

What is PE 1000

PE 1000 natural

Ultra-high molecular weight polyethylene (PE-UHMW / PE 1000)

PE 1000 (ultra-high molecular weight polyethylene, PE-UHMW for short) belongs to the polyolefin family and is characterised by an exceptionally low coefficient of friction, very high wear resistance and excellent impact strength – even at low temperatures. Liedtke stocks this material in the natural (unpigmented) standard grade.

Material Character

Due to its very high molecular weight of around $5 \cdot 10^6$ g/mol, PE 1000 differs markedly from standard polyethylenes such as PE-HD, whose molecular weight is several orders of magnitude lower. The exceptionally long molecular chains provide high toughness, very high abrasion resistance and permanent self-lubrication, without the need for additional lubricants.

In the sand-slurry test, a common benchmark for wear resistance, PE 1000 achieves outstanding values, clearly outperforming many other thermoplastics as well as numerous metals. At the same time, the material remains tough and impact-resistant even at sub-zero temperatures, where many other plastics already become brittle.

Advantages and Limitations

Advantages

- Very low coefficient of friction and permanent self-lubrication
- Very high wear and abrasion resistance
- High impact strength, even at low temperatures
- Good chemical resistance
- Low moisture absorption

Disadvantages

- Lower stiffness and dimensional stability than engineering plastics such as PA or POM
- Lower permissible continuous service temperature than high-performance plastics (up to around 80 °C)
- More demanding to machine than many other thermoplastics – sharp tools required
- Paintable, printable and bondable only after pretreatment

Processing

PE 1000 can be milled, turned, drilled and sawn with sharp tools suited to tough plastics; low cutting speeds and good chip removal improve surface finish. Before machining, the semi-finished product should be at room temperature and/or stored for at least 24 hours under normal ambient conditions to relieve internal stresses.

Typical Applications

Thanks to its combination of wear resistance, low coefficient of friction and impact strength, PE 1000 is the classic material for slide and guide rails as well as wear-protection parts in machinery and plant engineering and in conveyor technology. It is also used in mining, agriculture, and water and wastewater engineering wherever components must withstand high abrasive wear.

Typical Properties

- Very low coefficient of friction
- Very high wear and abrasion resistance
- High impact strength, even at low temperatures
- Good sliding properties, permanent self-lubrication

Product Examples

- Slide and guide rails in conveyor technology
- Wear plates and linings for bulk material handling systems
- Chain guides and wear parts in machinery

Typical Industries

- Conveyor technology & automation
- Machinery and plant engineering
- Mining & bulk material handling
- Agriculture
- Water and wastewater engineering
- Packaging industry

- Good chemical resistance
- Low moisture absorption
- Components for water and wastewater engineering

	Test Method	Unit	Value
General Properties			
Density	ISO 1183	g / cm ³	0.93
Molecular weight	–	g / mol	~5 · 10 ⁶
Flammability	–		normally flammable
Mechanical Properties			
Tensile strength	ISO 527; 50 mm/min	N / mm ²	≥ 17
Elongation at tensile strength	ISO 527; 50 mm/min	%	≥ 8
Tear strength	ISO 527; 50 mm/min	N / mm ²	≥ 40
Tear elongation	ISO 527; 50 mm/min	%	> 50
Tensile E-modulus	ISO 527	N / mm ²	≥ 700
Ball indentation hardness (30 s)	DIN ISO 2039/1	N / mm ²	38
Shore hardness D (3 s)	DIN 53505	scale D	63
Shore hardness D (15 s)	DIN 53505	scale D	61
Impact strength	DIN 53453	mJ / mm ²	no break
Notched impact strength	ISO 179	mJ / mm ²	no break
Notched impact strength (sharp notch, 15°)	ISO 179	mJ / mm ²	≥ 200
Wear (sand-slurry test)	Internal method	Index	100
Thermal Properties			
Vicat softening temperature	DIN ISO 306/B	°C	79
Crystalline melting range	DTA	°C	130 ... 135
Linear expansion coefficient (23 ... 80 °C)	DIN 53752	10 ⁻⁴ / K	2
Thermal conductivity (23 °C)	DIN 52612	W / (m * K)	0.41
Electrical Properties			
Volume resistivity	VDE 0303/3	Ω * cm	> 10 ¹⁴
Surface resistance	VDE 0303/3	Ω	> 10 ¹¹

	Test Method	Unit	Value
Dielectric strength	VDE 0303/2	kV / mm	45
Arc resistance	VDE 0303/5		L4

The values stated are mean values secured through continuous statistical testing. They serve as information for material selection and do not constitute a legally binding guarantee of specific properties.

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