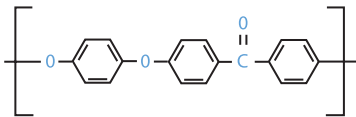


## PEEK Fabrics in the Automotive Industry

### Injection Nozzles and Fuel Filtration

20.03.2018

#### Chemical structure



PEEK (Polyetheretherketone) is a semi-crystalline thermoplastic with a very stable chemical structure that offers critical advantages when compared to other materials. It belongs to the PAEK (Polyaryletherketone) polymer family.

#### High temperature resistance

PEEK is especially useful when process temperatures exceed the limits of conventional PA, PET and PP filters and where an alternative to metallic media is required.

#### Excellent chemical resistance

PEEK is very resistant to a wide range of chemical environments, even at elevated temperatures. The only environment which dissolves PEEK is concentrated sulfuric or nitric acid.

#### Hydrolysis resistance

PEEK can be used for thousands of hours in steam and high pressure water without significant degradation in properties.

#### Extended lifetime

PEEK is a strong, stiff and hard polymer and fabrics made from PEEK have good friction and wear properties. For this reason PEEK is probably the most universal «exotic» polymer. Filters made from PEEK are ideal for applications where the high temperatures or aggressive environments prohibit the use of «normal» polymers.

	Temperature Performance	Chemical Resistance	Dimension Stability	Gamma Radiation	Flex Fatigue	Abrasion Resistance	Relative Tensile Strength	Specific Weight	Costs
PEEK	1	1	1	1	2	2	2	2	4
PTFE	1	1	4	4	1	2	4	4	4
ETFE/E-CTFE	2	2	3	3	2	2	3	3	3
PVDF	2	3	3	3	2	2	3	3	3
PPS	1	2	2	2	3	3	2	2	3
PEN	2	3	2	2	3	3	2	2	1
PET	3	3	2	2	2	3	2	2	1
PA	3	3	3	2	1	1	2	2	2
PP	4	2	3	3	3	4	3	1	1
STEEL	1	2	1	1	4	1	1	4	3

1 = Excellent

2 = Good

3 = Acceptable

4 = Poor

Fig 1: Properties of PEEK versus other polymers and versus metal (stainless steel)

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## Applications for Filter Element Manufacturers

### Automotive fuel pump filters (Replacement of wire cloth)

Automotive manufacturers have historically substituted wire mesh filters for polyamide filters in cars shipped to regions with hot climates.

The polyamide polymer tends to swell in the hot fuel mixture. The wire mesh filters do not completely solve all their problems:

- Wire mesh exhibits poor fatigue resistance in dynamic stress situations and thus has a more limited lifetime.
- Use of wire mesh in a molded filter housing requires more expensive tooling to prevent damage caused by mold parting line shut-off on the steel fibers of the mesh.
- Only specially alloyed metals can match the wide range of corrosion resistance available through synthetic fabrics.

In order to overcome the limitations of wire mesh filters, Sefar has developed PEEK filter fabrics that provide similar filtration efficiencies plus the added benefits of high temperature and chemical resistance.

### Biofuel fuel filters

In the past decade, biofuel has been gaining worldwide popularity as an alternative energy source because of its many benefits. However the standard fuel filters made of PA will degrade rapidly in biofuel.

PEEK on the other hand has a much higher resistance towards biofuel and therefore guarantees a lifelong use of the fuel filter.



- Fabric solution for biofuel fuel filters  
17-22/14 | 17-35/22

- Customers  
**Injection molders for automotive industry**

## Sefar's material resistant test | Insertion Attempts

### Mesh samples

- 03-31/24
- 07-33/21
- 17-35/22

### Fuels

Representing Europe, North- and South America:

- RSG-E10
- RSG-E85
- CEC-E85

Representing Asia:

- BSG-M15
- CEC-M15

*RSG = Risk Safeguarding Gasoline → Media was defined externally with manufacturers, oil industry and suppliers.*

*BSG = Bosch Safeguarding Gasoline, added with aggressive substances.*

### Test conditions A

14 days | Temp. 100°C | Pressure 20MPa

### Results A

No damage or porosity change detected. Polyamide has yellowish discoloration. Shrinkage of about 2%. Between the mesh samples from the different fuels is not a significant difference seen.

