



DAMPER BUTTERFLY

ML/MF SERIES

18/12/2015

BIDIRECTIONAL Round damper butterfly valve

- Round damper butterfly valve, with bidirectional design.
- Designed for pneumatic transport of air or gases at different temperatures.
- Option of manufacturing "WAFER" type or with bored flanges.
- Watertight integrity between 97% and 99%.
- Option of using an air sealing system to increase watertight integrity up to 100%.
- Various seal and gasket materials available.
- Opening in accordance with **C.M.O.** standard. Other openings upon request.

General applications:

- These butterfly damper valves are suitable to work with a wide range of air and gases. They are particularly suitable for controlling the flow of gas in pipelines.

Used mainly in:

- Cogeneration plants. - Thermal power stations.
- Electrical power stations. - Chemical plants.
- Energy Sector. - ...

Sizes:

- From DN 80 up to DN 3000 (larger sizes on request). Check with **C.M.O.** for the general dimensions of a specific damper butterfly.

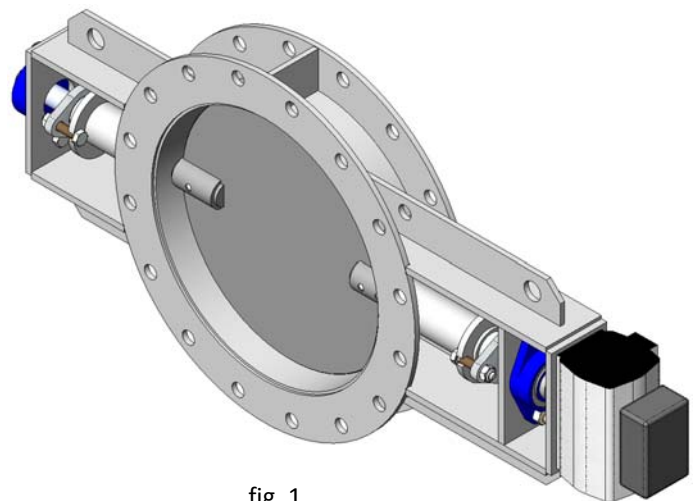


fig. 1

Working (ΔP):

- The most significant difference between the **ML** and **MF** series is the differential working pressure (ΔP). For lower pressures, choose the **ML** series (Light Butterfly); for higher pressures, choose the **MF** series.
- Maximum standard work pressure is 0.5 kg/cm²; greater pressures upon request.

Joint flanges:

- There are two options to secure these valves to the conduit:
 - Flange connection: The valve is manufactured with "WAFER" type design.
 - Bolting the flanges: The valve is manufactured with bored flanges.
- In both variants, the flange connections and openings are in line with **C.M.O.** standard, although these can be tailored to customer requirements upon request.

Watertight integrity:

- These standard watertight integrity rate for these **C.M.O.** valves is between 97% and 99%. 100% watertight integrity can also be obtained using dual swing check systems sealed by air injection (upon request).

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Directives:

- Machinery Directive: **DIR 2006/42/EC (MACHINERY)**.
- Pressure Equipment Directive: **DIR 97/23/EC (PED) ART.3, P.3.**
- Explosive Atmospheres Directive: **DIR 94/9/EC (ATEX) CAT.3 ZONE 2 and 22 GD.** For further information on categories and zones please contact **C.M.O.**'s Technical-Commercial Department.

Quality dossier:

- All valves are tested at **CMO** and material and testing certificates can be supplied on request.
- The watertight integrity of the seat area is measured with gauges.

Advantages of C.M.O.'s "ML-MF Models".

These **ML** or **MF** valves are mechanically welded.

The main elements which make up these damper butterflies are the body, which contains a swing check which turns on two duly aligned shafts. The rotation shaft is located on the central planes of the swing check and the body (fig. 2), meaning the direction of flow is irrelevant, since the valve is bidirectional.

The watertight integrity of these valves ranges between 97% and 99%. If the body is designed without sealing rims, watertight integrity will be 97%. However, better watertight integrity is achieved if half-moons are welded for sealing. There is also the option of mounting a seal system on the half-moons, in order to achieve up to 99% watertight integrity.

Whenever 100% watertight integrity is required, the design of the valve can be duly adapted, resulting in a slight variation from the standard. A dual swing check is manufactured and an air injection system using a fan is coupled to the body.

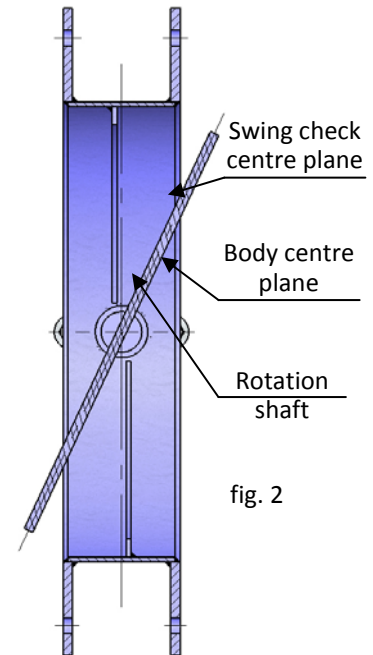


fig. 2

The **ML** or **MF** valve body consists basically of a collar of the same interior diameter as the conduit where it is installed, with a flange on each side. If the valve is "WAFFER" type, assembly in the conduit is by way of flanges ("sandwich" type) (fig. 3). In the case of bolted flanges, the valve is mounted in the conduit by bolting down the flanges (fig. 4).

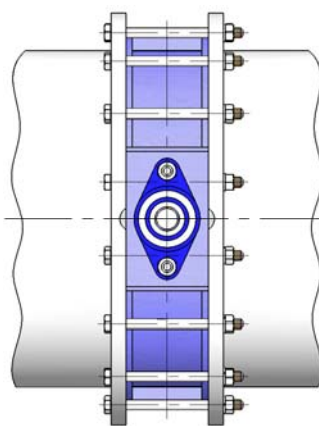


fig. 3

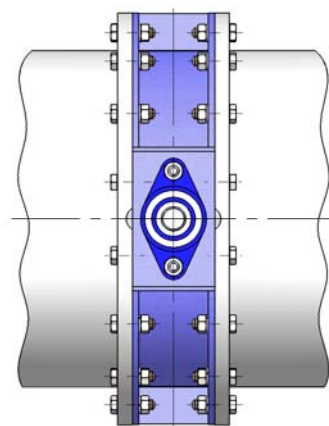


fig. 4

C.M.O.

