Liedtke Kunststofftechnik
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What is PET EN

PET

PET (polyethylene terephthalate) – semi-crystalline engineering thermoplastic from the polyester family, dimensionally stable and wear-resistant

PET (polyethylene terephthalate) is a semi-crystalline engineering thermoplastic from the family of polyesters. In its machinable, extruded form (PET-C) it combines high stiffness and hardness with excellent dimensional stability, low moisture absorption and outstanding sliding and wear properties. It is also suitable for food contact and machines extremely precisely.

Classification and basic character

PET belongs to the polyesters – thermoplastics with ester bonds in the molecular chain. For machined parts, the semi-crystalline variant (PET-C) is extruded as semi-finished stock; it is stiffer, harder and more dimensionally stable than the well-known transparent bottle PET. PET absorbs only little moisture (about 0.3 %), is dimensionally stable and largely retains its dimensions even under changing climate. It is hard and stiff, yet comparatively notch- and impact-sensitive.

Stiffness, dimensional stability and sliding properties

The outstanding feature of PET is the combination of high stiffness (tensile modulus around 3,000 MPa), high hardness (Shore D 84) and very good dimensional stability at low moisture absorption. Added to this are good sliding, wear and creep properties. This makes PET ideal for precise, dimensionally stable components and for sliding and wear applications – often as a harder, more dimensionally stable alternative to POM where toughness is less critical.

How PET is made and processed

PET is produced by polycondensation of terephthalic acid (or dimethyl terephthalate) and ethylene glycol. For engineering parts, the polymer is extruded into semi-finished stock such as round bars and plates and specifically set to be semi-crystalline. From these we machine precision parts – turning, milling, drilling and sawing produce clean, dimensionally accurate results. Thanks to the low moisture absorption and low coefficient of expansion, tight tolerances are reliably maintained.

Mechanical, thermal and media resistance

PET reaches a yield stress of about 85 MPa with a tensile modulus around 3,000 MPa and a density of about 1.38 g/cm³. The elongation at break is about 15 %, but the notched impact strength is only around 2 kJ/m² – so the material is rather brittle and notch-sensitive. The service temperature ranges from about -20 °C up to a continuous +115 °C, short-term to around 180 °C; the heat deflection temperature (HDT) is about 80 °C. PET is well resistant to many chemicals, dilute acids, oils and fats, but is attacked by hot water/steam (hydrolysis) as well as strong acids and alkalis.

When PET is the right choice

PET is worthwhile whenever dimensional stability, stiffness and wear resistance are required – for example:

- Precision parts with tight tolerances and high dimensional stability
- Sliding and wear parts such as bearings, bushings, guides and wear strips
- Components for food processing (FDA-compliant, food-safe)
- Components for conveyor technology and automation
- Electrically insulating components with high stiffness

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When PET is NOT the right choice

Equally important are the limits of the material:

- Applications with high impact/shock loading – PET is brittle and notch-sensitive; use POM or PA instead
- Continuous contact with hot water or steam above about 60 °C (hydrolysis)
- Contact with strong acids and alkalis
- Components with fire-safety requirements – PET only reaches UL 94 HB; use PA 6 FR or PVDF
- Continuous service above about 115 °C – then PVDF or PEEK are options

What does PET cost?

PET is priced in the mid-range of engineering plastics – usually somewhat above POM, but considerably below high-performance plastics such as PVDF or PEEK. As a rough guide, semi-finished stock prices are in the range of about 8–20 €/kg. The component price is determined mainly by the semi-finished shape and dimension, material utilisation (offcut), machining effort and lot size. We are happy to quote binding prices on request based on your drawing.

Machining at Liedtke

PET machines excellently – turning, milling, drilling and sawing produce clean, dimensionally accurate results. Thanks to low moisture absorption and low thermal expansion, tight tolerances are reliably maintained. Because of its notch sensitivity, we use sharp tools and adapted cutting parameters and avoid sharp internal corners. This is how we reliably produce precision and wear parts – from single pieces to series production.

Advantages and disadvantages at a glance

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

Advantages

- High stiffness, hardness and dimensional stability
- Low moisture absorption, very good dimensional accuracy
- Good sliding, wear and creep properties
- Suitable for food contact (FDA-compliant)
- Very good, precise machinability

Disadvantages

- Brittle and notch-sensitive – low impact strength
- Not resistant to hot water/steam (hydrolysis) and strong acids/alkalis
- Only UL 94 HB – not flame-retardant
- Continuous service limited to about 115 °C

Practical tip: PET plays to its strengths wherever dimensional stability, hardness and wear resistance matter – for example in precision and sliding parts in food and conveyor technology. Where impact strength is the priority, we recommend the tougher POM or PA; for fire-safety requirements PA 6 FR or PVDF, and for higher temperatures PVDF or PEEK.

Typical Properties

- High stiffness and hardness
- Low moisture absorption
- Very good dimensional stability
- Good sliding and wear properties
- Good creep resistance
- Suitable for food contact
- Very good machinability
- Electrically insulating

Product Examples

- Precision parts with tight tolerances
- Bearings, bushings, guides and wear strips
- Components for food processing
- Components for conveyor technology and automation
- Insulating and structural parts in electronics
- Wear and functional parts in mechanical engineering

Typical Industries

- Automotive engineering
- Electronics
- Conveyor technology & automation
- Food industry
- Beverage industry
- Mechanical and plant engineering

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	Test Method	Unit	Value
General Properties			
Density	DIN EN ISO 1183-1	g / cm³	1.38
Moisture absorption	DIN EN ISO 62	%	0.3
Flammability (thickness 3 mm / 6 mm)	UL 94		HB / HB
Mechanical Properties			
Yield stress	DIN EN ISO 527	MPa	85
Elongation at break	DIN EN ISO 527	%	15
Tensile modulus	DIN EN ISO 527	MPa	3000
Notched impact strength	DIN EN ISO 179	kJ / m²	2
Shore hardness	DIN EN ISO 868	scale D	84
Thermal Properties			
Melting temperature	ISO 11357-3	°C	248
Coefficient of linear thermal expansion	DIN 53752	10^{-6} / K	60
Service temperature, long-term	Average	°C	-20 ... 115
Service temperature, short-term (max.)	Average	°C	180
Heat deflection temperature	DIN EN ISO 75, method A, HDT	°C	80
Electrical Properties			
Volume resistivity	DIN EN 62631-3-1	Ω * cm	10^{18}
Surface resistivity	DIN EN 62631-3-2	Ω	10^{16}
Dielectric strength	IEC 60243	kV / mm	20

The values stated are typical average values for PET natural (semi-crystalline); they serve as an aid to material selection and are not a legally binding warranty of specific properties. PET is resistant to many chemicals but is attacked by hot water/steam (hydrolysis) as well as strong acids and alkalis – media resistance must be verified case by case. Price information is a rough, non-binding guide and may vary depending on market situation, grade, dimension and quantity.

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