

BUTTERFLY VALVES

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1. General

A butterfly valve is from a family of valves called quarter-turn valves. In operation, the valve is fully open or closed when the disc is rotated a quarter turn. The "butterfly" is a metal disc mounted on a rod. When the valve is closed, the disc is turned so that it completely blocks off the passageway. When the valve is fully open, the disc is rotated a quarter turn so that it allows an almost unrestricted passage of the fluid. The valve may also be opened incrementally to throttle flow.

Butterfly valves are designed to fully open or fully close and for flow-control of the passage of a fluid in a pipe. They find their main applications in the oil & gas industry, chemical and petrochemical, mining, power engineering, water supply, paper industry, cryogenic applications, etc. The design is according to API 609 or ISO 10631, other designs on request.

1.1 Fluids

Waste and service water, drinking water, hot water, steam, non-aggressive liquid, and gases (natural gas, CO-gas, petroleum products, etc.)

*The valves can be supplied with surface protection done by cladding with plastic material (RILSAN, HALAR, or similar). This surface protection together with the use of stainless-steel material is widening the usage of butterfly valves for chemically aggressive or abrasive media and sea water.

1.2 Sizes, pressure classes and temperature ranges

See the individual technical description of each type below.

1.3 Operation

The operation of butterfly valves is quarter turn (90°)
Butterfly valves can be actuated with following types of actuators.

- Manual (lever)
- Manual with gear operator
- Electric actuator
- Pneumatic actuator
- Hydraulic actuator
- Gas over oil actuator
- Others

All actuators can be supplied with the corresponding automation components.

For more details see the description of the different types of actuators.

1.4 Connections

Butterfly valves can be supplied with flanged ends, welded ends, wafer type, lug type or other upon request. Face to face dimensions according to ISO 5752, ANSI B16.10, API 609, BS 5155, or according to customer's requirement.



Flanged ends with manual gear



Flanged ends with pneumatic actuator



Welded ends with electric actuator



Welded ends with hydraulic cylinder and counterweight

1.5 Test

The valves are tested according to EN 12 266-1 / ISO 5208 or API 598

1.6 Installation

This butterfly valves can be installed into horizontal, vertical, or inclined pipelines.

The arrow stamped on the valve body must correspond to the flow direction, the arrow points from higher pressure to lower when the disc is closed.

The rotating axe of the disc should be in horizontal position.

When using actuators, the instructions about their installation position should be attended.

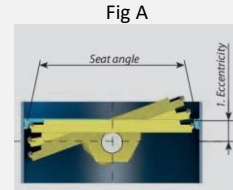
2. Single-eccentric butterfly valve type ET-000L32.6EX

Single-eccentric butterfly valves are industrial valves, which are designed to fully open or close a passage of the working medium flowing through a pipeline. They can also be used for flow-control purposes. However, a 100% tightness of the valve cannot be guaranteed in a long-term use for control purposes.

2.1 Technical description

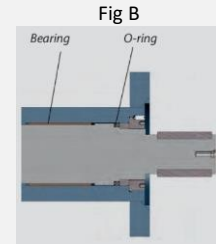
Single eccentricity, the operating shaft axis is eccentric to the packing axis (Fig. A)

- easy replacement of gasket
- gasket is not interrupted on the circumference by shaft



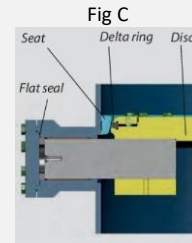
Disc is clamped on the operating shaft and pivot, which are pivoted in self-lubricated friction bearings (Fig. B).

Shaft is sealed by O-ring (Fig. B).



The pivot is sealed by flat gasket (Fig. C).

The sealing bears on the conical area of the seat and is together with the disc pushed by the media pressure onto the conical seat, and by this is an absolute tightness reached (Fig. C). To see the tightness grade in the opposite direction, please contact manufacturer.

