

What is PA 12

PA 12 natural

Polyamide 12 (PA 12)

Polyamide 12 (PA 12) is a semi-crystalline engineering thermoplastic from the family of aliphatic polyamides. Compared with other polyamides, it stands out for its very low water absorption, low density and excellent resistance to stress cracking. Liedtke supplies PA 12 as a natural-coloured semi-finished product for machining.

Material Character

Compared with PA 6 and PA 66, PA 12 has the longest methylene chain between the amide groups of the polymer chain. This results in significantly lower water absorption, a lower density and better dimensional stability than the shorter-chain polyamides.

Because PA 12 absorbs only little moisture, its mechanical properties change only slightly under varying climatic conditions – an advantage over polyamides whose properties depend much more strongly on ambient humidity. Should the material nonetheless absorb moisture, toughness increases while the tensile modulus decreases; in thick-walled parts this mainly affects the surface layer.

PA 12 also offers excellent resistance to stress cracking as well as good impact strength even at low temperatures, making the material suitable for components subject to varying mechanical and chemical loads.

Advantages and Limitations

Advantages

- Very low water absorption, resulting in high dimensional stability
- Excellent stress cracking resistance
- Good impact strength, even at low temperatures
- Low density compared with other polyamides
- Good chemical resistance to many fuels, oils and alkalis

Disadvantages

- Lower strength and stiffness than PA 6 or PA 66
- Lower continuous service temperature than other engineering polyamides
- Only conditionally suitable for highly loaded, rigid structures

Processing

PA 12 can be readily machined with the conventional machine tools used for polyamides, such as milling, turning and drilling. Before machining, the semi-finished product should be at room temperature and/or stored for at least 24 hours under normal ambient conditions so that internal stresses in the material are relieved.

Because of its low water absorption, pre-drying of PA 12 semi-finished products before machining is generally required less often than for PA 6 or PA 66. For dimensionally precise parts, however, climatically stable storage before final machining is still recommended.

Typical Properties

- Very low water absorption
- Excellent stress cracking resistance
- Good impact strength, even at low temperatures
- Low density
- Good chemical resistance

Product Examples

- Sliding and guide elements
- Fuel and fluid lines
- Housing and insulating parts in vehicle construction
- Textile machinery components

Typical Industries

- Mechanical and plant engineering
- Automotive industry
- Textile industry

	Test Method	Unit	Value
General Properties			
Density	DIN EN ISO 1183-1	g / cm ³	1.02
Water absorption	DIN EN ISO 62	%	0.8
Flammability (thickness 3 mm / 6 mm)	UL 94		HB / HB
Mechanical Properties			
Tensile strength	DIN EN ISO 527	MPa	50
Elongation at break	DIN EN ISO 527	%	200
Tensile modulus	DIN EN ISO 527	MPa	1800
Notched impact strength	DIN EN ISO 179	kJ / m ²	20.0
Ball indentation hardness	DIN EN ISO 2039-1	MPa	100
Shore hardness	DIN EN ISO 868	scale D	78
Thermal Properties			
Melting temperature	ISO 11357-3	°C	178
Thermal conductivity	DIN 52612-1	W / (m * K)	0.3
Specific heat capacity	DIN 52612	kJ / (kg * K)	1.7
Coefficient of linear expansion	DIN 53752	10 ⁻⁶ / K	100
Long-term service temperature	Typical value	°C	-50 ... 80
Short-term service temperature (max.)	Typical value	°C	140
Heat deflection temperature (Method A)	DIN EN ISO 75	°C	50
Electrical Properties			
Dielectric constant	IEC 60250		3.8
Dielectric dissipation factor (50 Hz)	IEC 60250		0.04
Volume resistivity	IEC 60093	Ω * cm	10 ¹⁵
Surface resistivity	IEC 60093	Ω	10 ¹³
Comparative tracking index (CTI)	IEC 60112		600
Dielectric strength	IEC 60243	kV / mm	26

The stated values are average values, confirmed by continuous statistical testing. They serve as information for material selection and do not constitute a legally binding assurance of specific properties.