

POLYCARBONATE (PC)

Physical and mechanical properties: Polycarbonate is a polymer which, when uncrystallized, has excellent transparency. When thick, it has a slight yellowish tint. The index of refraction of transparent and colorless PC is very high, 1.584. The industrial grades of PC have molecular weights on the order of 20,000 to 50,000g.mol⁻¹. The relative rigidity of the chain causes high viscosity in the liquid state.

Polycarbonate has a vitreous transition temperature of about 150°C and consequently it is to be used almost exclusively in the vitreous range (great rigidity). At ambient temperature (between $T_{\beta} = -80^{\circ}\text{C}$ and $T_g = 150^{\circ}\text{C}$). PC is ductile, which explains in part its very good resistance to shock. Polycarbonate has polymers.

- Little elongation relative to rupture,
- Excellent resistance to shock even when cold,
- A wide temperature range for use (up to 135°C) → sterilization possible.

Chemical properties: PC absorbs only small quantities of water (<0.6%) and its mechanical properties are not affected by it. PC can be used for making objects frequently washed with hot or sterilized water, but a long period of time in hot water ($0 > 60^{\circ}\text{C}$) causes a decomposition resulting in a drop in shock resistance.

PC is not attacked by diluted mineral and organic acids. It is insoluble in aliphatic hydrocarbons, ether and alcohol. It is partially soluble in numerous halogenous hydrocarbons.

PC is attacked by strong bases (ammonia). PC is fairly stable in the presence of ozone. Stability in UV light is not exceptional and PCs turn yellow fairly quickly. Suitability for contact with food and physiological innocuousness. PC is recognized as being suitable for making objects in contact with food. Certain grades are approved for medical use. PCs can be sterilized with steam.

Electrical properties: Polycarbonate has good insulating properties little affected by variations in temperature or humidity.

Thermal properties: PC is practically self-extinguishable. Resistance to fire, rated per UL94, ranges from HB to V0-V2 according to type, wall thickness and stabilization.

Dimensional properties: Polycarbonate, as all uncrystallized polymers, offers limited retraction when molded (< 0.6%):

- its low absorption of humidity gives it good dimensional stability in a humid atmosphere;
- PC has good creep resistance, especially when reinforced with fiber glass.

Implementation properties: In a general way, PC should be carefully dried in a ventilated oven or dryer at 120° C (PC humidity < 0.02%); 0.1% humidity is enough to diminish the mechanical properties of the finished product.

Injection: PC remains viscous even in the melted state and requires high injection pressures (800 to 1800 bars) or thicknesses in relation to the flow path.