



PTFE Bellows



PTFE bellows are used as balancing elements between engineering parts. They are machined parts. Due to the different geometries of the folds highly flexible or pressure-resistant versions can be designed and manufactured.

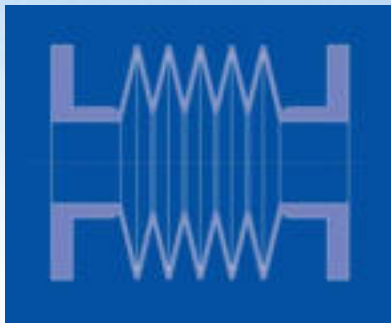
PTFE's outstanding material properties allow bellows to be used increasingly in medical, food and general industrial applications.

Benefits

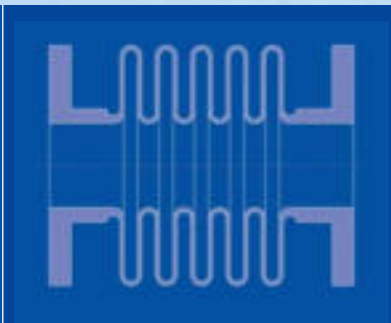
- Nearly universal chemical resistance
- FDA-conforming materials for food and pharmaceutical products
- Very good suitability for sterilization
- Anti-adhesive
- Wide temperature range from -60°C to $+200^{\circ}\text{C}$
- Cost effective series production from in-house production of semi-finished goods to the final product
- High reverse bending strength
- Good dimensional stability
- Low tooling costs
- Freedom of design

Applications

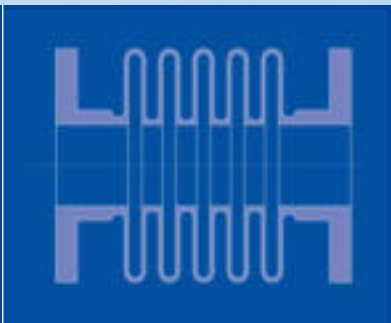
Versions



Pointed, Non-cut Folds
for maximum expansion and
low pressures up to 3 bar.



Round, Machined Folds
for improved cleaning and
maximum reverse bending
strength. Low to medium
pressures up to 6 bar.

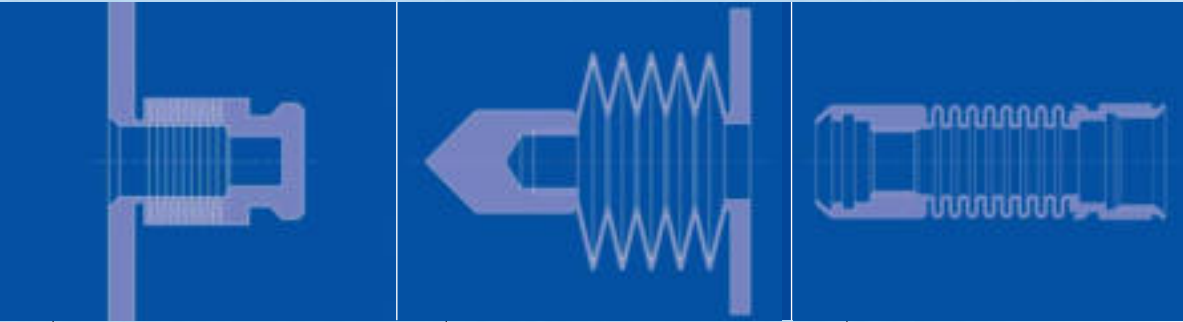


Solid, Machined Folds
for high pressures above
6 bar. Optimal with
rectangular support on the
rod or in the cylinder.

Fields of Application

- As compensation for expansion in pipe systems
- For shielding sterile areas
- For filling systems
- With aseptic valves
- With solenoid valves
- With metering devices
- With pumps and valves

Application Examples



Bellows for a solenoid valve in medical technology.
 High flexibility and frequency.
 Physiologically harmless.
 Resistant to aggressive cleaning agents.

Bellows for filling valves
 Hermetical separation of the medium from the actuation mechanism. The tip is the sealing cone of the valve.

Multi-functional bellows
 Separation of two areas with moving parts. Integration of sealing and guiding elements. Connections can be performed according to customer specifications.

Various Connecting Configurations



Positive flange compression fit.



Clamping flange with additional O-ring seal.



Locating connection with thread.



Clamping by means of a sleeve.

