



HIGH PERFORMANCE MATERIALS FOR MEDICAL TECHNOLOGY

PLASTICS
ENGINEERED BY **GEHR** 

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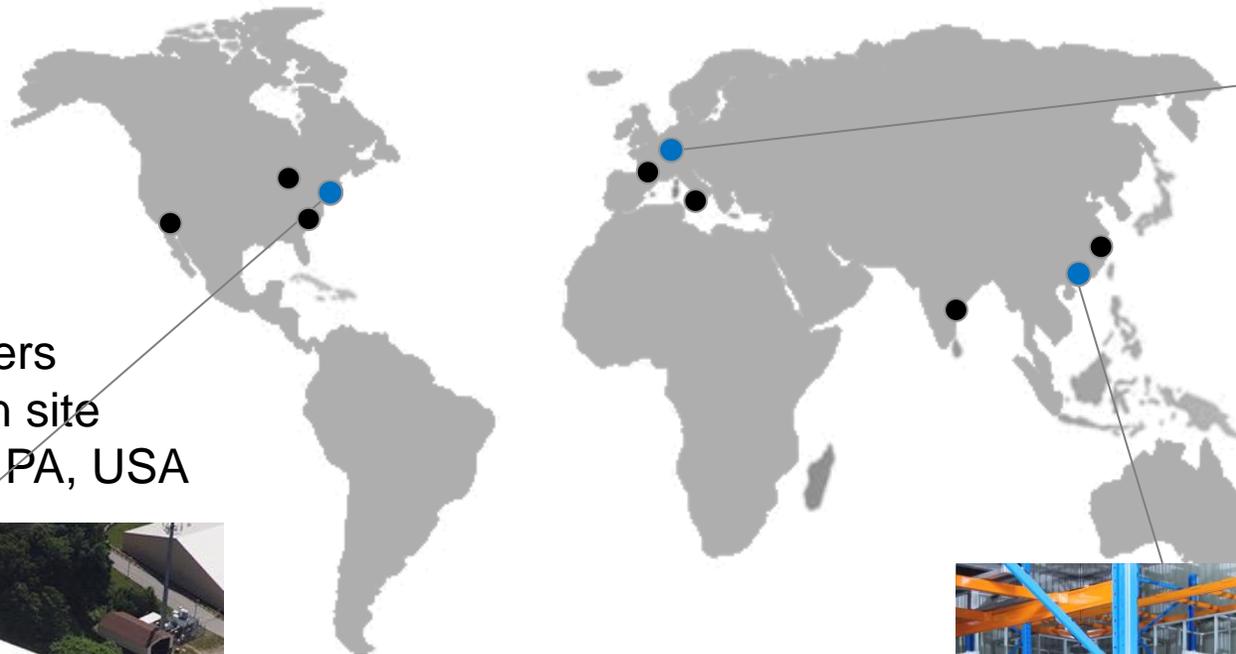