Amategui Aldea 142, 20400 Txarama-Tolosa (SPAIN)

TEC-MF/ML.ES00

Tel. National: 902.40.80.50 Fax: 902.40.80.51 / Tel. International: 34.943.67.33.99 Fax: 34.943.67.24.40

cmo@cmo.es <http://www.cmo.es>

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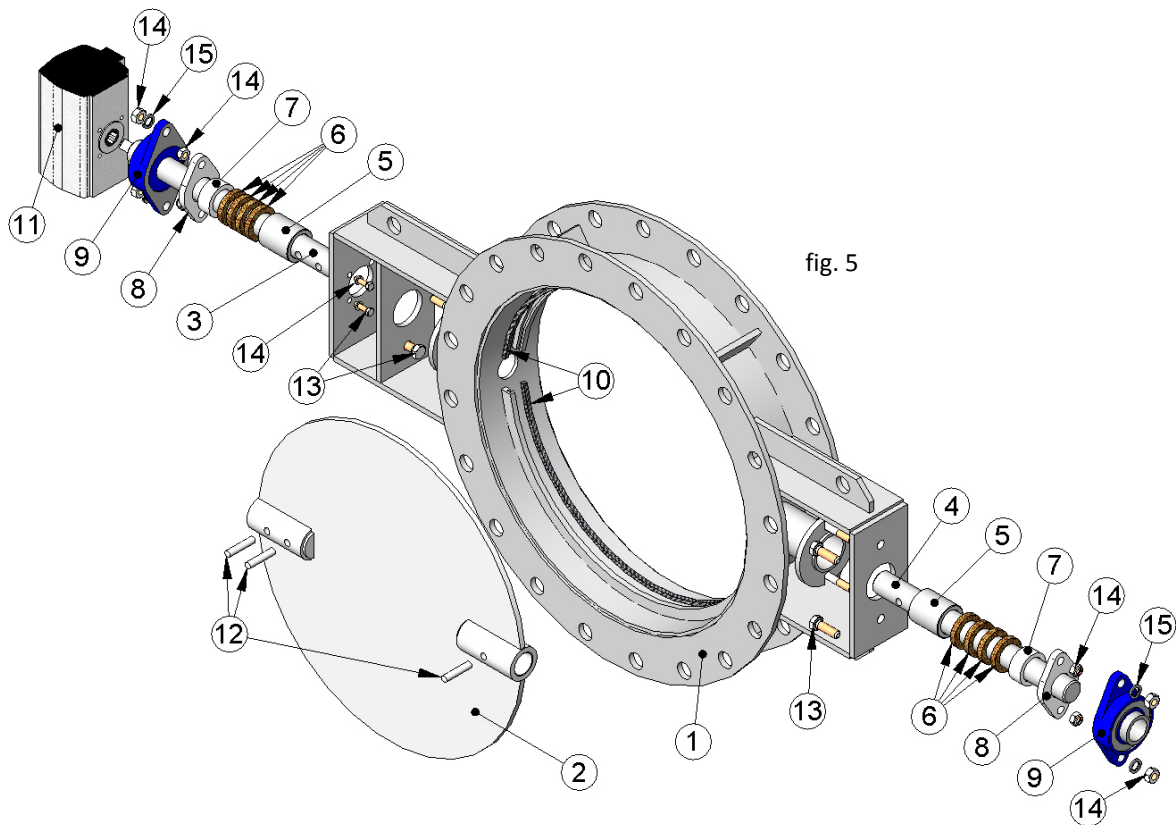
ML/MF SERIES

Both the opening and the boring of the flanges are defined in accordance with **C.M.O.** standards; however, they can also be manufactured in accordance with customer requirements.

These damper butterflies are designed for the rotation shaft to remain in horizontal position, although they can be designed for assembly in other positions upon request.

Since these valves are designed to control the passage of air or gases, these flows are occasionally at very high temperatures. Specific materials are used for high temperatures (e.g. AISI 316, AISI 310, etc.) in order to ensure the valve responds correctly under these conditions.

There are manual and automatic actuators to operate these valves. In either case, the drive system is positioned far away from the valve when the valve is to work at very high temperatures. Exterior insulation, heat dissipaters or interior insulation based on refractory materials can also be used.



STANDARD COMPONENTS LIST					
POS.	COMPONENT	POS.	COMPONENT	POS.	COMPONENT
1	Body	6	Gasket	11	Actuator
2	Swing check	7	Press bushing	12	Pin
3	Driving shaft	8	Press flange	13	Bolt
4	Driven shaft	9	Support with bearing	14	Nut
5	Spacer	10	Seal (optional)	15	Washer

table 1

C.M.O.

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Tel. National: 902.40.80.50 Fax: 902.40.80.51 / Tel. International: 34.943.67.33.99 Fax: 34.943.67.24.40

cmo@cmo.es <http://www.cmo.es>

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DESIGN CHARACTERISTICS

1- BODY

The body of this type of damper butterflies is usually mechanically welded. Its geometry consists basically of a collar of the same interior diameter as the conduit in which it is installed, with a flange on each side. In the case of “WAFER” type valves, these flanges will not include boreholes (fig. 6). When a valve with bored flanges is required (fig. 7), the flanges will be bored in accordance with **C.M.O.** standard, as with the opening dimensions of the body throughout the **ML** and **MF** series. However, both the opening and the flange standard can be tailored in accordance with customer requirements upon request.

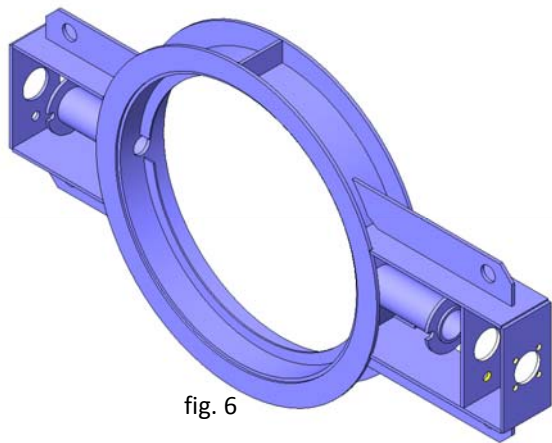


fig. 6

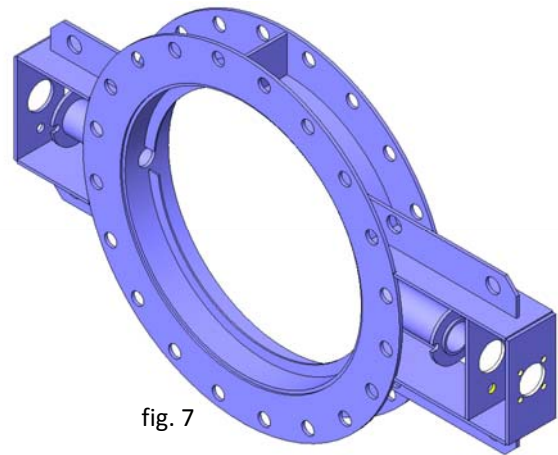


fig. 7

There are orifices on both sides of the collar in which sections of pipe are welded on the outside (fig. 8). These are perfectly aligned and coincide with the rotation shaft. The shafts are introduced in these pipes to support and operate the swing check. A packing system is used in both pipes in order to ensure the watertight integrity of these areas and prevent leakages of gas from inside the body. This system comprises multiple gasket lines which, when oppressed by way of a flange and press bushing, achieves the watertight integrity between the body and the shafts. The choice of gasket material depends mainly on the work temperature.