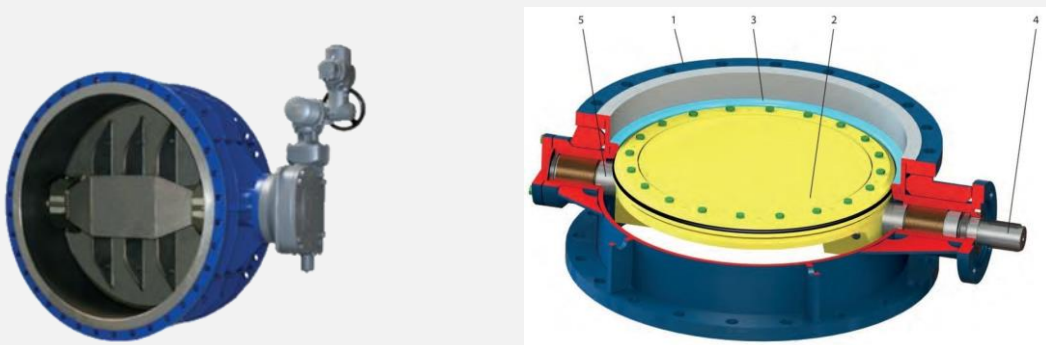


2.2 Sizes, pressure classes and temperature range

Size: DN 150 up to DN 2400 (6" up to 96")

Pressure class: PN 2,5 up to PN 25

Maximum operating temperature: 180°C



2.3 Standard materials

Pos	Component	Standards according to EN			Standards according to ASTM		
		Carbon steel		SS	Carbon steel		SS
		-29 / +180°C	-40 / +180°C	-40 / +180°C	-29 / +180°C	-40 / +180°C	-40 / +180°C
1	Body	1.0577 1.0425	1.0566	1.4541	A105	A350 LF2	A182 F316
2	Disc	1.0577 1.0425	1.0566	1.4541	A105	A350 LF2	A182 F316
3	Seat	1.4541 1.4301	1.4541 1.4301	1.4541	A182 F304	A182 F304	A182 F316
4	Shaft	1.4021 QT700	1.4021 QT700	1.4541	A182 F6	A182 F6	A182 F316
5	Pivot	1.4021 QT700	1.4021 QT700	1.4541	A182 F6	A182 F6	A182 F316

The operation temperatures of the valve depend on the pressure-temperature characteristic of the material - see further information in this catalog.

EN 1.4021 +QT 700 steel is EN 1.4021 stainless steel in the quenched and tempered condition. It has the second highest ductility compared to the other variants of EN 1.4021 stainless steel.

2.4 Other materials

Other materials can be provided upon request, e.g.:
Nickel alloys, Duplex and Super duplex chromium alloys, etc.

2.5 Recommended sealing materials

Elastomer	Code	Applications	Temperature
Nitrile-butadiene rubber	NBR	Water, air, gear oils, mineral oils, combustion gases, non-aggressive gases	-20°C up to +80°C
Ethylene-propylene rubber	EPDM	Drinking water, hot water, steam, diluted acids and alkalis, air. Unsuitable for oil and fats	-40°C up to +130°C
Fluorine rubber	FPM	Mineral oils, petroleum products, coke & blast furnace gas. Unsuitable for hot steam and water	-20°C up to +140°C
	VITON GF	Hot water and steam	-20°C up to +180°C

3. Double-eccentric butterfly valve ET-000L32.6EX

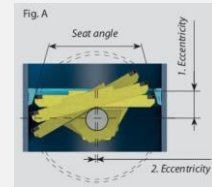
Double-eccentric butterfly valves are industrial valves, which are designed to fully open or close the passage of the working medium flowing through a pipeline. They can also be used for flow-control purposes. However, 100% tightness of the valve cannot be guaranteed in a long-term use for control purposes.

3.1 Technical description

At double eccentric design, the tension on the disc is released after a few degrees of opening which minimizes wear of the disc seal. Furthermore, the design minimizes the compression of the sealing which ensures low operating torques.

Double eccentricity design means (see Fig A)

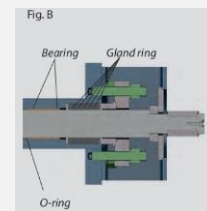
1. the operating shaft axis is eccentric to the packing axis of the disc
2. the operating shaft axis is eccentric to the flow axe



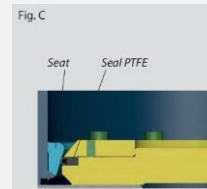
Disc is clamped on the operating shaft and pivot, which are pivoted in self-lubricated friction bearings (Fig. B).

The shaft is sealed by gland packing (Fig. B).