» FAMILY OWNED AND OPERATED COMPANY WITH TRADITION



» GEHR – AN INTERNATIONAL COMPANY

» US headquarters and production site
Philadelphia, PA, USA



» World headquarters and production site
Mannheim, Germany



» Asia headquarters and warehouse
Hong Kong

» QUALITY AND INNOVATION



» MARKET SEGMENTS

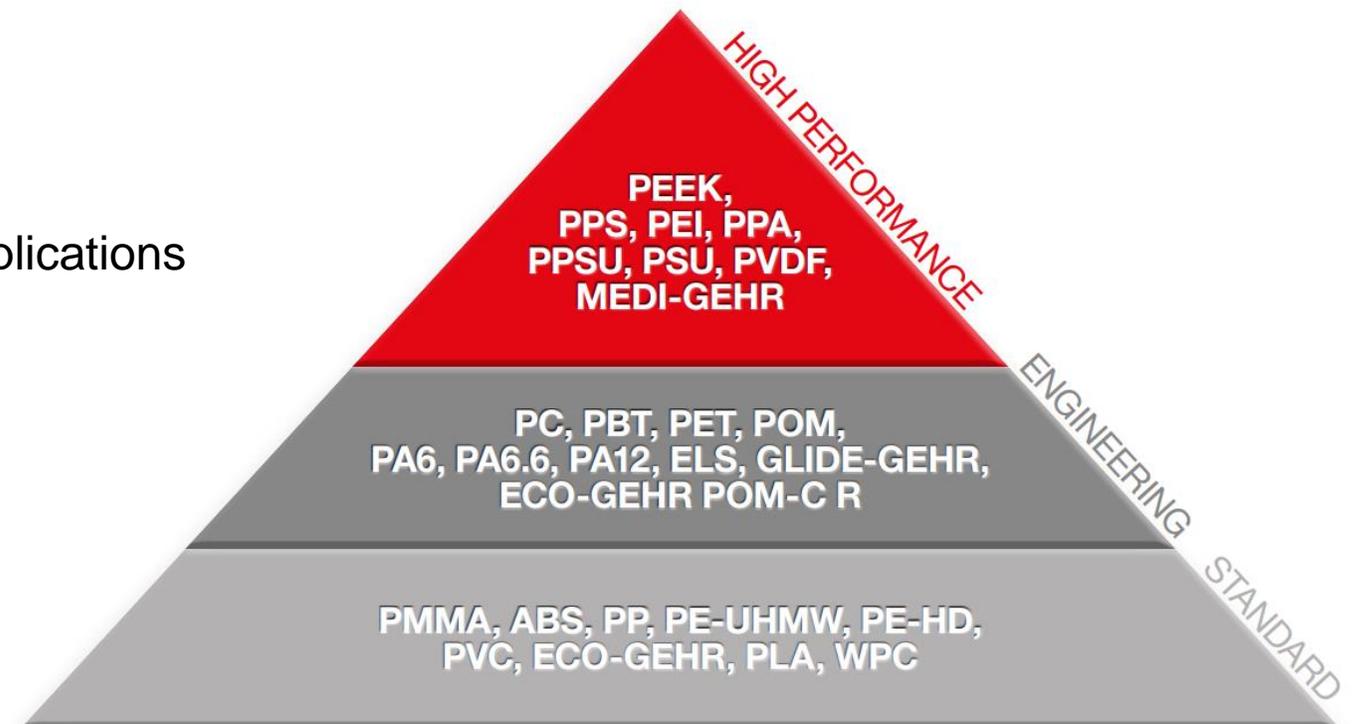
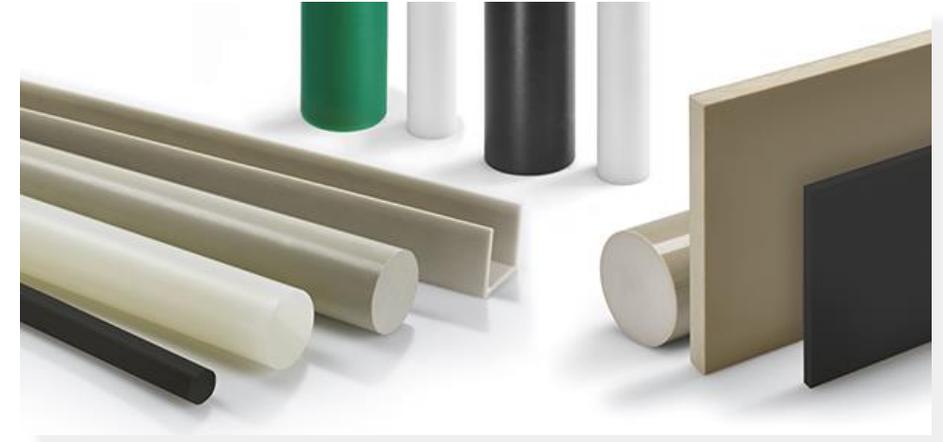


» GEHR EXPERTISE

EXTRUDED RODS, SHEETS, TUBES, PROFILES AND FILAMENTS

SPECIALTIES:

- » Rods up to 700 mm diameter
- » Thick plates up to 300 mm thickness
- » Decorative precision tubes
- » Semi-finished products for medical applications
- » Filaments for professional 3D printing



» ENVIRONMENTAL PROTECTION AND SUSTAINABILITY

CO₂-NEUTRAL PRODUCTION

- Conversion to green electricity and green gas in Mannheim and Philadelphia.
- Achievement of the implementation packages of Katowice Scope1 and Katowice Scope1 and 2

SINCE 2016: 100% RENEWABLE ELECTRICITY

Since 2016, total electricity requirements covered by renewable energies - mainly from hydropower in Norway.