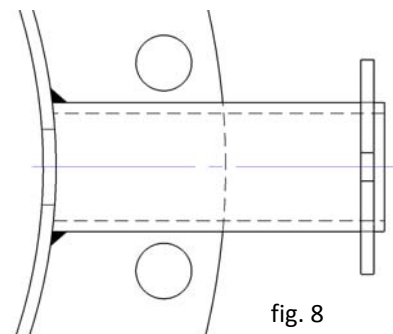


fig. 8

The watertight integrity offered by this type of valves is at least 97%. If greater watertight integrity is required, half-moons are welded inside the body, which the swing check closes on to improve sealing. There is the possibility of mounting a seal system on these half-moons, increasing watertight integrity up to 99%.

100% watertight integrity can only be achieved by fitting a dual swing check with dual sealing on the body. Air will be injected using a fan, achieving 100% watertight integrity by air sealing.

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The construction materials used are highly varied, and are chosen in accordance with the valve requirements, the work temperature, pressure, dimensions, etc. Some of the most commonly used materials are: S275JR carbon steel, stainless steel AISI 304, AISI 316, etc. However, other special materials such as steel H11, 16Mo3, AISI 310, etc., can also be used.

As standard, carbon steel damper butterflies are coated with an anti-corrosive protection of 80 microns of EPOXY, colour RAL 5015. Nevertheless, other types of anti-corrosion protections are available.

2- SWING CHECK

The swing check in these damper butterflies comprises a circular disc with bushing on each end (fig. 9) where the shafts are introduced. The swing check turns on these shafts and is operated by the driving shaft, joined using pins.

The swing check is designed in accordance with the dimension of the conduit and the work pressure required. When the situation so requires, the disc can be fitted with ribs and reinforcements to guarantee the necessary robustness (fig. 10).

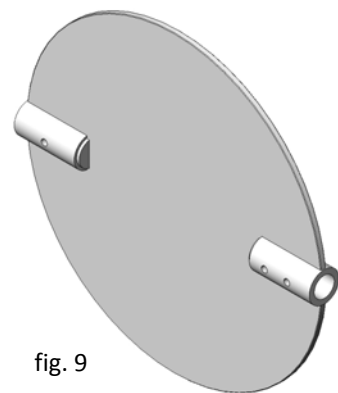


fig. 9

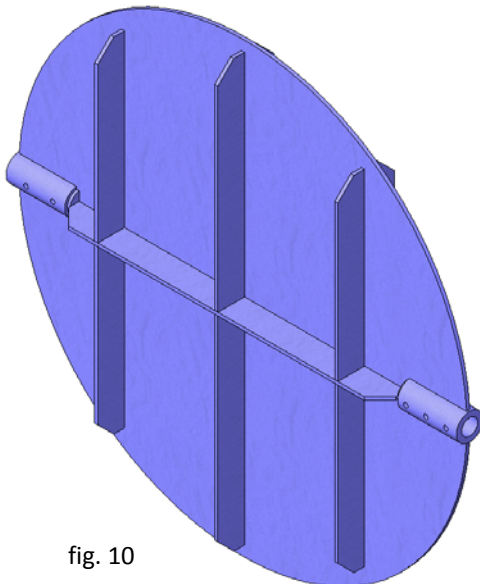


fig. 10

As mentioned above, the design varies from the standard whenever a valve with 100% watertight integrity is required, most notably through the inclusion of a dual swing check, as shown in fig. 11.

The swing checks are generally made of the same material as the body, although other materials or combinations can be produced upon request. The materials are chosen in accordance with the requirements of each valve, the working temperature, pressure, dimension, etc. Some of the most commonly used materials are:

S275JR carbon steel, stainless steel AISI 304, AISI 316, etc. However, other special materials such as steel H11, 16Mo3, AISI 310, etc., can also be used.

As standard, carbon steel or iron valves are painted with an anti-corrosive protection of 80 microns of EPOXY colour RAL 5015. Nevertheless, other types of anti-corrosion protections are available.

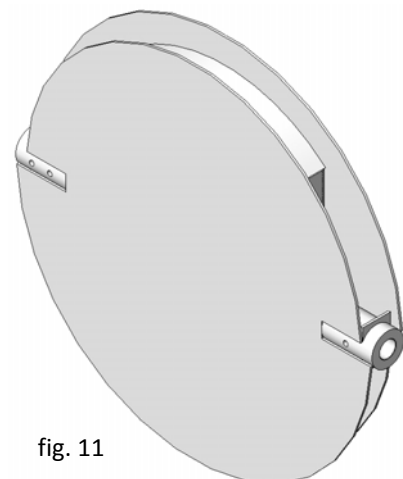


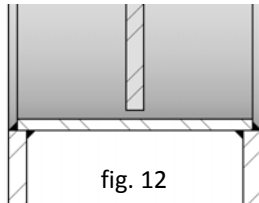
fig. 11

DAMPER BUTTERFLY

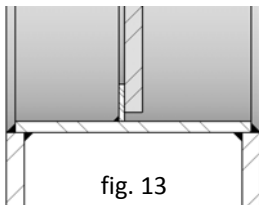
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3- SEAT

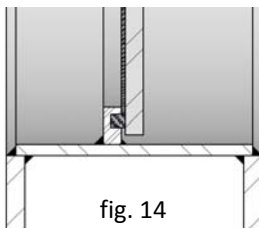
Different types of seats are available according to the working application:



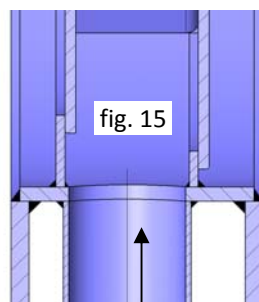
- **Seat 1:** In this type of seal there is no contact between the body and the swing check (fig. 12). The estimated leak is 3% of the pipe flow. There is a specific margin between the interior diameter of the body and the exterior diameter of the swing check, in order to ensure the valve can open and close without any problems. We therefore calculate that this type of seal achieves watertight integrity of 97%.