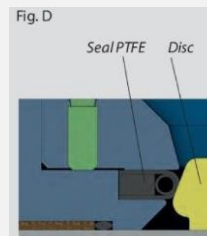
The pivot is sealed by flat gasket.



The gasket bears on the conical area of the stainless-steel seat, and is together with the disc, pushed by the media pressure onto the conical seat, and by this is an absolute tightness reached (Fig. C). The tightness is restricted when the media flow is from the opposite side.



For DN 80-125 is the major packing ring attached in the body by the thrust ring. In the „closed “position, the disc is pushed against the seat by its conical area due to the pressure caused by the working medium, which ensures a total tightness in that direction (Fig. D). For all the valve variants, however, the valve tightness is limited in the opposite flow direction. For the leakage class in opposite direction please contact manufacturer.



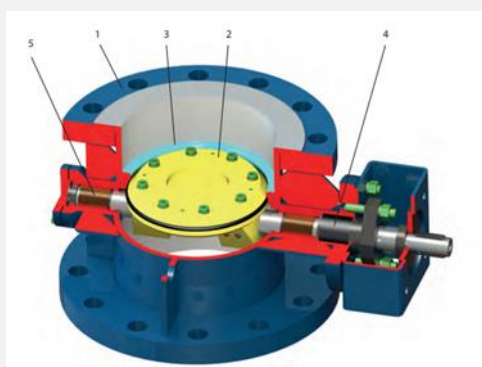
3.2 Sizes, pressure classes and temperature ranges

Size: DN 150 up to DN 2000 (6" up to 80")

Pressure class: PN 2,5 up to PN 40

Maximum operating temperature 250°C

Design PTFE seal



3.3 Standard materials

Pos	Component	Standards according to EN			Standards according to ASTM		
		Carbon steel		SS	Carbon steel		SS
		-29 / +250°C	-46 / +250°C	-50 / +250°C	-29 / +250°C	-46 / +250°C	-50 / +250°C
1	Body	1.0577 1.0425	1.0566	1.4541	A105	A350 LF2	A182 F316
2	Disc	1.0577 1.0425	1.0566	1.4541	A105	A350 LF2	A182 F316
3	Seat	1.4541 1.4301	1.4541 1.4301	1.4541	A182 F304	A182 F304	A182 F316
4	Shaft	1.4021 QT700	1.4021 QT700	1.4541	A182 F6	A182 F6	A182 F316
5	Pivot	1.4021 QT700	1.4021 QT700	1.4541	A182 F6	A182 F6	A182 F316

The operation temperatures of the valve depend on the pressure-temperature characteristic of the material - see further information in this catalog.

EN 1.4021 + QT700 steel is EN 1.4021 stainless steel in the quenched and tempered condition. It has the second highest ductility compared to the other variants of EN 1.4021 stainless steel.

3.4 Other materials

Other materials can be provided upon request, e.g.:
Nickel alloys, Duplex and Super duplex chromium alloys, etc

3.5 Recommended seal materials

Elastomer	Code	Applications	Temperature
Teflon	PTFE	Wastewater and service water, seawater, hot water and stem, non-aggressive liquids, and gases	-50°C up to +250°C
Nitrile-butadiene rubber	NBR	Water, air, gear oils, mineral oils, combustion gases, non-aggressive gases	-20°C up to +80°C
Ethylene-propylene rubber	EPDM	Drinking water, hot water, steam, diluted acids and alkalis, air. Unsuitable for oil and fats	-40°C up to +130°C
Fluorine rubber	FPM	Mineral oils, petroleum products, coke & blast furnace gas. Unsuitable for hot steam and water	-20°C up to +140°C
	VITON GF	Hot water and steam	-20°C up to +180°C

4. Triple-Eccentric butterfly valve type ET-000L32.8EX

The triple eccentric butterfly valve has three eccentricities. Two are placed in a similar position to the double eccentric butterfly valve, while the third eccentricity is the geometry of the seating surface, creating a type of cone shape of the disc and seat. This cone angle, along with the two eccentric shaft offsets, allows the disc to seal against the seat with no friction.

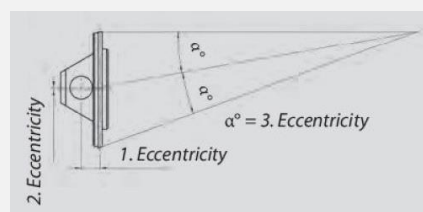
This seat design also allows for uniform sealing, and thus a tight shutoff in a metal seat design. This design is a lower cost, lower torque option (easier to automate), than alternative style metal seated valves.