COOLING PROCESS OPTIMIZED

In order to sustainably conserve water as a resource, we have also made mechanical adjustments to our plants. This has enabled us to significantly reduce the amount of water required in the cooling system as well as the supply of fresh water.

RECYCLING CONCEPT FOR THE AVOIDANCE OF PRODUCTION WASTE

The returned material is sorted, ground, recycled and reused in production wherever possible and permitted.



» MOBILITY OF THE FUTURE

In collaboration with TU Munich and Evonik, we are ensuring that the Hyperloop project moves into the next phase. Hyperloop is a new concept for transporting goods and people at almost the speed of sound. The train travels like a maglev train in a low-pressure tube above the earth's surface. In this team, we produced sheets made of VESTAMID® (PA12 filled with glass fibers) for a 24-m-long test track. After extrusion, these sheets are machined before installation to hold the magnetic coils in position for the train.



» GENERAL INFORMATION ABOUT **MEDI-GEHR**®

Products suitable for medical and pharmaceutical applications with direct body contact with tissue, bone, skin and mucosa for up to 24 hours. All raw materials used for the medical grade products are food grade (FDA, EU 10/2011) and have been tested and evaluated by an independent accredited testing laboratory and meet the following biocompatibility requirements:

- » ISO 10993-1: Assessment and testing as part of a risk management system
- » ISO 10993-5: Tests for in vitro cytotoxicity
- » ISO 10993-12: Sample preparation and reference materials
- » ISO 10993-18: Chemical characterization of materials
- » USP Class VI



» GENERAL INFORMATION ABOUT **MEDI-GEHR**®

During production, we ultrasonically inspect our semi-finished products to ensure that they are free of defects and voids. As a manufacturer, we thus fulfill a special duty of care that makes it easier for medical device manufacturers to obtain approval for their end products by reducing costs and time. We also attach great importance to the traceability of the stock goods that leave our production facilities.



» **MEDI-GEHR PP-HT MG[®]**

- » High heat resistance
- » High stiffness
- » High surface hardness
- » Low density
- » Very high chemical resistance
- » Resistance to hot steam sterilization
- » Brittle at low temperature

APPLICATIONS:

- » Sterilization cassettes and inserts
- » Centrifuge holders
- » Analysis technology





» **MEDI-GEHR PET MG®**

- » Very good chemical resistance
- » Very high impact strength
- » High surface hardness
- » High hydrolysis resistance
- » High creep resistance
- » Good polishability
- » Good sliding friction properties and abrasion resistance
- » Good electrical insulation properties
- » High resistance to gamma radiation

APPLICATIONS:

- » Operating room lights
- » Housings
- » Medical components
- » Disposables for biomedical applications

» **MEDI-GEHR PC MG[®]**



- » Continuous service temperature from -60°C to +120°C
- » Very high stiffness
- » Very high impact strength
- » Very high dimensional stability
- » Resistance to x-ray irradiation
- » Very good heat deflection temperature (approx. 135°C)
- » High surface hardness

APPLICATIONS:

- » Surgical lights
- » Dialysis machines
- » Incubators
- » Oxygen equipment
- » Inhalers





» **MEDI-GEHR PEI MG[®]**

- » Long-term Service Temperature 170°C
- » High Chemical and Hydrolysis Resistance
- » Very high strength and stiffness as well as creep resistance
- » Very high torsional strength and hardness
- » High heat resistance
- » Very Good Weather Resistance
- » High resistance to γ -rays

APPLICATIONS:

