves which prevent a working medium from flowing back in a pipeline. They are used in order to prevent backflow from pumps, fans etc. The check valve is not a shut-off valve.

5.2 Technical description

The valve disc, eccentrically embedded, rotates inside a flanged end forged body. The shaft is clamped in the self-lubricated friction bearings. Outside the valve on the end of the shaft there is the lever with counterweight.

5.3 Working medium:

- Water
- Air
- Steam
- Gas
- Other fluids

5.4 Operation

Swing check valves are automatic, quick-acting valves. Movement of the disc is controlled by the flowing fluid.

5.5 Sizes

DN 100 up to DN 1600

5.6 Pressure class

PN 6 up to PN 100

5.7 Operating temperature range

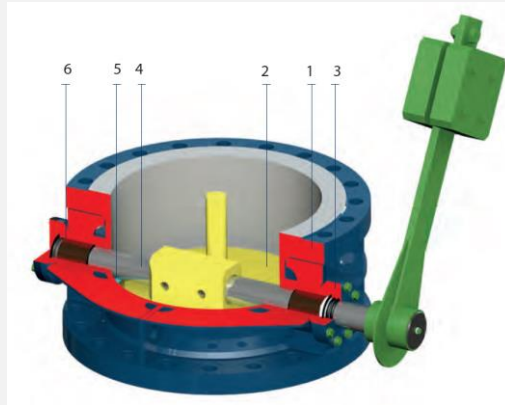
Service temperature depends on the material of seals (see below list)

Standard range - 46°C up to 300 °C

5.8 Design configurations

- ET-000C09.5EX in sizes up to DN 1600

5.9 Materials



Materials according to EN

Pos	Component	Carbon steel	
		Temperatures -46°C up to +300°C	Temperatures -20°C up to +300°C
1	Body	1.0566	1.0425 / 1.0577
2	Disc		
3	Cover		
4	Shaft	1.4021	1.4021
5	Sealing surface	Cr13 x Cr13	Cr13 x Cr13
6	Packing	TURKON [®]	NBR, EPDM, VITON, TURKON [®]

Materials according to ASTM

Pos	Component	Carbon steel	
		Temperatures -46°C up to +300°C	Temperatures -20°C up to +300°C
1	Body	A350 LF2	A515 Gr 60 A537 Cl. 1
2	Disc		
3	Cover		
4	Shaft	A182 F6A	A182 F6A
5	Sealing surface	Cr13 x Cr13	Cr13 x Cr13
6	Packing	TURKON [®]	NBR, EPDM, VITON, TURKON [®]

5.10 Connection to the pipe

- Valve with flanged ends according to EN 1092-1, EN 1759-1,
- Face to face dimension acc. to EN 558
- Valves with weld ends according to EN 12627,
- Face to face dimension acc. to EN 12982
- Other type of connections upon request

5.11 Test

Valves are subject to following tests according to EN 12266 performed with water:

- Shell strength test
- Shell leakage test, grade is D according to ISO 5208 (grade B on request) or acc. to API 598
- Shell tightness test
- Functional test

Other tests on request

5.12 Installation

The butterfly swing check valves can be mounted into a horizontal or a vertical piping so that the arrow on the valve stamped in the valve body corresponds to the flow direction of the working medium, the valve disc rotation axis is in a horizontal position and above axis of flowing (only a horizontal piping). If the valve is to be mounted in a vertical piping, the fluid direction must be upwards.

5.13 Advantages

- Possibility of installation into vertical, horizontal, or inclined piping
- Low pressure loss
- Design with forged materials, which allows us flexibility (no castings)
- Maintenance free and long service life
- Design variability
- One-piece body
- Minimization of water hammer

6. Swing check valve type ET-000L10.7EX

6.1 Application

The swing check valves are industrial valves designed so that the working medium directly flows in one direction. They are used in order to prevent from backflow the pumps, fans etc. The check valves are not the shut-off valves.

