Liedtke Kunststofftechnik
Siemensstr. 32a /42551 Velbert/Germany (DE) • Tel. +49 2051 605 105

What is PC Industrial Grade

PC Industrial Grade

PC (Industrial Grade) – polycarbonate, natural colour, transparent

PC Industrial Grade is a technical polycarbonate semi-finished product available as sheets and round rods, natural coloured and virtually colourless-transparent. As an amorphous thermoplastic with a glass transition temperature of 150 °C, the material combines high stiffness and hardness with good impact strength – even at low temperatures – while remaining easy to machine and form. This makes PC one of the most versatile technical plastics for mechanical engineering and electrical applications.

Material Character

Polycarbonate is an amorphous thermoplastic with no defined melting point. Above its glass transition temperature of around 150 °C the material progressively softens, while below it it remains dimensionally stable and accurate. Its virtually colourless transparency makes PC Industrial Grade easy to distinguish from opaque technical plastics and enables applications where visual inspection, light transmission or an attractive appearance are required.

The combination of high stiffness, high hardness and good impact strength is unusual for a transparent thermoplastic: while many clear plastics are either hard and brittle or tough and soft, PC remains resistant to impact and shock loading even at low temperatures. Together with its low moisture absorption, this results in good dimensional stability even under varying climatic conditions.

Advantages and Limitations

Advantages

- High heat deflection resistance up to around 135 °C
- Very good electrical insulation properties
- Good impact strength, also at low temperatures
- Virtually colourless transparency
- Good dimensional stability due to low moisture absorption

Disadvantages

- Limited resistance to many solvents
- Susceptible to stress cracking under the influence of certain media
- Only limited weathering resistance without UV protection
- Burning behaviour HB (not self-extinguishing)

Processing and Applications

PC Industrial Grade can be readily machined with standard plastics machining processes – sawing, milling, drilling, turning – achieving tight dimensional tolerances. Bonding and thermoforming are also possible, allowing sheets and round rods to be turned into components, viewing windows, insulating parts or prototypes.

Typical fields of application are in electronics and electrical engineering – for example as an insulating component, housing or carrier element – as well as in mechanical engineering, where stiffness, dimensional stability and transparency are equally required, for instance in viewing windows, guide and mounting parts or test fixtures.

Comparison with Glass and Acrylic

As a transparent material, PC is often used where glass or acrylic (PMMA) reach their limits. Compared directly, PC shows markedly higher impact and fracture toughness than either alternative and does not shatter even under strong impact loading – an advantage wherever protection of people or components is required.

Compared with acrylic, PC is also more dimensionally stable at elevated temperatures and tougher at low temperatures, but in its uncoated state it does not match acrylic's scratch resistance and UV stability to the same degree. For applications permanently exposed to the weather, the specific conditions of use should therefore be checked.

Typical Properties

Product Examples

Typical Industries

Liedtke Kunststofftechnik, 42551 Velbert, Siemensstr. 32a, +49 2051 605 105, Info@liedtke-kunststofftechnik.de, www.liedtke-kunststofftechnik.de

- Amorphous thermoplastic, glass transition temperature 150 °C
- Natural colour, virtually colourless and transparent
- Low moisture absorption
- High stiffness and hardness
- High heat deflection resistance
- Good formability and dimensional stability
- Electrically insulating
- Good impact strength, also at low temperatures

- Sheets: 10–50 mm thickness, 500–620 mm width, 1000–3000 mm length, colour natural
- Round rods: Ø 12–150 mm, 1000–3000 mm length, colour natural

- Electronics
- Mechanical engineering

	Test Method	Unit	Value
Mechanical Properties			
Yield stress	DIN EN ISO 527	MPa	65
Elongation at break	DIN EN ISO 527	%	80
Tensile modulus	DIN EN ISO 527	MPa	2300
Notched impact strength	DIN EN ISO 179	kJ / m²	20
Shore hardness	DIN EN ISO 868	scale D	82
Thermal Properties			
Glass transition temperature	ISO 11357-3	°C	150
Thermal conductivity	DIN 52612-1	W / (m·K)	0.21
Specific heat capacity	DIN 52612	kJ / (kg·K)	1.20
Coefficient of linear expansion	DIN 53752	10^{-6} / K	70
Continuous service temperature	Guide value	°C	-40 ... 115
Short-term service temperature (max.)	Guide value	°C	140
Heat deflection temperature	DIN EN ISO 75	°C	135
General Properties			
Density	DIN EN ISO 1183-1	g / cm³	1.20
Water absorption	DIN EN ISO 62	%	0.2
Burning behaviour (thickness 3 mm / 6 mm)	UL 94		HB / HB
Electrical Properties			
Dielectric constant	IEC 60250		3

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	Test Method	Unit	Value
Dielectric dissipation factor (50 Hz)	IEC 60250		0.001
Volume resistivity	DIN EN 62631-3-1	Ω · cm	10^{15}
Surface resistivity	DIN EN 62631-3-2	Ω	10^{15}
Comparative tracking index (CTI)	IEC 60112		275
Dielectric strength	IEC 60243	kV / mm	30

The values stated are typical average values determined on standardised test specimens. They serve solely to inform about our products and to assist in material selection. We do not thereby provide a legally binding assurance of specific properties or of suitability for a particular purpose. As actual property values also depend on the dimensions of the semi-finished product and on processing conditions, they may deviate from the figures stated in individual cases.

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