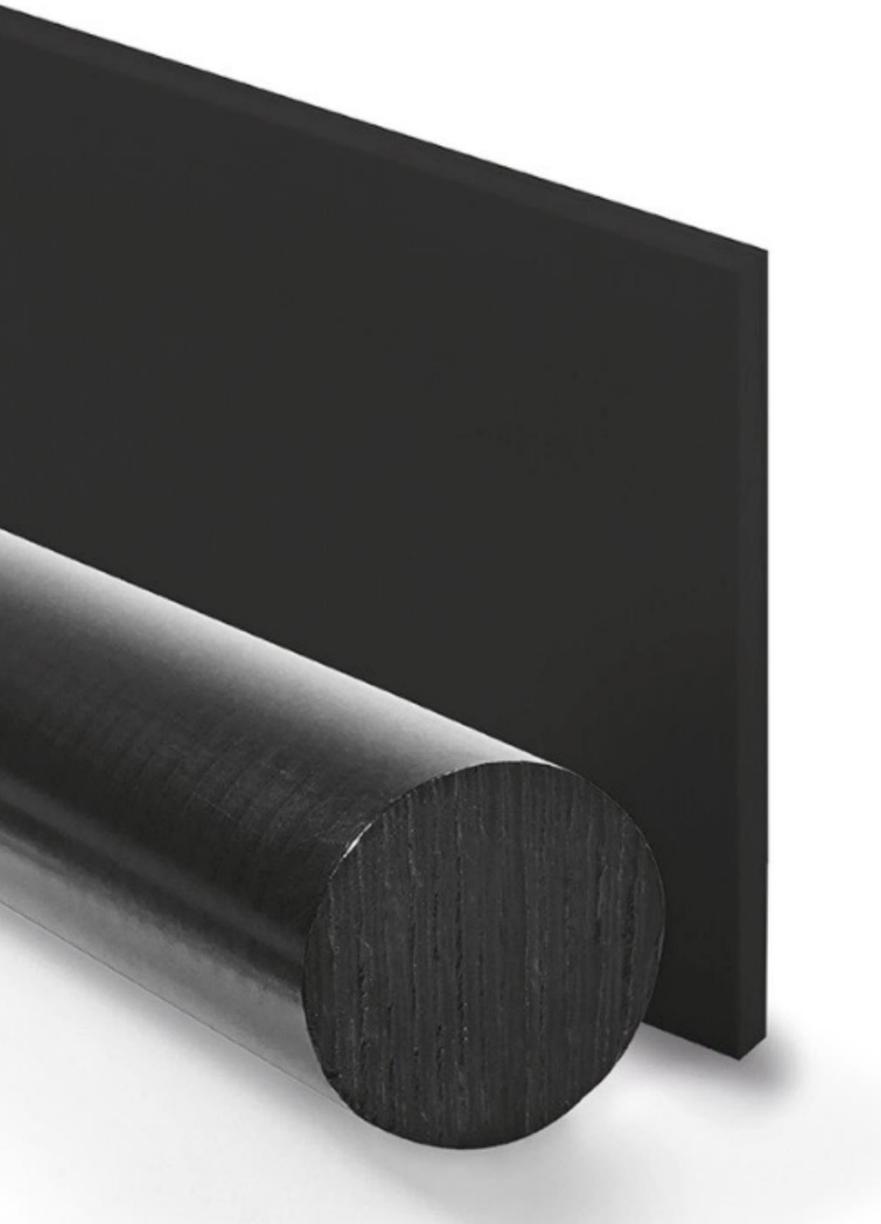
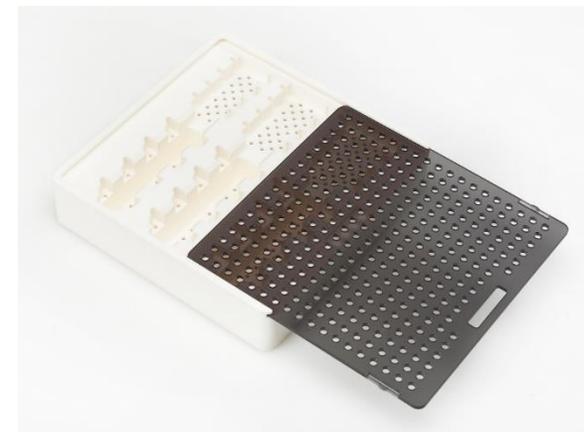
- » Delivery capsule for minimally invasive procedures
- » Autoclave components
- » Structural medical components
- » Radiation therapy systems
- » Infusion pumps