The triple offset valve is used in similar industries as the double offset butterfly valve, but in more demanding applications.

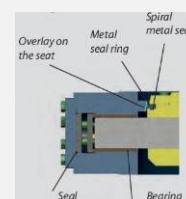
4.1 Technical description

Triple eccentricity means:

1. the operating shaft axle is eccentric to the packing axis
 2. the operating shaft axle is eccentric to the axis of the flow
 3. the axe of the seat cone is eccentric to the axis of the flow
- Triple eccentricity assures, that the packing stays out of sealing surface of the body except for the closed position, which results in long lifetime of the packing (sealing) and lots of cycles.

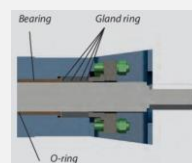


The triple eccentricity design immediately divides the disc from the sealing surface and when closing the valve, the disc touches sealing surface just before closure. By this is the closing and opening torque lower and the opening and closing of the valve is done by very little friction. This makes the valves lifetime longer. Butterfly valve is both-side tight. The arrow stamped on the valve body corresponds with the direction of the long-term tightness. Stems of the butterfly valves manufactured according to TA-Luft Standard of fugitive emissions or are tightened through the Quick



set seal from Garlock company. The butterfly valves are produced of wrought or cast material.

Seal material is metal x metal or metal x graphite seal ring

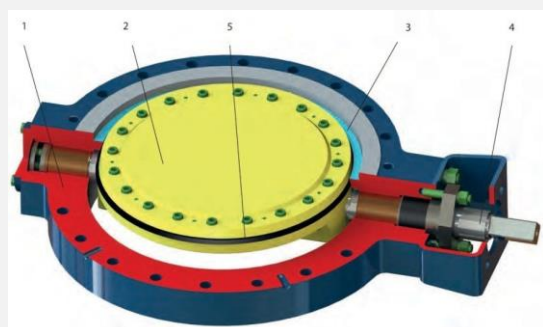


4.2 Sizes, pressure classes and temperature range

Sizes: DN 150 up to DN 1000 (6" up to 40")

Pressure class: PN 6 up to PN 63

Maximum operating temperature 500°C



4.3 Standard forged materials

Pos	Component	Standards according to EN				Standards according to ASTM			
		Carbon/alloy steel		SS		Carbon/alloy steel		SS	
		+400°C	-46 / +400°C	+500°C	+500°C	+400°C	-46 / +400°C	+500°C	+500°C
1	Body	1.0577 1.0425	1.0566	1.7335	1.4541	A105	A350 LF2	A182 F12	A182 F316
2	Disc	1.0577 1.0425	1.0566	1.7335	1.4541	A105	A350 LF2	A182 F12	A182 F316
3	Seat	13% Cr stellite	stellite	stellite	stellite	13% Cr stellite	Stellite	stellite	stellite
4	Shaft	1.4021 QT700	1.4021 QT700	1.4923	1.4541	A182 F6A	A182 F6A	A479 XM19	A182 F316

The operation temperatures of the valve depend on the pressure-temperature characteristic of the material - see further information in this catalog. Design for temperature higher than 500 °C is possible on request.

EN 1.4021 + QT700 steel is EN 1.4021 stainless steel in the quenched and tempered condition. It has the second highest ductility compared to the other variants of EN 1.4021 stainless steel.

4.4 Standard cast materials

Pos	Component	Standards according to ASTM				
		+400°C	-46°C/+300°C	+550°C	+500°C	+550°C
1	Body	A216 WCB	A325 LCB	A217 WC6	A351 CF8	A351 CF8M
2	Disc	A216 WCB	A352 LCB	A217 WC6	A351 CF8	A351 CF8M
		Cr13 / stellite 6	Cr13 stellite 6	Stellite 6	Stellite 6	Stellite 6
3	Seat	A276 420 / Cr13	A276 420 / Cr13	6370 (AMS) 24CrMo4	A276 302 / 18Cr8Ni	A705 630 17Cr4Ni4Cu
4	Shaft	A240 301 /graphite 17Cr7Ni / graphite	A240 301 /graphite 17Cr7Ni / graphite	A240 301 /graphite 17Cr7Ni / graphite	A240 304 /graphite 18Cr8Ni / graphite	A240 316 /graphite 16Cr12Ni2Mo / graphite

The operation temperatures of the valve depend on the pressure-temperature characteristic of the material - see further information in this catalog

4.5 Other materials

Other materials can be provided upon request, e.g.:
Nickel alloys, Duplex and Super duplex chromium alloys, etc.

