Material properties

Polymer-based heat transfer solutions

Physical properties	PP-GR	PPS-GR	SI-Unit	Test Standard	Temperature
Density	1.58	1.78	g/cm³	DIN EN ISO 1183-1	23°C
Specific heat capacity	1.21	1.16	J/g·K	DIN EN ISO 11357-4	PP-GR 80 °C / PPS-GR 100 °C
Tensile modulus	7751	17043	MPa	DIN EN ISO 527-2	23 °C
Tensile strength	29.1	47.9	MPa	DIN EN ISO 527-2	23 °C
Tensile elongation at break	0.46	0.25	%	DIN EN ISO 527-2	23 °C
Flexural modulus	7438	14864	MPa	DIN EN ISO 178	23 °C
Flexural strength	43.98	68.71	MPa	DIN EN ISO 178	23 °C
Flexural elongation at break	0.52	0.45	%	DIN EN ISO 178	23 °C

Chemical resistance		PP-GR	PPS-GR	Concentration	Temperature	Duration
Seawater	6.5 % salt content	+	+	6.5 %	80 °C	180 d
Concentrated Acid	Hydrochloric acid (HCl)	+	+	36 %	100 °C	14 d
	Sulfuric acid (H_2SO_4)	•	+	60 %	140 °C	180 d
	Phosphoric acid (H_3PO_4)	•	+	85 %	156 °C	180 d
	Hydrofluoric acid (HF)	•	+	40 %	100 °C	14 d
Mixed Acid DIN EN ISO 1447	Hydrochloric acid (HCl)	•	+	0.003 %	90 °C	70 d
	Nitric acid (HNO_3)			0.02 %		
	Sulfuric acid (H_2SO_4)			0.04 %		
Mixed Acid „Green Death“	Sulfuric acid (H_2SO_4)	•	+	23 %	100 °C	7 d
	Hydrochloric acid (HCl)			1.2 %		
	Iron chloride ($FeCl_3$)			1 %		
	Copper chloride ($CuCl_2$)			1 %		

+ resistant
- not resistant
• not tested

All tests performed with injection moulded standard tensile bars unless otherwise specified in respective standard

TECHNOFORM

Profile properties and design parameters

Polymer based heat transfer solutions

Exemplary profile properties

Properties		PP-GR	PPS-GR	SI-Unit	Test conditions
Heat conductivity through tube wall		>3	>3	W/m·K	Tested with laser flash and single tube heat exchanger
Linear thermal expansion in profile length	0 °C ... 100 °C	20 x 10^{-6}	14 x 10^{-6}	1/K	ASTM E831-14
	100 °C ... 200 °C	N/A	26 x 10^{-6}		
Surface roughness tube wall Rz		≤ 4	≤ 8	µm	DIN EN ISO 16610
Surface roughness tube wall Ra		≤ 0.5	≤ 1	µm	DIN EN ISO 16110
Burst pressure		20.9	36.6	bar	23 °C

Above properties are for round tube 24 mm outer diameter, 1.5 mm wall thickness. Properties vary between different profiles, further information available upon request.

Recommended design parameters

Design Parameter	PP-GR	PPS-GR	SI-Unit	Comment
Continuous operation temperature (minimum/maximum temperature in profile wall)	-30 +80	-100 +250	°C	Recommendation based on material properties and long-term testing in application

Compliance with design parameters does not guarantee safe operation in the respective process.

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