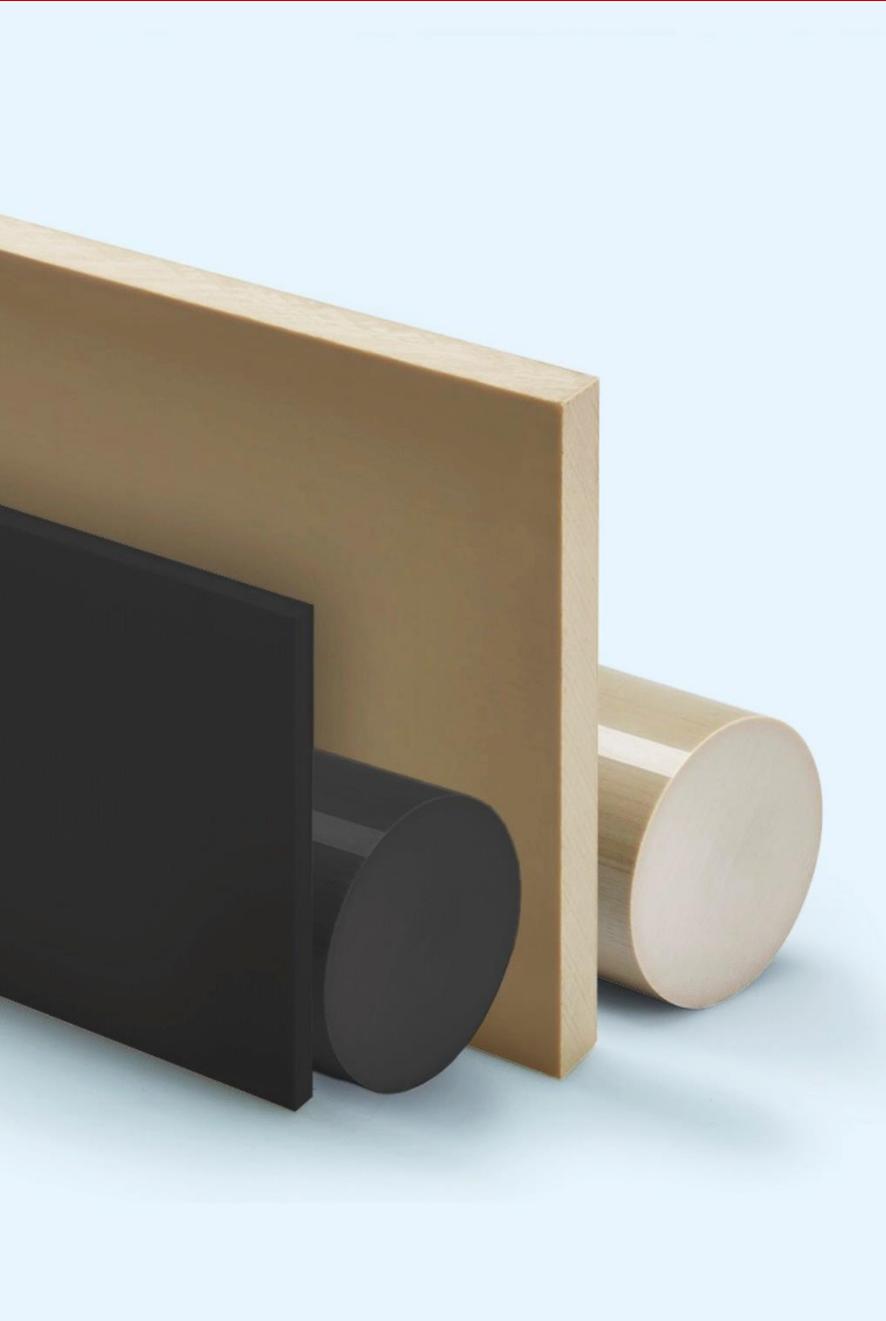
» **MEDI-GEHR PPSU MG[®]**

- » Continuous service temperature 170°C
- » High strength and stiffness
- » Very high toughness (even at low temperatures)
- » Very high dimensional stability
- » Very high chemical resistance
- » Very good sterilizability
- » Lower chemical resistance than comparable semi-crystalline materials

APPLICATIONS:

- » Instrument handles
- » Instruments for microinvasive surgery
- » Components in the food industry
- » Pump impellers, pump bodies
- » Valves