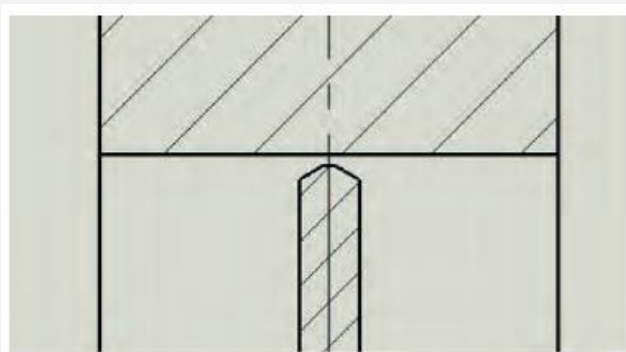
5. Throttling butterfly valves type ET-000L35.1EX & ET-000L35.3EX

5.1 Application & Technical description

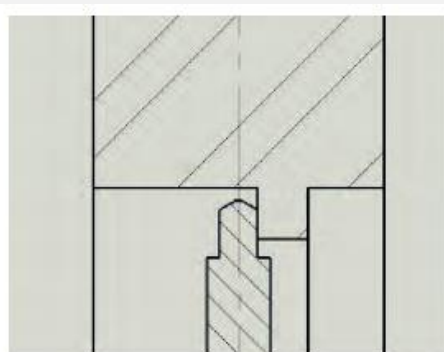
The throttling butterfly valves are valves for regulation of flow rate, which can flow in both ways. The throttling butterfly valves are not intended to close the line completely.

The disc is pivoted by the shaft in the body. The angle displacement of the disc is 0-90°. Disc position is shown by indicator line on the shaft, on the lever or on the actuator.

There is always a gap between the body and the disc in closed position.



Design ET-000L35.1EX with centric installed disc



Design ET-000L35.3EX with single eccentric installed disc

5.2 Sizes, pressure classes and temperature ranges

Type ET-000L35.18EX

Size: DN 50 up to DN 2400 (2" up to 96")

Pressure class: PN 1 up to PN 16

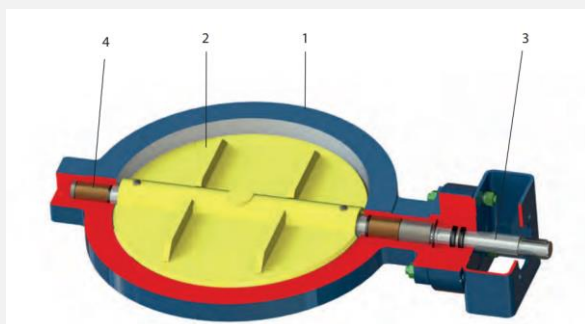
Maximum operating temperature 550°C

Type ET-000L35.38EX

Size: DN 200 up to DN 2400 (8" up to 96")

Pressure class: PN 2,5 up to PN 16

Maximum operating temperature 550°C



5.3 Standard materials

Pos	Component	Standards according to EN				
		Forged carbon steel			SS	Alloy steel
		+150°C	+425°C	-40°C / +400°C	+500°C	+500°C
1	Body	1.0577	1.0425	1.0566	1.4541	1.7335
2	Disc	1.0577	1.0425	1.0566	1.4541	1.7335
3	Shaft, pivot	1.4021 + QT700	1.4021 + QT700	1.4021 + QT700	1.4541	1.4923
4	Bearing bush	GGG40	GGG40 / Ni alloy	GGG40 / Ni alloy	Niquel alloy	Niquel alloy

The temperature range of the valve depends on the pressure-temperature characteristic of the material - see further information in this catalog.

EN 1.4021 +QT700 steel is EN 1.4021 stainless steel in the quenched and tempered condition. It has the second highest ductility compared to the other variants of EN 1.4021 stainless steel.

5.4 Other materials

Other materials can be provided upon request, e.g.:
Nickel alloys, Duplex and Super duplex chromium alloys, etc.