6.2 Technical description

The swing check valve is designed so that a disc with a pivot is swing pivoted in the valve body. The disc movement is controlled by the flow of the working medium. If the medium flows in the direction of the arrow, the disc will open. The flow in return direction is not possible. The disc is closed and bears on sealing surfaces with O-rings of the seat in the body. The valves are delivered without pressure spring (type 107) and with pressure spring (type 109).

6.3 Working medium

Water, drink water, steam, air and other non-aggressive liquids. In case potable water the gasket ring must be made from EPDM or a sealing area of metal-metal.

6.4 Operation

Self-acting

6.5 Sizes

DN 40 up to DN 800

6.6 Pressure Classes

PN 6 up to PN 40

6.7 Operating temperature

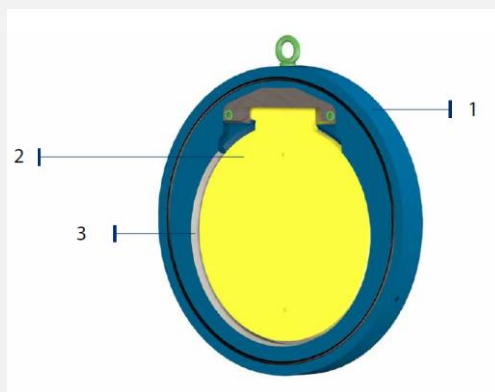
The working temperature depends of the material of the sealing:

- for gasket rings NBR: -20 °C ÷ +100 °C
- for gasket rings VITON: -10 °C ÷ +160 °C
- for gasket rings EPDM: -20 °C ÷ +150 °C
- for gasket rings metal-metal: -20 °C ÷ +350 °C

6.8 Design configurations

- ET-000L10.7EX in sizes up to DN 800

6.9 Materials



Pos	Component	European materials	
		Carbon steel	Stainless steel
1	Body	1.0425 / 1.0577	1.4541
2	Disc		
3	Seal	NBR / EPDM / VITON	

6.10 Connection to piping

Wafer type

face to face dimensions are determined by the manufacturer Installation

6.11 Testing

The valves are tested acc. to EN 12 266-1 / ISO 5208, for strength and leakage, functionality and tightness, leakage grade D.

The check valves are tested to full differential pressure on the closed disc in back flow direction for strength.

6.12 Installation

The check valves can be mounted into a horizontal, a vertical and an inclined piping so that the arrow on the valve stamped in the valve body corresponds to the flow direction of the working medium.

If the valve is to be mounted into a horizontal and inclined pipeline, the lifting eye will have to be above the valve and its axis together with the pipeline axis will have to lie in a vertical plane. If the valve is to be mounted in a vertical and inclined pipeline, the working medium will have to flow upwards.

6.13 Advantages

- Simple design
- Minimal dimensions
- Maintenance free

7. Lift check valve Type ET-000Z16EX

7.1 Application

Lift check valves are self-acting valves preventing the back flow of the fluid. It is used especially in power engineering, chemical industry as well as other industries depending on material selection.

Lift check valves are not shut-off valves.

7.2 Technical description

The body is a forged or a cast depending on nominal size and nominal pressure. The disc is inserted into the valve body through the body-cover joint. Both the disc and the seat are hard faced and the disc is pressed into seat by a spring.

7.3 Working medium

- water
- steam
- gas
- other fluids

7.4 Operation

Self-acting operation

7.5 Sizes

Type ET-000Z16.1EX	DN 15 up to DN 300
Type ET-000Z16.2EX	DN 15 up to DN 200
Type ET-000Z16.3EX	DN 15 up to DN 200
Type ET-000Z16.4EX	DN 15 up to DN 125
Type ET-000Z16.5EX	DN 15 up to DN 300
Type ET-000Z16.6EX	DN 15 up to DN 200
Type ET-000Z16.7EX	DN 15 up to DN 200
Type ET-000Z16.8EX	DN 15 up to DN 125