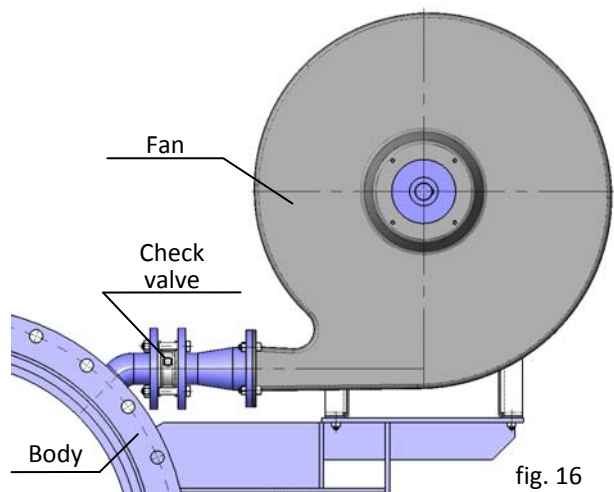
- **Seat 2:** Metal/metal seal. This type of seal includes rims in the shape of a half-moon welded inside the body. The swing check closes against these rims, making a metal/metal seal (fig. 13). The estimated leak is 2% of the pipe flow. The thickness of these rims means they can be handled easily to adjust the swing check. We therefore calculate that this type of seal achieves watertight integrity of 98%.



- **Seat 3:** Metal/joint seal. This type of seal includes rims in the shape of a half-moon welded inside the body. These rims have a machined recess where the seal fits. The swing check closes against this seal (fig. 14). The estimated leak is 1% of the pipe flow. There are several materials available for the watertight joint, chosen mainly in line with the working temperature of the valve. We calculate that this type of seal achieves watertight integrity of 99%.



- **Seat 4:** Air-sealed. This type of seal is particularly special. The valve is designed with a dual seal, between which air is injected to completely separate the gases on both sides of the swing check (fig. 15). This type of valve requires a dual swing check, which closes against the dual half-moon rim system fitted inside the body. In order to inject air in the seal, a fan system with a check valve is attached (fig. 16), meaning the conduit gases cannot leave through the fan pipe when the damper butterfly is open. We therefore calculate that this type of seal achieves watertight integrity of 100%.



C.M.O.



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There is a range of materials for the seal when choosing the seal type described in point "Seat 3" (metal/joint seal).

Watertight seal materials

EPDM

Recommended for temperatures below 90°C*, providing the damper butterfly with watertight integrity of 99% of the pipe flow.

NITRILE

Used with gases containing fats or oils at temperatures no higher than 90°C*. Provides the damper butterfly with watertight integrity of 99% of the pipe flow.

VITON

Suitable for corrosive applications and temperatures of up to 190°C continuously and peaks of 210°C. Provides the damper butterfly with watertight integrity of 99% of the pipe flow.

SILICONE

Used mainly in the food industry and for pharmaceutical products with temperatures no higher than 200°C. Provides the damper butterfly with watertight integrity of 99% of the pipe flow.

PTFE

Suitable for corrosive applications and pH between 2 and 12. Does not provide the damper butterfly with 99% watertight integrity. Estimated leakage: 1.5% of the pipe flow.

NATURAL RUBBER

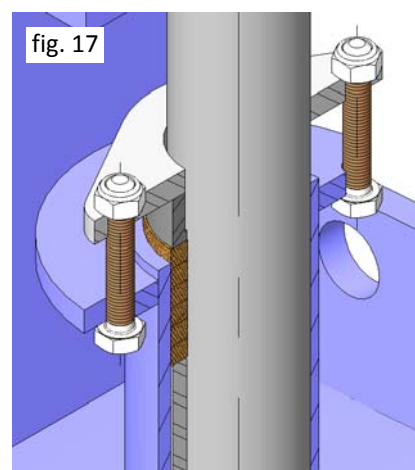
This can be used in multiple applications at temperatures below 90°C, with abrasive products, and provides the damper butterfly with 99% watertight integrity.

Depending on the work temperature and the watertight integrity to be achieved, bronze, graphite, Hecker seals, etc., can also be used.

***Note: In some applications other types of elastomer are used, such as: hypalon, butyl, etc. Please contact C.M.O. for any such requirements.**

4- GASKET

C.M.O.'s standard gasket comprises several lines of SYNT.+PTFE gasket which provide watertight integrity between the shafts and the body, preventing any type of leakage into the atmosphere (fig. 17). It is located in an easily accessible place and can be replaced without dismantling the valve in the line. Below we indicate various types of gasket available according to the valve's application:



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GREASED COTTON (Recommended for hydraulic services)

This gasket is composed of braided cotton fibres soaked in grease both inside and out. It is for general use in hydraulic applications in both pumps and valves.

DRY COTTON

This gasket is composed of cotton fibres. It is for general use in applications with solids.

COTTON + PTFE

This gasket is composed of braided cotton fibres soaked in PTFE both inside and out. It is for general use in hydraulic applications in both pumps and valves.

SYNTHETIC + PTFE

This gasket is composed of braided synthetic fibres soaked in PTFE both inside and out. It is for general use in hydraulic applications in both pumps and valves and in all types of fluids, especially corrosive ones, including concentrated and oxidising oils. It is also used in gas with solid particles in suspension.

GRAPHITE

This gasket is composed of high-purity graphite fibres. A diagonal braiding system is used and it is impregnated with graphite and lubricant which helps to reduce porosity and improve operation.

It has a wide range of applications as graphite is resistant to steam, water, oils, solvents, alkali and most acids.

CERAMIC FIBRE

This gasket is composed of ceramic material fibres. It is used mainly with air or gases at high temperatures and low pressures.

SEAT/SEALS			GASKET			
Material	Max. Temp. (°C)	Applications	Material	P(bar)	Max. Temp. (°C)	pH
Metal/Metal	>250	High temperature/Low watertight integrity	Greased cotton	10	100	6-8
EPDM (E)	90 *	Water, acids and non-mineral oils.	Dry cotton (AS)	0.5	100	6-8
Nitrile (N)	90 *	Hydrocarbons, oils and greases	Cotton + PTFE	30	120	6-8
Viton (V)	200	Hydrocarbons and solvents	Synthetic + PTFE	100	-200+270	0-14
Silicone (S)	200	Food products	Graphite	40	650	0-14
PTFE (T)	250	Resistant to corrosion	Ceramic Fibre	0.3	1400	0-14
Natural Rubber	90	Abrasive products				

* → EPDM and Nitrile: possible up to max temp: 120°C to order.

NOTE: More details and other materials available to order.

table 2

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5- SHAFTS

The shafts of **C.M.O.'s ML and MF** damper butterflies are solid and manufactured in stainless steel (AISI 304, AISI 316, AISI 310, etc.). These characteristics make it highly resistant and provide excellent properties against corrosion.

Pins (fig. 18) are used to join the swing check and the shafts, which cross the swing check bushing from side to side, including the part of the shafts located inside.