Materials

- Typically, unfilled PTFE with FDA approval
- Modified PTFE with higher reverse bending strength
- Special versions with electrical conductivity
- With applications as metering, shut-off and sealing element the clamping flange, the sealing cone or the slide ring may be manufactured from a PTFE compound (e.g. glass fibers or ceramics)
- For information on materials with good reverse bending strength and low permeation, please see pages 26 – 27
- For your inquiry, please complete the technical questionnaire at the end of the catalog



PTFE Diaphragms



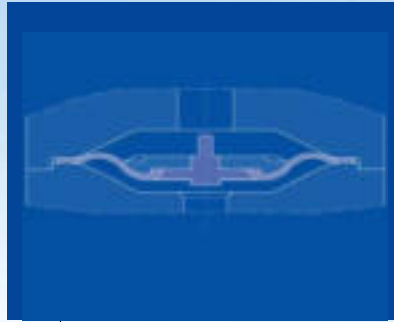
Diaphragms are hermetical seals between two spaces with media and pressures which, typically, differ from each other. Unlike piston and rod seals, there is no drag leakage at the contacting surfaces, and the requirements to be met in terms of tolerances and surfaces are lower.

Chemical resistance to aggressive media, flexibility and long service life are major requirements made on materials and the design of membranes. For perfect service, it is indispensable that diaphragms design and selection of the respective compound be adapted specifically to the particular application conditions.

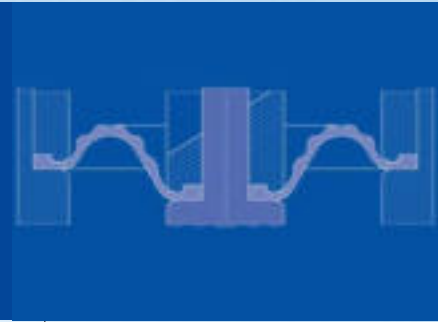
Benefits

- Good reverse bending strength
- Nearly universal chemical resistance
- Very good suitability for sterilization
- Temperature resistance
–60°C to +200°C
- FDA-approved materials
- Freedom of design
- Homogeneous structure

Applications



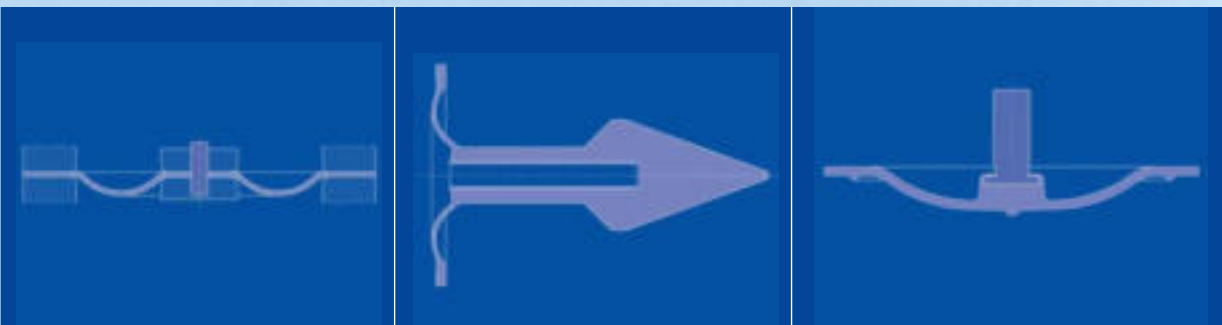
Diaphragm
with metal core for painting
pumps.



Diaphragm
with grooves on the back
for sterile valve with
very smooth surfaces.

Fields of Applications

- Metering devices for the pharmaceutical and food industries
- Pumps for the chemical industry
- Pumps for painting technology
- Pressure regulators
- Pharmaceutical valves



Diaphragm
for fluid pumps in the
chemical industry.

Piston Diaphragm
with integrated sealing
cone in filling lines.

Formed Diaphragm
for actuating valves.



PTFE diaphragms are used in metering devices for the pharmaceutical and food industries as well as in pumps of the chemical industry and in painting technology.

Because of their outstanding physical and chemical properties PTFE diaphragms are being used in constantly increasing fields of application. The lift of the diaphragm is determined by its shape and design as well as the existing effective diameters.

To reduce the risk of damage, the sandwich diaphragm technology is primarily being used (principle of the double barrier, diaphragm technology with breakage sensor). This enables early detection of malfunctions for planned execution of timely repairs and appropriate corrective action which reduces production downtimes significantly. In addition, this helps prevent contamination of the media fluids to be pumped.

With multi-layered diaphragms and constant material thicknesses the actuating forces are considerably lower than those of single-layered diaphragms.

In addition to stamped diaphragms, machined diaphragms are increasingly being used. A major advantage over PTFE/elastomer composite diaphragms is the homogeneous structure and freedom of design offered by these diaphragms.

To increase service life, specially treated PTFE films and films made from modified PTFE are used.

For information on materials with good reverse bending strength and low permeation, see pages 26–27.

For your inquiry, please complete the technical questionnaire at the end of the catalog.

