Polycarbonate (PC)

General properties

Source

Based on the MaterialUniverse record 'PC (low viscosity, molding and extrusion)'

Designation

Polycarbonate (Low Viscosity, Unfilled, Molding and Extrusion)

Density	1200 kg/m^3
Price	4.5 to 5.0 USD/kg

Tradenames

Alcom; Alfacarb; Anjalon; Astalon; AxxisPC; Azloy; Barlo; Beetle; Calibre; CarboGlass; Carbotex; Cyrolon; Dafneloy; Daitoplex; Decarglas; Diaterm; Durmax; Durolon; Dynacom; Ecocarb; Edgetek; Emerge; Ensicar; Forex; Hiloy; Hygard; Hylex; Hynsin; Hyzod; Iupilon; Iupon; Karbolon; Kobaloy; Kopla; Latilon; Lexan; Lubrilon; Lupoy; Luvocom; Makroclear; Makrofol; Makrolon; Markoblend; Maxxam; Megarad; Monogal; Multilon; Navalloy; Naxell; Nirion; Novamate; Novarex; Nyloy; Palsafe; Panlite; Paramighty; PCLight; Perlex; Permastat; Pokalon; Polygal; Polyman; Remex; RowTec; Scantec; SDPolyca; Seracarb; Sewon Glas; Shinite; Signature; Sinvet; Sitralon; Stapron; Staren; Staroy; Stella; Sungal; Sustanat; Tarolon; Tecanat; Teklon; Tekulon; Terez; TismoPoticon; Trirex; Tuffak; Tynec; Ultratuf; Vampcarb; Wonderlite; Zelux

Composition (summary)

Polycarbonate homopolymer of bis-phenol A (BPA): (OC6H4C(CH3)2C6H4OC=O)n. Low viscocity grades have lower molecular weight, are more processable but less tough.

Primary material production: energy, CO2 and water

Embodied energy, primary production	100 to 110 MJ/kg
CO2 footprint, primary production	5.7 to 6.4 kg/kg
Water usage	170 to 180 l/kg

Material processing: energy

Polymer molding energy	18 to 19 MJ/kg
Polymer extrusion energy	5.8 to 6.4 MJ/kg

Material processing: CO2 footprint

Polymer molding CO2	1.3 to 1.5 kg/kg
Polymer extrusion CO2	0.43 to 0.48 kg/kg

Material recycling: energy, CO2 and recycle fraction	
Embodied energy, recycling	40 to 45 MJ/kg
CO2 footprint, recycling	3.2 to 3.5 kg/kg
Recycle fraction in current supply	0.67 to 0.74 %
Heat of combustion (net)	30 to 32 MJ/kg
Combustion CO2	2.7 to 2.8 kg/kg
A renewable resource?	No

Bio-data	
Food contact	Yes
RoHS (EU) compliant grades?	Yes

Geo-economic data for principal component	
Principal component	Polycarbonate

Mechanical properties	
Young's modulus	2.3 to 2.4 GPa
Poisson's ratio	0.39 to 0.41
Yield strength (elastic limit)	59 to 65 MPa
Tensile strength	63 to 72 MPa
Compressive strength	69 to 86 MPa
Elongation	110 to 150 % strain

Thermal properties	
Maximum service temperature	100 to 120 °C
Minimum service temperature	-47 to -37 °C
Thermal conductivity	0.19 to 0.22 W/m.°C
Specific heat capacity	1200 to 1300 J/kg.°C
Thermal expansion coefficient	120 µstrain/°C

Electrical & optical properties	
Electrical resistivity	1.0e20 to 1.0e21 µohm.cm
Transparency	Optical quality

Durability

Flammability	Slow-burning
Organic solvents	Limited use
UV radiation (sunlight)	Fair
Water absorption @ 24 hrs	0.14 to 0.17 %
Water (fresh)	Excellent
Water (salt)	Excellent

Notes

Typical uses

Safety shields and goggles; lenses; glazing panels; business machine housing; instrument casings; lighting fittings; safety helmets; electrical switchgear; laminated sheet for bullet-proof glazing; twin-walled sheets for glazing; kitchenware and tableware; microwave cookware, medical (sterilizable) components.