7.6 Pressure classes

Type ET-000Z16.1EX	PN 16 up to PN40
Type ET-000Z16.2EX	PN 63 up to PN 100
Type ET-000Z16.3EX	PN 160
Type ET-000Z16.4EX	PN 250 up to PN 420
Type ET-000Z16.5EX	PN 16 up to PN 40
Type ET-000Z16.6EX	PN 63 up to PN 100
Type ET-000Z16.7EX	PN 160
Type ET-000Z16.8EX	PN 250 up to PN 420

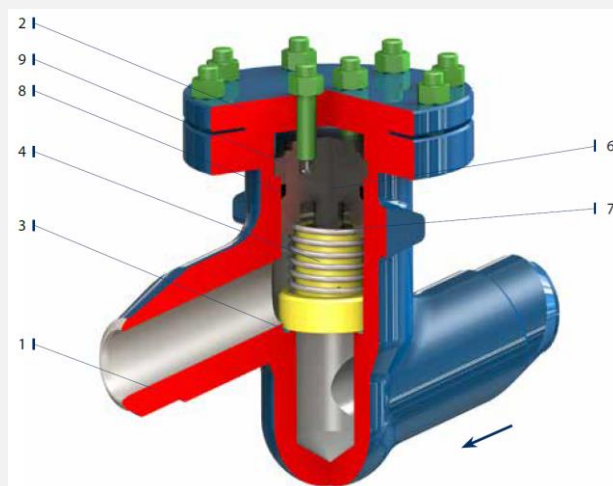
7.7 Operating temperature

For all types depending of the materials up to 600°C

7.8 Design configurations

• Type ET-000Z16.1EX	DN 15 up to DN 300	PN 16 up to PN 40	560°C	CS
• Type ET-000Z16.2EX	DN 15 up to DN 200	PN 63 up to PN 100	560°C	CS
• Type ET-000Z16.3EX	DN 15 up to DN 200	PN 160	560°C	CS
• Type ET-000Z16.4EX	DN 15 up to DN 125	PN 250 up to PN 420	600°C	CS
• Type ET-000Z16.5EX	DN 15 up to DN 300	PN 16 up to PN 40	550°C	SS
• Type ET-000Z16.6EX	DN 15 up to DN 200	PN 63 up to PN 100	550°C	SS
• Type ET-000Z16.7EX	DN 15 up to DN 200	PN 160	550°C	SS
• Type ET-000Z16.8EX	DN 15 up to DN 125	PN 250 up to PN 420	550°C	SS

7.9 Materials



For the type ET-000Z16.1EX / ET-000Z16.2EX / ET-000Z16.3EX / ET-000Z16.4EX – Carbon steel housings

Pos	Component	DN15 / DN 40			DN 50 / DN 300		
		450°C	530°C	560°C	450°C	530°C	560°C
1,2	Body, bonnet	1.0460	1.5415	1.7335	1.0619	1.5419	1.7357
3	Seat	Cr13 or stellite					
4	Disc	1.4028 / 1.4057 / 1.0460 / 1.7335					
9	Disc ring	Cr13 / stellite / PTFE / NBR					
7	Spring	1.8159					
8	Sealings	Graphite					

For the type ET-000Z165EX / ET-000Z16.6EX / ET-000Z16.7EX and ET-000Z16.8EX – Stainless steel housings

Pos	Component	Temp. up to 550°C		Temp. up to 500°C	
		DN 15 / DN 50		DN 65 / DN 300	
1,2	Body, Bonnet	1.4541	1.4404	1.4308	1.4408
4	Disc	1.4541 / 1.4404			
7	Spring	1.4571			
8	Packing	Graphite			

The temperatures listed above are designed for non-aggressive media. For aggressive media the maximum temperature is 250°C

7.10 Connection to the piping

- Flanged ends acc. to EN 1092-1, ISO 7005-1, GOST 12815-80
- Welded ends acc. to EN 12627

7.11 Test

Valves are subject to shell strength test, shell tightness test, seat tightness test and functionality test according to EN 12266 with water as a standard. If required, other tests may be performed as well.

7.12 Installation

Lift check valves may be installed in any position. The flow direction shall correspond to the arrow on the valve body.