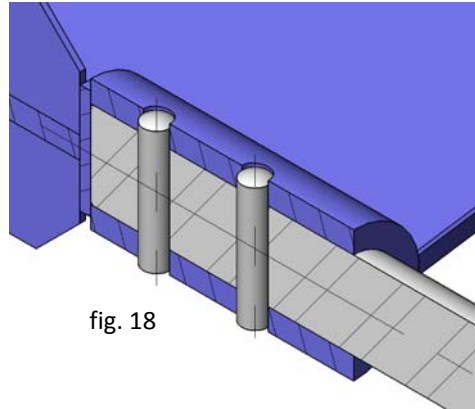


fig. 18

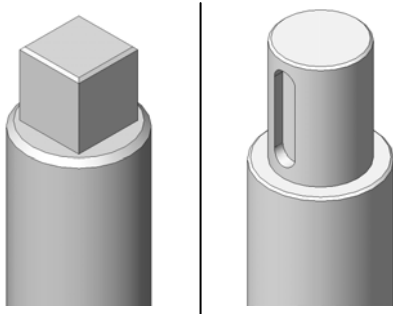


fig. 19

fig. 20

The other end of the driving shaft can, in order to transmit the torque generated by the actuator, use either the square head system (fig. 19) or the slot system (fig. 20).

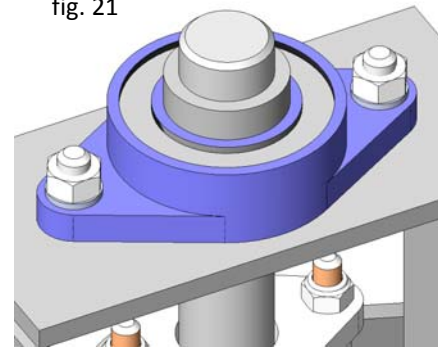


fig. 21

Commercial support pieces fitted with self-lubricating bearings are used to ensure the shafts can turn without any problems. These support pieces are bolted in the body and each shaft has its own support (fig. 21).

6- PACKING GLAND

As explained above, a packing system is used to achieve the watertight integrity of the shaft. This comprises multiple gasket lines which are oppressed by way of a flange and press bushing. The combination of press flange plus packing bushing (fig. 22) allows a uniform pressure and force to be applied throughout the gasket, thus guaranteeing there are no leakages between the body and the shafts.

As a general rule, both the press flange and the press bushing are made of stainless steel AISI 316. However, other materials can be used to order.

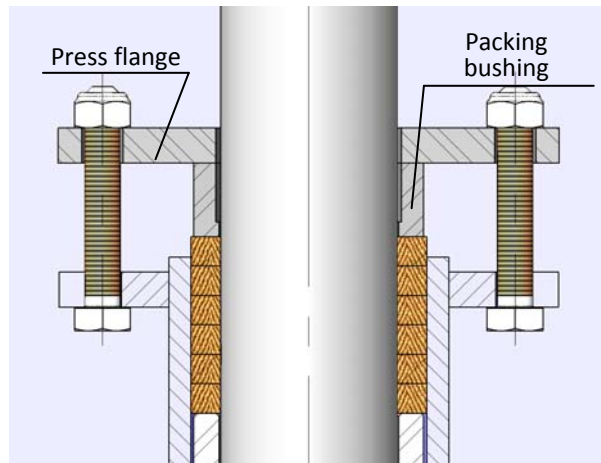


fig. 22

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7- ACTUATORS

The damper butterfly actuator system is located in one of the body support pieces. The actuator is attached to the body and transmits the torque generated to the swing check through the actuating shaft.

Our damper butterflies are supplied with several types of actuator, bringing the advantage that, thanks to the **C.M.O.** design, they can be interchanged.

This design allows customers to change the actuators themselves and no extra assembly accessories are required.

The total dimensions of the damper butterfly may vary in accordance with the type of actuator chosen.

Manual:

- Reducer (fig. 29)
- Lever (fig. 24)
- Square-head (fig. 27)
- ...

Automatic:

- Electrical actuator (fig. 25)
- Linear pneumatic cylinder (fig.28) *
- ¼ Turn pneumatic cylinder (fig. 26) *
- Single acting pneumatic cylinder (fig. 23) *
- ...

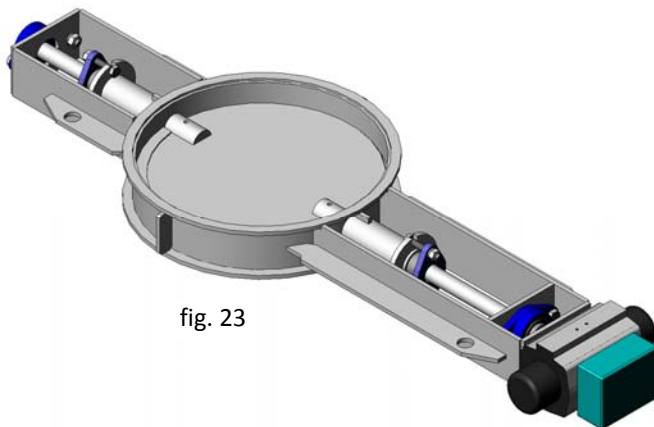


fig. 23

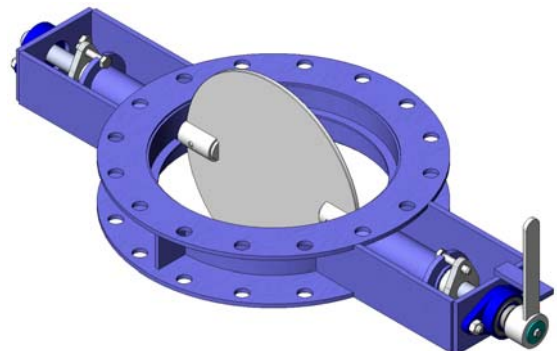


fig. 24

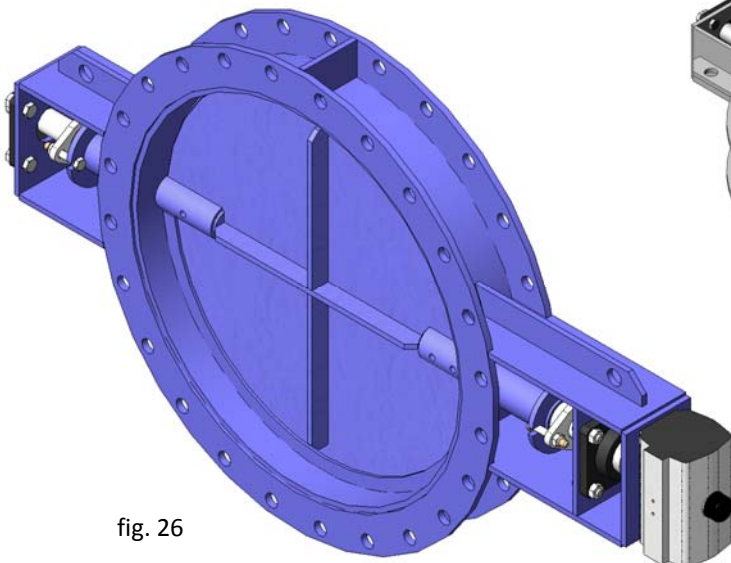


fig. 26

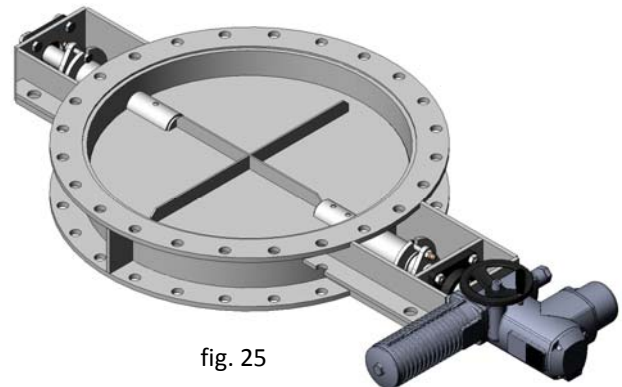


fig. 25

* → Speed regulators must be included when the damper butterflies are fitted with a pneumatic drive. In these cases the minimum time of each operation (opening or closing) is 6 seconds.



