

What is Perlon®

Perlon® (PA 6)

Perlon® – historical brand name for polyamide 6 (PA 6), originally for synthetic fibres

Perlon® is the brand name coined in 1938 by chemist Paul Schlack at IG Farben for the first German polyamide 6 synthetic fibre – the German counterpart to the American Nylon developed shortly before. Chemically it is polyamide 6 (PA 6), the same semi-crystalline engineering thermoplastic that Liedtke also carries as PA 6 semi-finished stock (sheets, round rods). Perlon® remains an actively registered trademark today.

Classification and basic character

Perlon® (PA 6, also polyamide 6) is a semi-crystalline engineering thermoplastic from the polyamide family. Characteristic properties are high toughness, impact and abrasion resistance, very good sliding properties and pronounced sound and vibration damping. A special feature is moisture absorption: it increases toughness but reduces stiffness and hardness, and changes dimensions.

History: from stockings to technical semi-finished products

Perlon® was originally developed for textile fibres – above all for stockings, parachutes and other fibre applications, in direct competition with American Nylon. Chemically, Perlon® is nothing other than polyamide 6, produced by ring-opening polymerisation of ϵ -caprolactam. While the name today is still used mainly in the textile and fibre industry and remains an actively registered trademark there, historically it denotes the same base material that Liedtke carries as technical semi-finished product (sheets, round rods) under the designation PA 6.

How Perlon® /PA 6 is manufactured and processed

PA 6 is produced by ring-opening polymerisation of ϵ -caprolactam into long polyamide chains. Extruded semi-finished product (round rods, sheets, tubes) is machined into precision parts; large-volume and thick-walled parts are often cast directly as cast polyamide (PA 6 G, e.g. under the brand name Ertalon®) by anionic polymerisation. For dimensionally stable parts we account for moisture absorption and condition the semi-finished product if required.

Mechanical and physical properties

Perlon®/PA 6 achieves (dry) a yield stress of around 80 MPa with a tensile modulus of around 3,200 MPa and a density of about 1.14 g/cm³. The material is remarkably tough and impact-resistant, highly abrasion- and wear-resistant, and has very good sliding properties with a low coefficient of friction. It also provides good sound and vibration damping. In the conditioned (moist) state, toughness increases further while stiffness decreases.

Chemical and thermal resistance

PA 6 has good resistance to fuels, oils, greases, many solvents and alkalis. The material is not resistant to strong acids, strongly oxidising media, and – over extended periods – to hot water (hydrolysis). The service temperature ranges from about -40 °C to a continuous +85 °C, and up to around 160 °C short-term. PA 6 is a good electrical insulator but is not flame-retardant (UL 94 HB). Physiologically safe grades for food contact are available.

When Perlon® /PA 6 is the right choice

PA 6 is worthwhile when toughness, wear resistance and good sliding properties are required at a moderate price – for example:

- Highly loaded plain bearings, bushings, gears and rollers
- Impact- and shock-loaded parts (high impact strength)
- Sound- and vibration-damping components
- Wear parts in conveying technology and mechanical engineering
- Components for food processing (food-grade types available)

When Perlon® /PA 6 is NOT the right choice

Equally important are the limits of the material:

- Highest dimensional stability under fluctuating humidity – POM is often the better choice here
- Continuous contact with hot water/steam or strong acids (hydrolysis/attack)
- Continuous use above approx. 85–100 °C or flame-retardancy requirements (only UL 94 HB)
- Applications with very high chemical or temperature requirements – then PVDF, PPS or PEEK
- Precision parts that must remain permanently and absolutely dry/dimensionally stable

What does Perlon® /PA 6 cost?

PA 6 is one of the more economical engineering plastics. As a rough guide, semi-finished product prices (natural round rod/sheet) are in the region of about €5–15/kg. The component price is determined mainly by grade, shape and dimensions of the semi-finished product, material utilisation (offcuts), machining effort and batch size. We are happy to provide binding prices on request based on your drawing.

Machining at Liedtke

PA 6 machines well – turning, milling, drilling and sawing produce clean results with good surface finish. Because of moisture absorption and comparatively high thermal expansion, we account for swelling and shrinkage behaviour at tight tolerances and condition the semi-finished product if required. This allows us to reliably manufacture precision parts, from single items to series production.

Advantages and disadvantages at a glance

An honest assessment – and how the disadvantages can be mitigated in practice:

Advantages

- Very high toughness and impact strength
- High abrasion and wear resistance
- Very good sliding and damping properties
- Machines and welds well, economical material price
- Good resistance to oils, greases and fuels

Disadvantages

- Absorbs moisture – dimensional and property changes
- Not resistant to strong acids and hot water (hydrolysis)
- Not flame-retardant (UL 94 HB), limited to approx. 85–100 °C continuous use
- Lower dimensional stability than POM under fluctuating humidity

Practical tip: where the highest dimensional stability is required, we choose POM; where high temperatures or aggressive chemicals are involved, PVDF, PPS or PEEK. For tough, wear-resistant and damping functional parts, however, Perlon® /PA 6 is the most economical choice – at tight tolerances we condition the semi-finished product accordingly.

Typical Properties

- Very high toughness and impact strength
- High abrasion and wear resistance
- Very good sliding properties

Product Examples

- Plain bearings, bushings and wear strips
- Gears, pinions and sprockets
- Rollers and rope sheaves

Typical Industries

- Textile and fibre technology (historical origin)
- Mechanical and plant engineering
- Conveying technology & automation

- Good sound and vibration damping
- Good machinability and weldability
- Good resistance to oils, greases, fuels
- Good electrical insulating properties
- Food-grade types available
- Impact and bump strips, buffers
- Guide and wear parts
- Components for food processing
- Food industry
- Meat, fish and poultry processing
- Bakery and confectionery

	Test Method	Unit	Value
Mechanical			
Yield stress	DIN EN ISO 527	MPa	80
Elongation at break	DIN EN ISO 527	%	50
Tensile modulus	DIN EN ISO 527	MPa	3200
Shore hardness	DIN EN ISO 868	scale D	82
Thermal			
Melting temperature	ISO 11357-3	°C	220
Service temperature	Average	°C	-40 ... 85
Heat deflection temperature	DIN EN ISO 75	°C	75
General			
Density	DIN EN ISO 1183-1	g / cm ³	1.14
Moisture absorption	DIN EN ISO 62	%	3.0
Flammability	UL 94		HB

Perlon® is a registered trade name coined in 1938 for the first German polyamide 6 synthetic fibre and remains actively registered as a trademark today; it is used here purely as a historically established designation for polyamide 6 (PA 6), without reference to any specific trademark owner. The values stated are typical averages for unreinforced natural PA 6; they serve as an aid to material selection and do not constitute a legally binding guarantee of specific properties. Moisture absorption changes the mechanical properties of polyamides; the values apply to dry material. Actual values may vary depending on the semi-finished product, grade and degree of crystallisation.