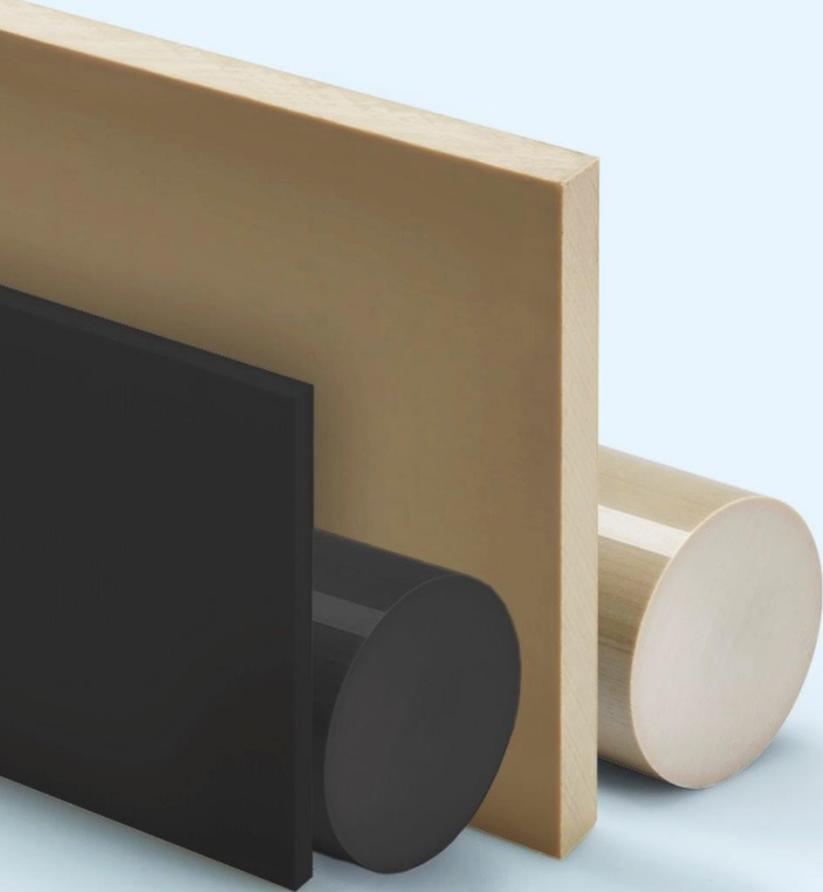
» **MEDI-GEHR PEEK MG[®]**

- » Continuous service temperature -40°C to +260°C
- » Excellent sterilizability with all common methods (superheated steam, gamma, e-beam, EtO)
- » Very high strength, stiffness and toughness
- » Very high temperature and heat resistance
- » Very high creep resistance
- » Very high dimensional stability
- » Very high resistance to β -, γ -, X-ray and infrared radiation
- » High resistance to hydrolysis
- » Good wear properties
- » Low water absorption
- » Inert

» **MEDI-GEHR PEEK MG[®]**

APPLICATIONS:

- » Dental instruments
- » In-vitro diagnostics
- » Locking devices
- » Connectors
- » Sealing rings, spacers, dosing systems
- » Flanges and sleeves, housing parts
- » Grippers, holders, insulation sleeves,
- » Primary packaging in the pharmaceutical sector





» **MEDI-FIL-A-GEHR®**

MEDI-FIL-A-GEHR products are suitable for medical and pharmaceutical applications with direct body contact with tissue, bone, skin and mucosa for up to 24 hours. All materials meet the same requirements as the semi-finished products. Especially for our certificates and approvals:

FDA*, **EU 10/2011***, **ISO 10993-1, -5, -12, -18** and **USP Class VI**

* only for raw material

MATERIALS:

- » **MEDI-FIL-A-GEHR** PET MG (white and transparent)
- » **MEDI-FIL-A-GEHR** PC MG
- » **MEDI-FIL-A-GEHR** PPSU MG
- » **MEDI-FIL-A-GEHR** PEEK MG



