



Material properties

Metal-free heat exchanger solutions

The following tube diameters and wall thicknesses are currently available without additional tooling costs:

10 x 1,25 mm	¾" - 19.5 x 1.5 mm	24 x 1.5 mm	40 x 2.0 mm	2" - 50.8 x 1.5 mm
10 x 1,5 mm	¾" - 19 x 1.25 mm	24 x 1.25 mm	50 x 2.0 mm	2" - 50.8 x 2.0 mm
½" - 12,7 x 1.25 mm	22.4 x 1.5 mm	1" - 25.4 x 1.5 mm	50 x 2.5 mm	
½" - 12,7 x 1.5 mm	22.4 x 1.25 mm	1" - 25.4 x 1.25 mm		

Of course, any other dimensions are available on request.

Mechanical data

Property	Test Standard
Density	DIN EN ISO 1183
Tube weight per meter (Ø 24 x 1.5 mm / Ø 0.945 x 0.06 in)	-
Tensile modulus	DIN EN ISO 527
Tensile strength	DIN EN ISO 527
Tensile elongation at break	DIN EN ISO 527
Flexural modulus	DIN EN ISO 178
Flexural strength (no yield)	DIN EN ISO 178
Flexural elongation at break	DIN EN ISO 178
Roughness Rz (extruded tube)	-
Burst strength (1.5 mm / 0.06 in wall thickness)	-

Thermal data

Property	Test Standard
Operation temperature	according DIN EN ISO 2578
Specific heat capacity cp	DIN EN ISO 11357
CTE: Coefficient of linear thermal expansion in extrusion direction (20 °C ... 100 °C / 68 °F ... 212 °F)	DIN 53752
Thermal conductivity through plane (extruded tube)	-

Si-unit	Metric-units		US-unit	US-units	
	PP-GR	PPS-GR		PP-GR	PPS-GR
g/cm ³	1.58	1.78	oz/in ³	0.91	1.03
kg/m	0.168	0.189	lb/ft	0.25	0.28
MPa	7836	16523	ksi	1136	2396
MPa	29.1	47.9	ksi	4.22	6.95
%	0.47	0.3	%	0.47	0.3
MPa	6554	14178	ksi	950.6	2056
MPa	41.1	67.8	ksi	5.96	9.83
%	0.63	0.45	%	0.63	0.45
µm	≤ 3	≤ 3	microinch	118.1	118.1
bar	18	36	psi	261.1	522.1

Si-unit	Metric-units		US-unit	US-units	
	PP-GR	PPS-GR		PP-GR	PPS-GR
°C	-30°... +80°	-100°... +200°	°F	-22°... +176°	-148°... +392°
J/(g*K)	1.21	in progress	BTU/lb*°F	0.289	in progress
1/K	22 x 10 ⁻⁶	14 x 10 ⁻⁶	1/°F	12.2 x 10 ⁻⁶	7.7 x 10 ⁻⁶
W/(m*K)	15	16	BTU/ (hr*ft*°F)	8.7	9.3



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Chemical resistance of thermoplastic polymers vs. metals

Medium	Polymer graphite			Metal			
	PP-GR	PPS-GR	PEEK-GR	AluAlloy 5052	Alubrass C68700	Stainless Steel 316 L	Titanium
Seawater 3,5 % 60 °C (140 °F)	+	+	+	+	+	+	+
Seawater 3,5 % 80 °C (176 °F)	+	+	+	•	•	•	+
Saltwater >10% 80 °C (176 °F)	+	+	+	-	•	•	+
Hydrochloric acid 2% (HCl)	+	+	+	•	•	+	+
Hydrochloric acid conc. 36%	+	•	+	-	-	-	•
Sulfuric acid 2% (H ₂ SO ₄)	+	+	+	•	•	•	+
Sulfuric acid 80%	+	+	•	-	-	-	•
Phosphoric acid 10% (H ₂ PO ₃)	+	+	+	-	•	•	+
Phosphoric acid concentrated hot	+	+	+	-	-	-	•
Hydrofluoric acid 40% (HF)	+	+	-	-	-	-	-
Ferric chloride (Cl ₂ Fe)	+	+	+	-	-	-	+
Hydrogen sulfide (H ₂ S wet)	+	+	+	•	-	•	+
Diammonium phosphate (NH ₄) ₂ HPO ₄	+	+	+	•	-	•	+

+ resistant • moderately resistant - not resistant

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