### Test conditions B

14 days | Temp. 140°C | Pressure 20MPa with fresh fuels

**Results B** See diagram on next page

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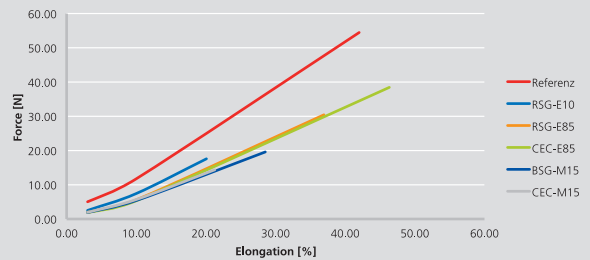


## Stress-strain analysis of the inserted fabric stripes (Test B)

- Bulk specimens
- Measurement equipment
- Preload
- Preload speed
- Testing speed

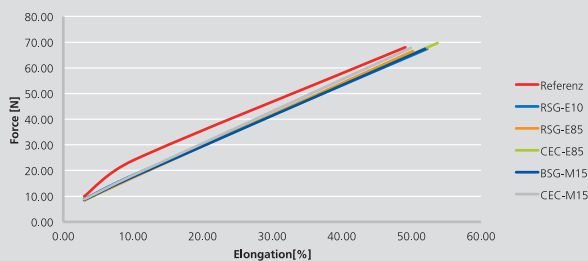
**200 x 25 mm**  
**Zwick / Roell Z005**  
**2N**  
**30 mm / min.**  
**30 mm / min.**  
**Date in N / 10 mm**

### PA66 03-31/24



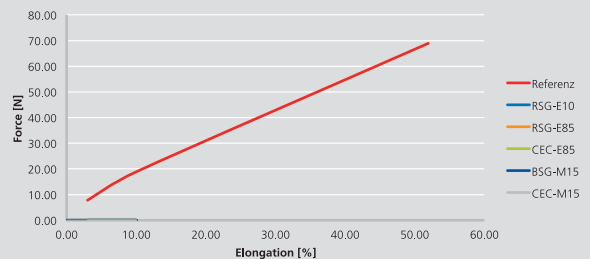
The polyamide has suffered severe damage, especially by methanol and ethanol in the proportions of 10 and 15%.

### Peek 17-35/22



Peek was the only material without damage.

### PET 07-33/21



After the insertion attempt was no coherent mesh more available to perform the strength test.

## Fabrication possibilities

### PEEK fabrics

Sefar technical specialists are available to assist you with selecting the correct PEEK fabric for your application. Sefar recommends consulting with their sales personnel regarding current inventory and availability.

Fabrication technologies for PEEK filter components Sefar has developed a wide range of fabrication capabilities suited for PEEK fabrics:

### Adhesive filter components US-welded tubes

#### Slitting

– Laser/Heat slitting

#### Stamping

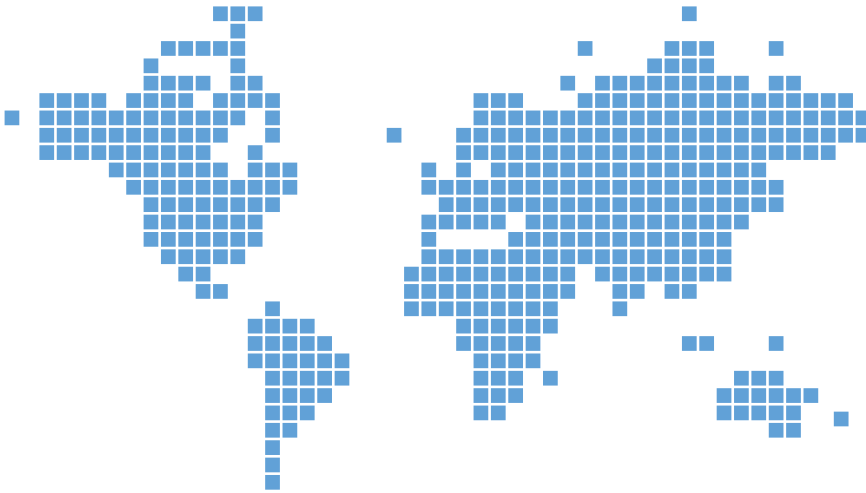
– Cold/US stamping

#### Welding

– US/RF/HF welding

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## Sefar Worldwide

Sefar is the leading manufacturer of precision fabrics from monofilaments for the screen printing and filtration market. Sefar products are used in a wide variety of industries, reaching from electronics, graphics, medical, automotive, food and pharmaceutical applications to aerospace, mining & refining and architecture. With its profound understanding of the applications, Sefar helps its customers to achieve optimum results in their industrial processes. With subsidiaries and representatives around the world, Sefar offers its customers the comprehensive, global support they need.

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