

Material properties

Polymer-based heat transfer solutions

| Physical properties | | PP-GR | PPS-GR | SI-Unit | Test Standard | Temperature |
|-----------------------------|--|----------|--------------|-------------------|--------------------|-----------------------------|
| Density | | 1.58 | 1.78 | g/cm ³ | 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 / - | 14100 / 2646 | MPa | DIN EN ISO 527-2 | 23 °C / 200°C |
| Ultimate Tensile strength | | 29.1 / - | 31,4 / 14 | MPa | DIN EN ISO 527-2 | 23 °C / 200°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 |
| Compressive Strength | | 34,03 | 53,31 | MPa | 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 |
| | Hydrochloric acid (HCl) | + | + | 36 % | 100 °C | 14 d |
| Concentrated Acid | Sulfuric acid (H ₂ SO ₄) | • | + | 60 % | 140 °C | 180 d |
| | Phosphoric acid (H ₃ PO 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 % | | |
| | Nitric acid (HNO ₃) | • | + | 0.02 % | 90 °C | 70 d |
| | Sulfuric acid (H ₂ SO ₄) | | | 0.04 % | | |
| Mixed Acid „Green Death“ | Sulfuric acid (H ₂ SO ₄) | | | 23 % | | |
| | Hydrochloric acid (HCl) | • | + | 1.2 % | 100 °C | 7 d |
| | Iron chloride (FeCl ₃) | | | 1 % | | |
| | Copper chloride (CuCl ₂) | | | 1 % | | |

+ resistant
 - not resistant
 • not tested

Profile properties and design parameters

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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 | 11,9 x 10 ⁻⁶ | 1/K | ASTM E831-14 |
| | 100 °C ... 200 °C | N/A | 30 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 / 20 | bar | 23 °C / 200°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 | -100 | °C | Recommendation based on material properties and long-term testing in application |
| | | +80 | +200 | | |

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

Technoform Tailored Solutions Holding GmbH
 An den Lindenbäumen 17
 34277 Fuldabrück
 Germany

T +49 151 15162288
 E hs@technoform.com

I www.technoform.com