

BUTTERFLY VALVE SEALS FOR THE PROCESS INDUSTRY



Seals for butterfly valves ensure the reliable function of butterfly and disc valves. In the food and beverage industry, they are used wherever a shut-off valve is sufficient and a more extensive flow regulation is not necessary.

Shut-off butterflies, butterfly or disc valves are normally four-part units composed of a two-part housing with a threaded connector, weld-on ends or a clamp connector; a valve disc and a butterfly valve seal. It is only the last component that guarantees the integrity of the entire unit, making it indispensable in preventing all three types of potential leakage – at the pipe seal, the flange and the actuator.

Despite the simplicity of their basic design, seals for butterfly valves are expected to master extremely demanding operating conditions: when the valve is open, the gasket should only minimally reduce the pipe diameter, and must be nearly free of dead space. The valve should be easy to close, but at the same time exhibit high compression when closed to provide a perfect seal. Optimum materials, torque-reducing geometries, and highly realistic testing are needed in order to combine all of the desired qualities.

The requirements are further intensified by the high flow speed when the valve is closing. This flow creates a major pressure differential and pressure fluctuations, both of which can blow the seal out of its seat into the pipe. In order to optimally tailor the seal design to prevent this, Freudenberg utilizes efficient and highly-effective computational models such as FEM.

Dimensions

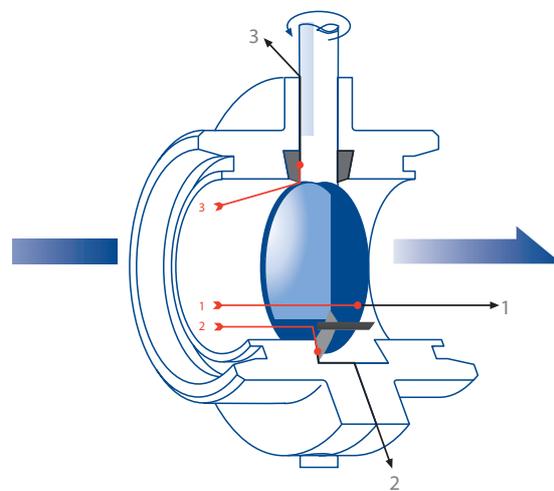
- Dimensions fit standard DIN and ISO pipe dimensions
- Standard metric: DN 15 to DN 250
- Standard inch: 1" to 6"
- Individual dimensions available on request

Types

- Customer-specific types available on request thanks to FEM calculations
- Special models with additional treatment (e.g. RfN)

Installation and assembly

When stretching the gasket over the valve, avoid ledges, sharp edges and threaded surfaces on the shaft.



- 1 Optimal compression on the butterfly valve (or "valve disc") ensures that the sealing location is reliably sealed. Here the goal is an ideal compromise between the integrity of the closed valve and the torque involved in actuating it
- 2 The quasi-static sealing location is also worth examining. If the compression is oriented correctly, the leakage of production and cleaning media is reliably prevented
- 3 The axle lead-through represents a particularly difficult sealing location. The optimal design dependably prevents leaks

VALUE FOR THE CUSTOMER

- Patented torque-reducing design allows high-frequency operating cycles with low actuating forces and minimal abrasion
- Extremely easy to assemble
- Leak-free and dead space-free variants available
- Low-friction coatings available
- A broad range of material versions for high media and temperature resistance

APPLICATIONS

Beverage Industry

- Use of EPDM materials
- Thermal resistance in steam and sterilization to +140 °C (+284 °F), for brief periods up to +160 °C (+320 °F)
- Suitable for aqueous media and cleaning processes
- For applications involving nitric or formic acid, high temperatures and media concentrations, EPDM represents the most economical solution in comparison to other materials. In extreme cases, however, EPDM is not optimal either and alternatives may have to be used

Dairy Industry

- EPDM, FKM, VMQ or HNBR materials are used, depending on the fat content and temperature
- In certain cleaning media, HNBR, FKM and VMQ cannot match the service life of EPDM; however, unlike EPDM they are resistant to fats, thus making them well-suited for use at high temperatures and concentrations

Pharmaceutical and Chemical Industry

- EPDM, FKM, VMQ or HNBR materials are used, depending on the production media and solvents
- FKM is resistant to certain oils and some aromatic oils, but shows limited resistance to alkaline cleaning media. It is also more prone to swelling in acids, making it necessary to select compatible cleaning media when using FKM
- Certain applications in the production of flavorings, in pharmaceutical and chemical processes exceed the resistance properties of EPDM, VMQ, and HNBR. In such cases, Freudenberg recommends the use of Fluoroprene® XP materials

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DESIGN NOTES	
Dimensions	<ul style="list-style-type: none"> • Information on the minimum and maximum dimensions of the flanges and valves are necessary for gasket design • Minimum necessary and maximum permissible actuating forces should be included in design considerations • Use of a patented Freudenberg design to reduce torque
Tolerances	Lowest possible tolerances with regard to the seal and installation space
Surfaces	<ul style="list-style-type: none"> • Perfectly smooth (no gaps or seams) in the dynamic area • The sealing butterfly should be polished on the sealing surface (Rmax 2.5 µm, Ra 0.05 – 0.3 µm) • The shaft should be polished in the sealing area • (Rmax 2.5 µm, Ra 0.05 – 0.3 µm)