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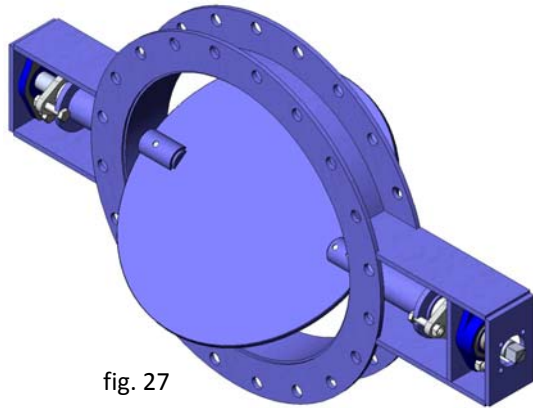


fig. 27

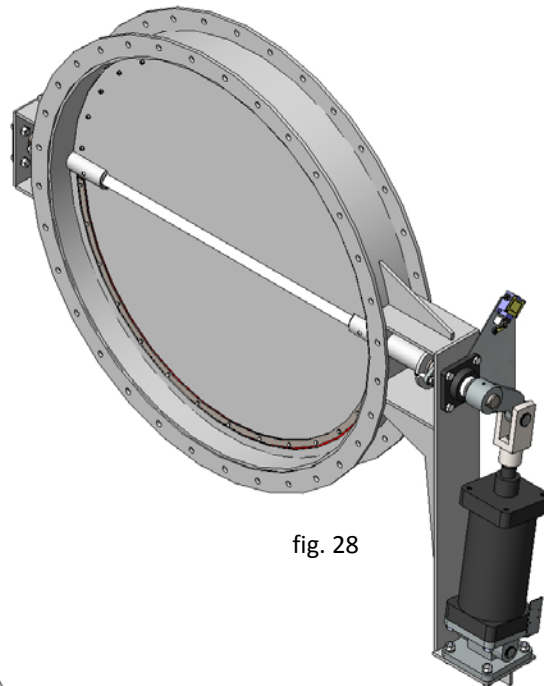


fig. 28

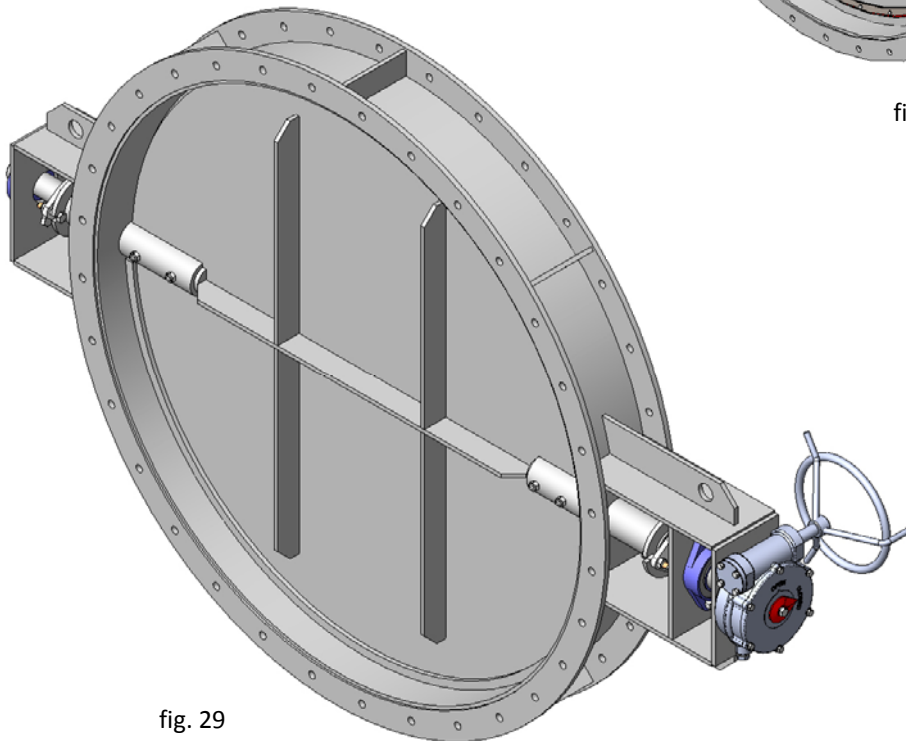


fig. 29

A range of accessories has also been developed to adapt the damper butterflies to customer requirements. Some of these are indicated below. Please check with our engineers for any accessories you require which are not in the list.

Wide range of accessories available:

Mechanical stoppers

Locking devices

Emergency manual actuators (fig. 30)

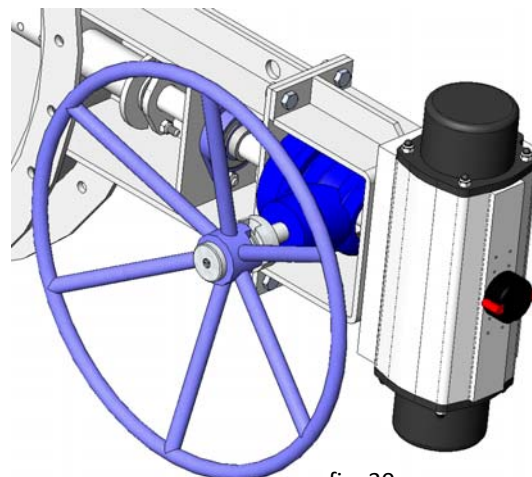


fig. 30



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Electrovalves
Positioners
Limit switches (fig. 31)
Proximity detectors
...

