New Materials and their Properties

In the past, with applications requiring the utilization of modified PTFE, certain limitations regarding reverse bending properties had to be accepted. Now ElringKlinger has managed to launch a new product on the market, HS 22121, which combines all the advantages of modified PTFE.

Benefits

- Higher permeation density
- Low cold flow
- Lower porosity
- Smoother surfaces
- Lower Stretch Void Index
- Weldability
- FDA-Approval

In certain aspects, the new material extent even significantly surpasses the excellent reverse bending properties of non-modified standard PTFE types. The combination of these properties was not possible in the past.

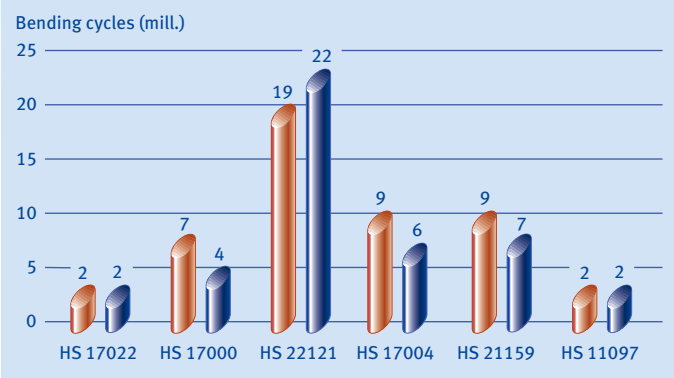
HS 22121 is equally suitable for use as a diaphragms or bellows.

In addition to the high reverse bending resistance, the material's reduced cold flow improves the retention of the diaphragm and/or bellows in the clamping area; another plus in terms of sealing performance and service life.

The results of the reverse bending test were determined by bending a test rod with a 1-mm thickness at a frequency of 4 Hz without media contact by 180° respectively.

Reverse Bending Test 180° [2]

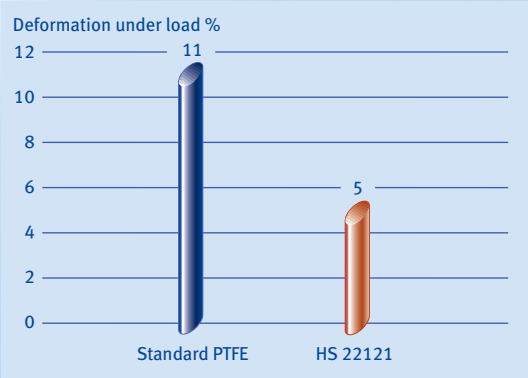
SPI test rod, 1 mm thick, average value



HS 22121 is also available as an anti-static version specifically for use in applications involving contact with solvents.

Cold Flow Benefits [2]

Measuring conditions: 15 N/mm², 100 hrs of pressure loading, 24 hrs of pressure relief, results in permanent deformation

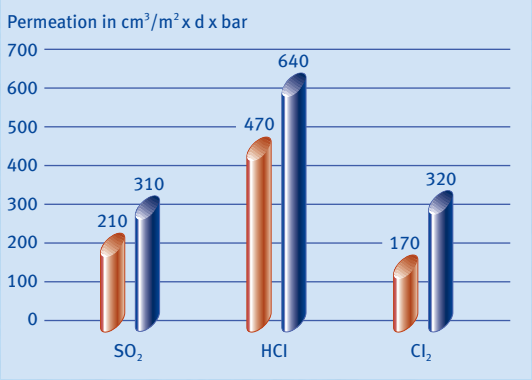


For long service life, bellows and/or diaphragms should be designed with thin walls. Consequently, it is all the more important that the material used have a high barrier effect with regard to permeation. This is the case with modified PTFE materials and applies to aggressive, gaseous chemicals such as SO_2, HCl or Cl_2 as well as to water. The latter poses a challenge for fluoropolymers particularly at high temperatures and/or in the vapor phase or in the form of aqueous, aggressive chemicals.

Higher Barrier Effect of HS 22121

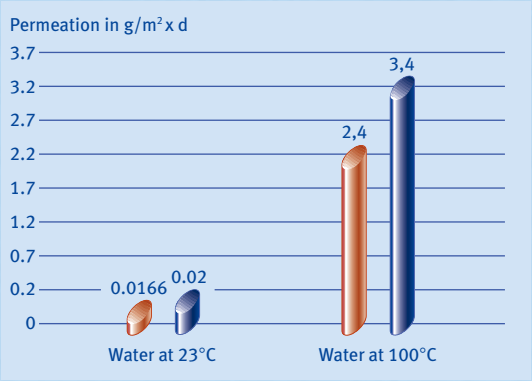
a) Aggressive Media[2]

Measuring method: According to DIN 53380, film thickness: 1 mm



b) Water and vapor [2]

Medium: Water, measuring temperature: 23°C or 100°C, film thickness: 1 mm



Further information about material you will find in our catalog “Compounds and Semi-Finished Products Made from PTFE”

The Most Commonly Used Fillers and their Influences on Compound Properties

PTFE-Type	*Influence of Fillers*	*Filler Content in % of Weight*	*Limits of Use*
PTFE filled with glass fibers	• higher pressure and wear resistance as well as better thermal conductivity • very good chemical resistance • good dielectric properties	up to 40%	resistant to organic solvents, non-resistant to alkaline solutions and acids
PTFE filled with carbon fibers	• very low deformation under load • good wear resistance, even in water • higher thermal conductivity and lower thermal expansion than glass fibers • very good chemical resistance	up to 25%	carbon fibers are chemically inert
PTFE filled with carbon	• high pressure resistance and hardness • good sliding properties and wear behavior • good thermal conductivity • good chemical resistance • low volume and surface resistivity • electrically conductive	up to 35%, also in combination with graphite	compound is brittle, filler may be attacked by oxidizing media
PTFE filled with graphite	• good lubricating effect • low friction coefficient • no static charging • good thermal conductivity • very good chemical resistance	typically up to 5%, in exceptional cases up to 15%, also in combination with glass fibers or carbon	high abrasion when used with hard metals, is attacked by oxidizing media
PTFE filled with molybdenum disulfite (MoS_2)	• good sliding properties and wear behavior • good no-lube operation in combination with bronze	up to 10%, also in combination with glass fibers or bronze	not resistant when used with hot, concentrated sulfuric acid
PTFE filled with bronze	• good sliding properties and wear behavior • low cold flow • good thermal conductivity • lower chemical resistance • high pressure resistance	up to 60%, also in combination with MoS_2	may be attacked by acids and water
PTFE filled with organic fillers (high-performance thermoplastics)	• outstanding sliding properties and wear behavior • good chemical resistance • high pressure resistance in some cases • suitable for soft mating surfaces, e.g. aluminum • non-abrasive	up to 20%, may be higher in combination with different fillers	depending on the respective filler

(1) Limit Values:
Limit values have been compiled with great care based on years of experience. Values, however, will not be deemed binding and are provided without guarantee. Please note that the desired function is only assured when considering the specific conditions of a particular application. In any event, we recommend prior sampling and testing. Our development team will be happy to assist you with requisite expertise and in-house test rigs.

(2) Diagrams:
The information provided in these diagrams is based on comparative values determined by ElringKlinger. These values have been obtained under specifically defined conditions and may not be transferred exactly to other applications. The diagrams, however, allow you to draw a basic comparison between our seal designs and compounds.