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What is Exolon® GP EN

Exolon® GP

Exolon® GP – solid polycarbonate sheet (PC), extremely impact-resistant, heat-resistant and flame-retardant

Exolon® GP is a solid sheet made of polycarbonate (PC) from Exolon Group. As a polycarbonate, the material combines exceptional impact strength – virtually unbreakable – with high heat deflection temperature (continuous service up to about 120 °C), good transparency of about 90 % and a flame-retardant classification (UL 94 V-2, EN 13501-1 B-s1,d0). This makes Exolon® GP particularly suitable for impact-resistant glazing, guard screens and roofing.

Classification and basic character

Exolon® GP is made of polycarbonate, an amorphous engineering thermoplastic without a defined melting point that softens above the glass transition temperature (around 147 °C). Its outstanding feature is extreme toughness: in the unnotched Charpy test the material does not break ("no break"), and it remains impact-resistant even at low temperatures. Exolon® GP is stiff, dimensionally stable and transparent, yet comparatively soft and scratch-sensitive at the surface; chemically, PC is sensitive to many solvents.

Impact strength, heat and fire behaviour

Exolon® GP combines three properties that set it apart from other transparent sheets: exceptionally high impact strength (Charpy notched about 80 kJ/m², unnotched "no break"), a high heat deflection temperature with continuous service up to about 120 °C and a service range from -100 to +120 °C, plus a flame-retardant classification according to UL 94 V-2 and EN 13501-1 B-s1,d0. The light transmission of the colourless grade 099 is about 90 % (thickness-dependent).

How Exolon® GP is processed

Exolon® GP is supplied as an extruded solid sheet. From the semi-finished product we machine components – milling, turning, drilling and sawing produce clean results. The sheets can also be cold-bent (line bending) and thermoformed; before thermoforming, PC must be pre-dried due to its hygroscopy. After machining, annealing can be useful to relieve internal stresses. PC is only conditionally suitable for laser cutting (dark cut edge).

Mechanical, thermal and chemical properties

Exolon® GP reaches a yield stress of over 60 MPa with a tensile modulus around 2,350 MPa and a density of about 1.20 g/cm³. Characteristic is the high nominal strain at break (>50 %) and the very high notched impact strength (Charpy about 80 kJ/m², Izod 70 kJ/m²) – PC is tough rather than brittle. The Vicat softening temperature is 148 °C, the heat deflection temperature (1.8 MPa) is 128 °C. Chemically, PC is sensitive: it is attacked by many solvents, alkalis and hydrocarbons and then tends to stress cracking; without UV protection it yellows outdoors.

When Exolon® GP is the right choice

Exolon® GP is worthwhile whenever transparency must be combined with shatter resistance, higher temperature or fire safety – for example:

- Safety and protective glazing, machine guard screens
- Impact-resistant sight windows, protective shields and covers
- Roofing and glazing in building and architecture
- Transparent components at temperatures above about 80 °C (up to 120 °C)
- Applications requiring flame-retardant material (B-s1,d0)

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When Exolon® GP is NOT the right choice

Equally important are the limits of the material:

- Contact with solvents, alkalis or hydrocarbons (strong risk of stress cracking)
- Permanent outdoor use without UV protection – natural PC yellows; then UV-protected sheets or PMMA
- Scratch- and abrasion-loaded surfaces – PC is soft; then hard-coated grades, PMMA or glass
- Highest optical clarity and non-yellowing – then PMMA
- Very tight budget – PMMA is usually cheaper

What does Exolon® GP cost?

Exolon® GP is a solid PC sheet in the mid price segment and is usually above acrylic glass (PMMA) but below high-performance plastics. As a rough guide, sheet prices are in the range of about 6–15 €/kg. The component price is determined mainly by sheet thickness and dimension, material utilisation (offcut), machining effort and lot size. We are happy to quote binding prices on request based on your drawing.

Processing at Liedtke

Exolon® GP machines well – milling, turning, drilling and sawing produce clean, dimensionally accurate results. We also offer cold bending (line bending), thermoforming, polishing and bonding. Before thermoforming we pre-dry the sheets due to their hygroscopy; after machining, annealing can relieve internal stresses. Because of its stress-cracking sensitivity, we avoid solvent-based cutting fluids. This is how we reliably produce impact-resistant, transparent precision and protective 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

- Extremely high impact strength – virtually unbreakable, even in the cold
- High heat deflection temperature (continuous up to ~120 °C, range -100…+120 °C)
- Flame-retardant (UL 94 V-2, EN 13501-1 B-s1,d0)
- Good transparency (~90 %) and high stiffness
- Good machinability, cold-bendable and thermoformable

Disadvantages

- Soft, scratch-sensitive surface (without hard coating)
- Sensitive to solvents, alkalis and hydrocarbons (stress cracking)
- Only limited weathering resistance without UV protection (yellowing)
- Higher price and slightly lower clarity than PMMA

Practical tip: Exolon® GP plays to its strengths wherever transparency meets shatter resistance, fire safety and higher temperatures – for example in safety glazing, machine guards and roofing. Where highest scratch resistance, non-yellowing and weathering resistance are required, acrylic glass (PMMA) is the better and cheaper choice; for permanent outdoor use, we recommend UV-protected PC sheets.

Typical Properties

- Extremely high impact strength (virtually unbreakable)
- High heat deflection temperature (up to ~120 °C)
- Wide temperature range (-100 … +120 °C)
- Flame-retardant (UL 94 V-2, B-s1,d0)
- Good transparency (~90 %)
- High stiffness and dimensional stability

Product Examples

- Safety and protective glazing
- Machine guard screens and protective shields
- Roofing and building glazing
- Impact-resistant sight windows and covers
- Housings and insulating parts in electronics
- Transparent components for higher temperatures

Typical Industries

- Mechanical and plant engineering
- Safety and glazing technology
- Building and architecture
- Electronics and electrical engineering
- Lighting and illumination technology
- Advertising and display technology

- Good electrical insulator
- Good machinability and thermoformability

	Test Method	Unit	Value
General Properties			
Density	ISO 1183-1	g / cm³	1.20
Water absorption (standard climate)	ISO 62	%	0.12
Light transmission (colourless 099)	ISO 13468	%	~ 90
Flammability	UL 94 / EN 13501-1		V-2 / B-s1,d0
Mechanical Properties			
Yield stress	ISO 527	MPa	>60
Nominal strain at break	ISO 527	%	>50
Tensile modulus	ISO 527	MPa	2350
Impact strength (Charpy, unnotched)	ISO 179-1eU	kJ / m²	no break
Notched impact strength (Charpy)	ISO 179-1eA	kJ / m²	80
Thermal Properties			
Vicat softening temperature B/50	ISO 306	°C	148
Heat deflection temperature (1.8 MPa)	ISO 75	°C	128
Continuous service temperature	Average	°C	~ 120
Temperature range	Average	°C	-100 ... +120
Coefficient of linear thermal expansion	ISO 11359	10^{-6} / K	65
Electrical Properties			
Dielectric strength	IEC 60243-1	kV / mm	34
Volume resistivity	IEC 60093	Ω * cm	10^{16}

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