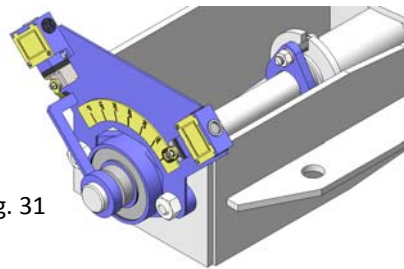


fig. 31

ACCESSORIES AND OPTIONS

Different accessories are available to adapt the damper butterflies to specific working conditions such as:

- **Mirror-polished swing check:** The mirror-polished swing check is especially recommended in the food industry and, as standard, in applications in which solids can stick to the swing check. It is an alternative to ensure the solids slide off and do not stick to the swing check.
- **PTFE coated swing check:** As with the mirror-polished swing check, this improves the damper butterfly's resistance to products that can stick to the swing check.
- **Stellited swing check:** This consists of providing stellite in the swing check sealing area to protect it from abrasion.
- **Scraper in the gasket:** Its function is to stop the passage of harmful particles and prevent damage to the gasket.
- **Air injection in the gasket:** By injecting air in the gasket, an air chamber is created which improves the watertight integrity.
- **Cased body:** Recommended in applications in which the fluid can harden and solidify inside the valve's body. An external casing keeps the body temperature constant, preventing the fluid from solidifying.
- **Flushing holes in body:** Several holes are drilled in the body to flush air, steam or other fluids out with the aim of cleaning the valve seat before sealing.
- **Mechanical limit switches, inductive switches and positioners:** Installation of limit switches (fig. 31) or detectors to indicate specific valve position, and positioners to indicate continuous position.
- **Electrovalves:** For air distribution to pneumatic actuators.
- **Connection boxes, cabling and pneumatic piping:** Units supplied fully assembled with all the necessary accessories.
- **Mechanical stroke limiters (mechanical stops):** These are used to mechanically adjust the movement, limiting the turning required of the damper butterfly swing check.
- **Mechanical locking system:** Allows the valve to be mechanically locked in a set position for long periods.
- **Emergency manual actuator (handwheel/gears):** Allows manual operation of the damper butterfly in the event of power or air failure (fig. 30).
- **Interchangeable actuators:** All actuators are easily interchangeable.
- **Epoxy coating:** All stainless steel bodies and components of C.M.O.'s damper butterflies are coated with a layer of EPOXY, which makes them resistant to corrosion and gives an excellent surface finish. CMO's standard colour is blue RAL-5015.



OPTIONS FOR HIGH TEMPERATURES

If a damper butterfly is required to work at high working temperatures, there are different options available in line with the temperature and the space for the valve.

1- Elongated supports (fig. 32):

When the damper butterfly has to work at high temperatures, there is the option of elongating the body supports. This moves the bearings and the actuator away from the source of heat, protecting them from possible damage due to the high temperatures of the conduit. Whenever the valve is fitted with a manual actuator, this allows the operator to use it without any risk of burns.

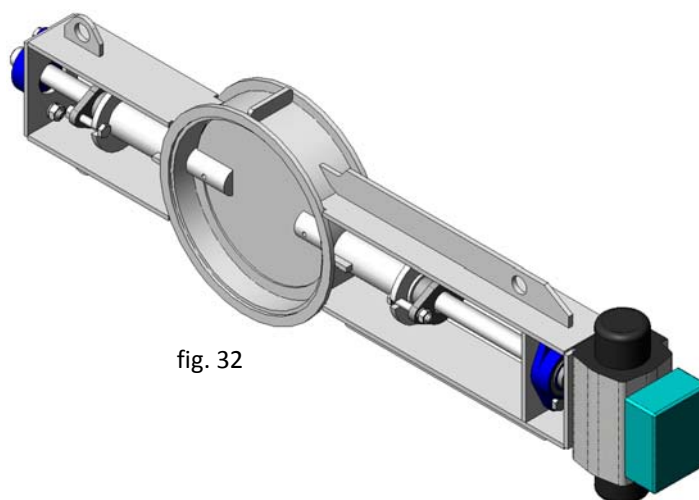


fig. 32

2- Insulation (fig. 33):

Whenever the damper butterfly has to work at high temperatures and it is necessary to avoid unnecessary loss of heat through the valve, e.g. to maintain optimum performance of the facility, there is the option of protecting the valve body with exterior insulation.

Sufficient free space is left around the body in order to fit the

insulation whenever the customer deems appropriate. The packing, bearings and drive systems therefore remain easily accessible and maintenance work can be carried out without having to remove the insulation.

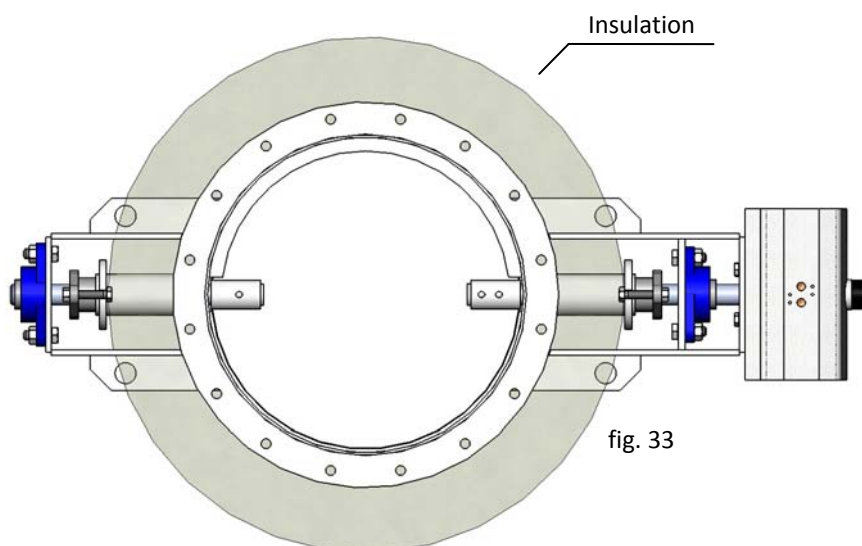


fig. 33



DAMPER BUTTERFLY

ML/MF SERIES

3- Heat dissipaters (fig. 34):

Heat dissipaters are installed in facilities in which the valve works at high temperatures and there is not enough space to extend the body support pieces (or the length required is greater than normal). They are installed principally in the shafts, since they are solid and have great thermal conductivity. The aim is to dissipate the heat and bring the temperature of the shafts down in the areas where the bearings and the actuator are assembled. This allows them to work at a lower temperature, causing less wear and tear and extending their working life.

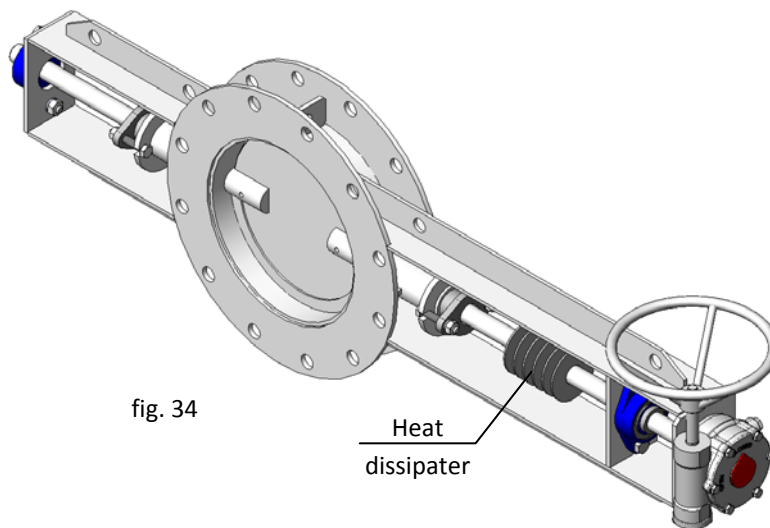


fig. 34

4- Interior insulation (fig. 35):

This type of damper butterfly is occasionally installed in conduits where the working temperature is very high. It may be the case that the temperature is too hot for the option of fitting insulation or that the valve is to be installed as close as possible to the source of heat. In these cases the inside of the body can be insulated with refractory material.