Versions

Film Diaphragms

- For large volumes
- For medium requirements regarding lift, service life, pressure
- More sophisticated design of clamping surfaces

Flat Diaphragms

- Only for very small lifts
- Lowest tooling and manufacturing costs
- Low assembly height



Diaphragms with Stamped Contour

- High performance capability
- Low restoring forces
- Multi-layered designs (for evacuation of leakage, higher pressure strength)



Machined Diaphragms

- For maximum requirements regarding lift, service life, pressure ($H_{\max} \leq 0,30 \times \varnothing \text{ eff}$)
- For specified installation spaces

Versatile Design Options

- No dead space in clamping areas
- Leakage evacuation with multi-layered designs
- Reinforcement grooves, beads, cuts to avoid radial creasing
- Sealing elements to close openings
- Core/disc design for mechanical articulation



Assembly and Design Instructions



In the clamping zone, the diaphragm is fastened between the housing flanges under sufficient pressure (thread-fastening, clamping). The diaphragm in this case acts like a static seal. Deformation damage caused by excessive clamping pressures must be avoided through flange stops and/or specified torque levels. Depending on the diaphragm material and diaphragm thickness, additional flat or profile seals may be used for sealing.

With PTFE diaphragms, sealing performance can be improved by a V-profile surface structure of the respective assembly components, meaning the V-profile structure of the housing or supporting parts is pushed into the PTFE, resulting in improved sealing performance.

For mechanical articulation, the diaphragm is typically clamped between the supporting and the pressure disc. The individual components are joined by a threaded connection, riveting or vulkanized. When designing the support, it must be ensured that the surfaces contacting the diaphragm are burr-free and that there are sufficiently dimensioned transition radii.

General rule: $R \geq 4 \cdot s$

R = radius; s = diaphragm thickness

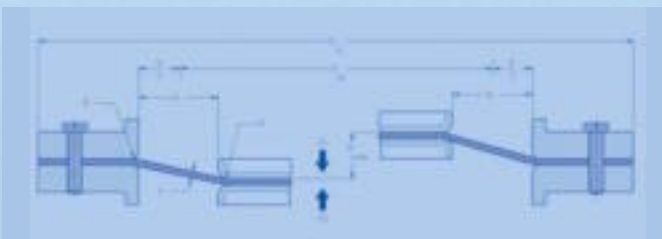
For perfect service, it is indispensable that diaphragm design and selection of the respective compound be adapted specifically to the particular application conditions.

We will be pleased to provide you with respective consulting support.

Dimensioning Legend for Engineering Drawings

- D_A Ø outside
- D_w Ø eff
- b (radial bead width)
- S (membrane thickness in the bead area)
- P (pressure)
- H_{max} (maximum lift)
- R (radii at the transition points)

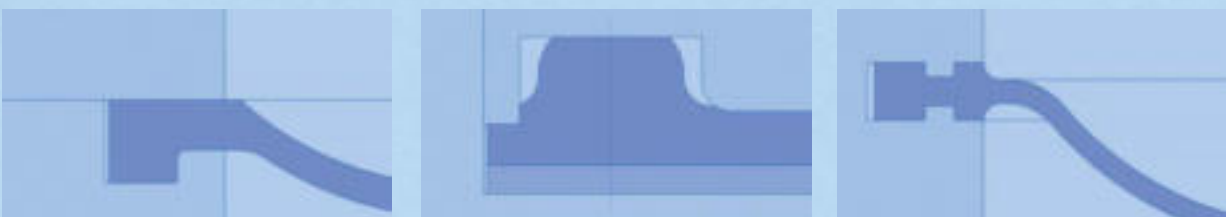
Flat Diaphragms



Diaphragm with Bead



Other Clamping Options



Technical Questionnaire

Diaphragms/Bellows

Please complete and return by fax to:

++49 (0)71 42/583-200



1.1. Pressure Conditions, Diaphragm

Pressure (bar): _____

Differential pressure (bar): _____

1.2. Pressure Conditions, Bellows

Pressure interior (bar): _____

Pressure exterior (bar): _____

2. Operating Conditions

Permanent temperature (°C): _____

Peak temperature (°C): _____

Frequency/# of strokes/lifts: _____

Medium: _____

Stroke/lift (mm): _____

Diaphragm feeding volume (cm³): _____

Required service life: _____

Application: _____

3.1. Dimensions, Diaphragm

Clamping dimensions D (mm): _____

Type of retention/fixing: _____

3.2. Dimensions, Bellows

Inner Ø (mm): _____

Outer Ø (mm): _____

Length min/max (mm): _____

4. Special Needs/Design

5. Requirement

Once-off (pieces): _____

Monthly (pieces): _____

Annually (pieces): _____

Company (Address)

Contact person

Phone

Fax

E-Mail