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.

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

The specifications of our products are designed to meet and exceed the challenging expectations of our customers. Because of technological developments related to the products and the constant optimization of our manufacturing processes the specifications are subject to change without notice. Please consult your local Sefar representative to verify that this information remains valid and check the suitability of this product for the targeted application before use. All stated values without indications of tolerances are nominal values, which are not measured. All stated values with indications of tolerances are measured based on a product specific control plan and represent statistical mean values.
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.

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**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

**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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**Filter Components**

**Technical**

**Info**

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

- Bulk specimens: 200 x 25 mm
- Measurement equipment: Zwick/Roell 2005
- Preload: 2N
- Preload speed: 30 mm/min.
- Testing speed: 30 mm/min.
- Date in N/10 mm

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**PA66 03-31/24**

The polyamide has suffered severe damage, especially by methanol and ethanol in the proportions of 10% and 5%.

**Peek 17-35/22**

Peek was the only material without damage.

**PET 07-33/21**

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

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**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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