In valves which use this system, the diameter of the collar in the body is usually

significantly larger than the nominal diameter of the conduit. The reason for this characteristic is that the refractory insulator is attached to the interior surface of the collar in the body. In consequence, higher temperatures will require higher quantities of refractory material. For this reason, the difference between the nominal diameter of the conduit and the diameter of the body must be larger.

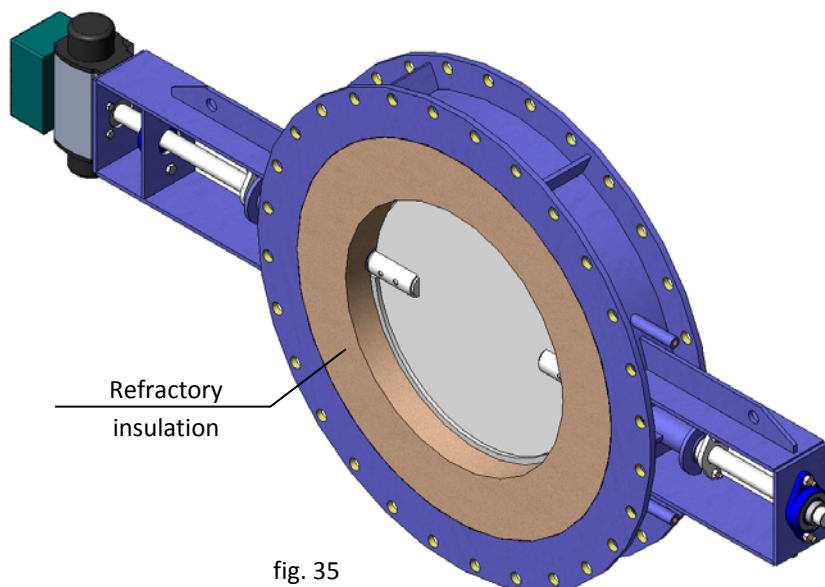


fig. 35

DAMPER BUTTERFLY

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GENERAL DAMPER BUTTERFLY DIMENSIONS

DN	A	ØB	C	ØD	ØE
80	100	180	4	140	14
100	100	200	4	160	14
125	100	225	8	185	14
150	100	250	8	210	14
200	100	300	8	260	14
250	100	350	12	310	14
300	100	400	12	360	14
350	100	450	12	410	14
400	100	500	16	460	14
450	100	550	16	510	14
500	100	600	20	560	14
550	140	670	20	620	18
600	140	720	20	670	18
650	140	770	20	720	18
700	140	820	24	770	18
750	140	870	24	820	18
800	140	920	24	870	18
850	140	970	24	920	18
900	140	1020	24	970	18
950	140	1070	24	1020	18
1000	180	1140	28	1080	18
1050	180	1190	28	1130	18
1100	180	1240	28	1180	18
1200	180	1340	32	1280	18
1300	200	1450	32	1380	18
1400	200	1550	36	1480	18
1500	200	1650	36	1580	18
1600	300	1800	40	1710	23
1700	300	1900	40	1810	23
1800	300	2000	44	1910	23
1900	300	2100	44	2010	23
2000	400	2220	48	2120	23
2100	400	2320	48	2220	23
2200	400	2420	52	2320	23
2300	400	2520	52	2420	23
2400	400	2620	56	2520	23
2500	400	2720	56	2620	23
2600	400	2820	60	2720	23
2700	400	2920	60	2820	23
2800	400	3020	64	2920	23
2900	400	3120	64	3020	23
3000	400	3220	68	3120	23

table 3

As indicated previously, the openings and general dimensions of **ML** and **MF** damper butterflies are defined in accordance with **C.M.O.** standard. A table is included with these measurements (Table 3). However, since these valves depend on multiple variables, such as work pressure, temperature, nominal diameter of the conduit, etc., we recommend checking with **C.M.O.** for the dimensions of a specific damper butterfly.

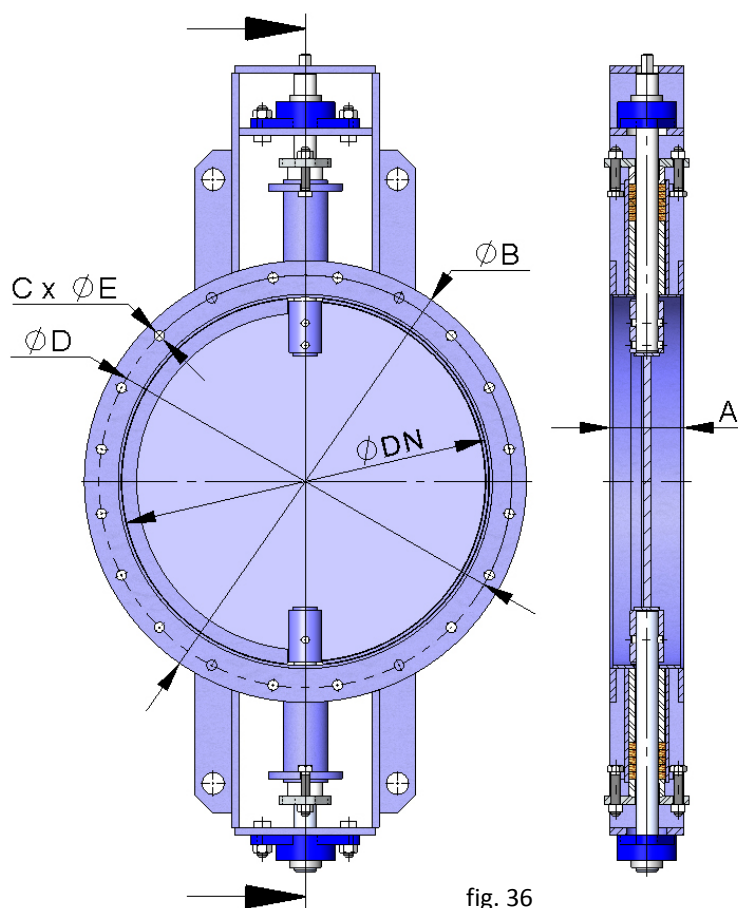


fig. 36