MEDI-FIL-A-GEHR PPSU MG
Arthroscope prototype



MEDI-FIL-A-GEHR PEEK MG
Instrument holder prototype



medical filaments



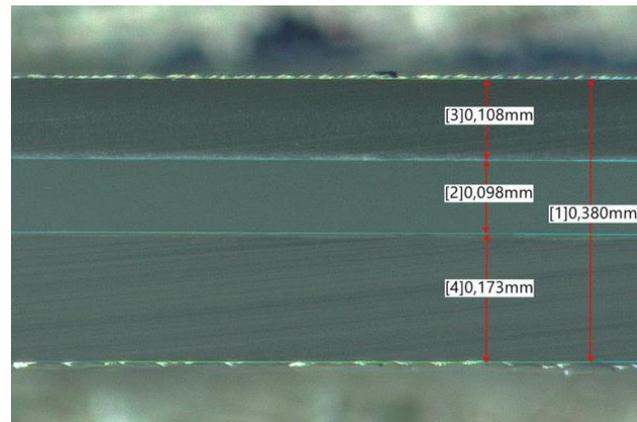
colored PPSU tubes

» GEHR CUSTOMIZING

- » Special manufacture of semi finished products such as tubes, plates, rods, profiles, etc. for industrial and medical applications
- » Tolling of high performance material filaments (also for implants)
- » Extrusion of sheets and rods for medical and electronic segment in clean room
- » Extrusion of multi-layer co-extruded tubes



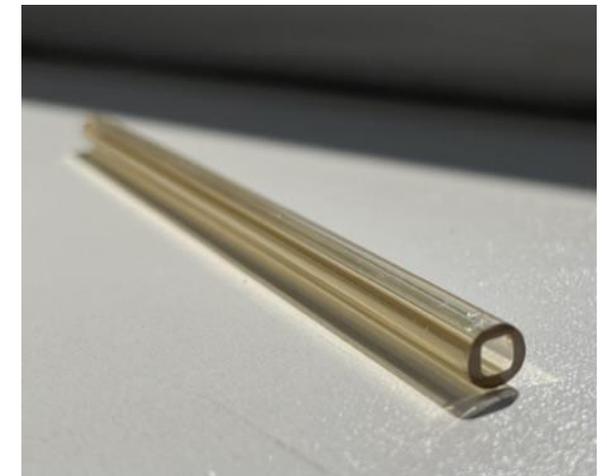
3-layer co-extruded tubes



1. layer

2. layer

3. layer



PPSU tubes for surgical instruments

» **MEDI-GEHR APPLICATIONS**



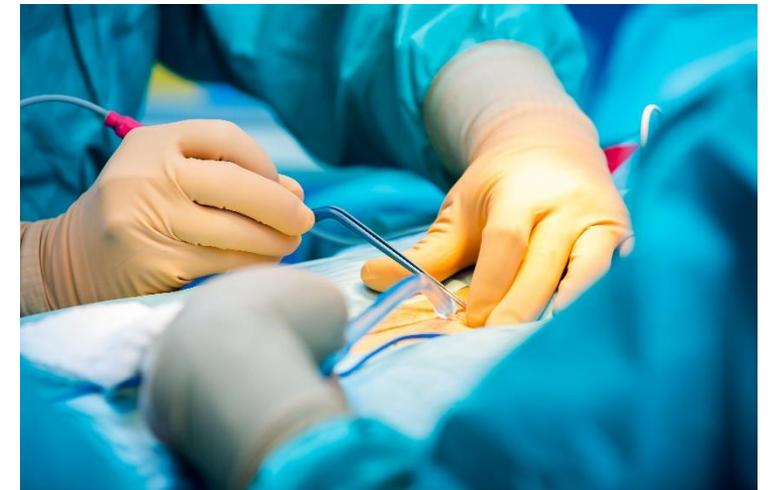
Surgical Equipment



Dental Applications



Surgical Instruments



Medical Disposables

» STERILIZATION / CLEANING

Product	UV irradiation	Gamma irradiation	Autoclave	Ethylene oxide	Hydrogene peroxide
MEDI-GEHR PP-HT MG®	-	-	+	-	-
MEDI-GEHR PET MG®	+	+	-	+	+
MEDI-GEHR PC MG®	+	+	+	+	+
MEDI-GEHR PEI MG®	+	+	+	+	+
MEDI-GEHR PPSU MG®	-	+	+	+	+
MEDI-GEHR PEEK MG®	-	+	+	+	+
MEDI-FIL-A-GEHR PET MG®	+	+	-	+	+
MEDI-FIL-A-GEHR PPSU MG®	-	+	+	+	+
MEDI-FIL-A-GEHR PEEK MG®	-	+	+	+	+



*Discoloration may occur

+	Compatible
-	Incompatible
o	Not tested

MEDI-GEHR DELIVERY PROGRAMME



PLATTEN / SHEETS

Länge / Length: 1 | 2 | 3m

mm	Toleranzen / Tolerances mm		MEDI-GEHR PEEK MG® Breite / Width 620 mm kg/m	MEDI-GEHR PPSU MG® Breite / Width 620 mm kg/m	MEDI-GEHR PP-HT MG® Breite / Width 610 mm kg/m	MEDI-GEHR PC MG® Breite / Width 620 mm kg/m	MEDI-GEHR PET MG® Breite / Width 620 mm kg/m
	min.	max.					
15	+0,3	+1,5			8,743 ○	11,718	11,337
16	+0,3	+1,5	14,340 ○ ●			12,499	12,093
20	+0,3	+1,5	17,730 ○ ●	17,970 ●	11,657 ○	15,624 ○	15,116 ○ ⊕
25	+0,3	+1,5	22,320 ○ ●	22,270 ●		19,530	18,895
30	+0,5	+2,5			17,485 ○	23,436	22,674
35	+0,5	+2,5		31,390 ●		27,342	26,453
40	+0,5	+2,5		35,690 ●	23,314 ○	31,248	30,232
50	+0,5	+2,5		44,290 ●		39,060	37,790

- Auf Lager / Stock item
- natur / natural
- schwarz / black
- weiß / white
- ⊕ transparent



FILAMENTE / FILAMENTS

kg	MEDI-GEHR PEEK MG® Ø 1,75 mm	MEDI-GEHR PPSU MG® Ø 1,75 mm	MEDI-GEHR PC MG® Ø 2,85 mm Ø 1,75 mm	MEDI-GEHR PET MG® Ø 2,85 mm Ø 1,75 mm
	0,1	○	●	
0,2	○	●		
0,5	○	●		
1	○	●	⊕	⊕ ○

- Auf Lager / Stock item
- natur / natural
- schwarz / black
- weiß / white
- ⊕ transparent



VOLLSTÄBE / ROUND RODS

mm	MEDI-GEHR PEEK MG®	MEDI-GEHR PPSU MG®	MEDI-GEHR PP-HT MG®	MEDI-GEHR PC MG®	MEDI-GEHR PEI MG®	MEDI-GEHR PET MG®
	Länge / Length 1 2 3 m kg/m					
5	0,032	0,027				
6	0,040	0,038				
8	0,072	0,068				
10	0,110	0,106				0,097
12	0,164 ⊕	0,153		0,143		0,140
15	0,252	0,239		0,223		0,219
16	0,285 ⊕ ●	0,272		0,253	0,268	0,249
18	0,360	0,345		0,321	0,339	0,315
20	0,439 ⊕ ●	0,443 ●		0,396	0,419	0,389
22	0,535	0,515		0,479	0,507	0,471
25	0,685 ⊕ ●	0,665 ●	0,484 ⊕	0,619	0,654	0,608
28	0,850	0,834		0,776	0,821	0,763
30	1,000	0,958		0,891	0,942	0,876
32	1,110 ⊕ ●	1,089 ●		1,013	1,072	0,996
36	1,430 ⊕ ●	1,379		1,283	1,357	1,261
40	1,740	1,750 ●	1,230 ⊕	1,583	1,675	1,557
45	2,220	2,154		2,004	2,120	1,971
50	2,770 ⊕ ●	2,730 ●	1,930 ⊕	2,474	2,617	2,433
56	3,400	3,336			3,283	3,052 ⊕ ⊕
60	3,920 ⊕ ●	3,940	2,770 ⊕		3,768	3,503
65	4,550	4,950			4,423	4,111
70	5,400	5,213			5,129	4,768
75	6,100	5,984			5,888	5,474
80	6,960	6,970			6,700	6,228
90	8,800	8,617				7,882
100	10,800	10,900				9,731
110	13,000					
120	15,610					
125	16,930					
140	21,300					
150	24,600					

» FURTHER INFORMATION



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