

# Polycarbonate

## HIGH STRENGTH ENGINEERING THERMOPLASTIC FOR DEMANDING FUNCTIONAL PARTS

Polycarbonate is a strong, tough engineering thermoplastic with excellent temperature and impact resistance. This grade is formulated for reduced shrinkage and improved dimensional stability, making it suitable for functional components that must carry load or retain performance at elevated temperatures.

### Design Advantages

- High tensile and flexural strength for structural prototypes and end-use components
- Elevated glass transition and heat-deflection temperatures for higher-temperature service
- Strong impact performance for housings, guards, brackets, fixtures, and protective parts
- Naturally transparent polymer family with useful toughness and dimensional stability

### Material Specifications

| ITEM                         | PUBLISHED VALUE                                |
|------------------------------|------------------------------------------------|
| Material family              | Polycarbonate                                  |
| Filament diameter            | 1.75 mm                                        |
| Published density            | 1.20 g/cm <sup>3</sup>                         |
| Glass transition temperature | 145 C                                          |
| Water solubility             | Insoluble                                      |
| Appearance and odor          | Solid filament; odorless under normal handling |

### Recommended Processing Window

| SETTING                       | RECOMMENDED RANGE                                                        |
|-------------------------------|--------------------------------------------------------------------------|
| Drying before printing        | Forced-air drying oven at 80 C for 8 h                                   |
| Printing and storage humidity | Below 20% RH sealed with desiccant                                       |
| Nozzle temperature            | 260 to 280 C                                                             |
| Build surface                 | Engineering plate, high-temperature plate, or textured PEI with PVP glue |
| Bed temperature               | 90 to 110 C                                                              |
| Cooling fan                   | 0 to 60%                                                                 |
| Printing speed                | Below 300 mm/s                                                           |
| Retraction                    | 0.8 to 1.4 mm at 20 to 40 mm/s                                           |
| Chamber temperature           | 45 to 60 C                                                               |
| Overhang and bridging         | Approximately 70 degree maximum overhang; approximately 40 mm bridge     |

## Physical and Thermal Properties

| PROPERTY                     | TEST METHOD           | PUBLISHED VALUE        |
|------------------------------|-----------------------|------------------------|
| Density                      | ISO 1183              | 1.20 g/cm <sup>3</sup> |
| Melt index                   | 260 C at 2.16 kg      | 32.2 +/- 2.9 g/10 min  |
| Melting temperature          | DSC at 10 C/min       | 228 C                  |
| Glass transition temperature | DSC at 10 C/min       | 145 C                  |
| Crystallization temperature  | DSC at 10 C/min       | Not reported           |
| Vicat softening temperature  | ISO 306 and GB/T 1633 | 119 C                  |
| Heat deflection at 1.8 MPa   | ISO 75                | 117 C                  |
| Heat deflection at 0.45 MPa  | ISO 75                | 112 C                  |
| Saturated water absorption   | 25 C and 55% RH       | 0.25%                  |

## Mechanical Properties in Dry State

| PROPERTY                | TEST METHOD           | PUBLISHED VALUE                                                        |
|-------------------------|-----------------------|------------------------------------------------------------------------|
| Young's modulus X Y     | ISO 527 and GB/T 1040 | 2,110 +/- 40 MPa                                                       |
| Young's modulus Z       | ISO 527 and GB/T 1040 | 1,450 +/- 60 MPa                                                       |
| Tensile strength X Y    | ISO 527 and GB/T 1040 | 62 +/- 2 MPa                                                           |
| Tensile strength Z      | ISO 527 and GB/T 1040 | 56 +/- 2 MPa                                                           |
| Elongation at break X Y | ISO 527 and GB/T 1040 | 3.8 +/- 0.3%                                                           |
| Elongation at break Z   | ISO 527 and GB/T 1040 | 2.1 +/- 0.4%                                                           |
| Flexural modulus X Y    | ISO 178 and GB/T 9341 | 2,310 +/- 70 MPa                                                       |
| Flexural modulus Z      | ISO 178 and GB/T 9341 | 1,620 +/- 80 MPa                                                       |
| Flexural strength X Y   | ISO 178 and GB/T 9341 | 108 +/- 4 MPa                                                          |
| Flexural strength Z     | ISO 178 and GB/T 9341 | 55 +/- 2 MPa                                                           |
| Impact strength X Y     | ISO 179 and GB/T 1043 | 34.8 +/- 2.1 kJ/m <sup>2</sup> ; notched 7.5 +/- 1.3 kJ/m <sup>2</sup> |
| Impact strength Z       | ISO 179 and GB/T 1043 | 9.0 +/- 0.4 kJ/m <sup>2</sup>                                          |

Representative dry-state values from standardized specimens. Actual part performance depends on geometry, orientation, wall thickness, moisture condition, processing parameters, and service environment.

## Chemical and Handling Characteristics

| CHARACTERISTIC             | PUBLISHED INFORMATION                                 |
|----------------------------|-------------------------------------------------------|
| Composition                | Polycarbonate                                         |
| Odor and skin hazards      | Odorless; source documentation reports no skin hazard |
| Chemical stability         | Stable under normal storage and handling conditions   |
| Water solubility           | Insoluble                                             |
| Acid and alkali resistance | Not resistant                                         |
| Organic solvent resistance | Not resistant to some organic solvents                |
| Oil and grease resistance  | Resistant to most kinds of oil and grease             |
| Flammability               | Flammable and self-extinguishing in air               |
| Combustion products        | Water and carbon oxides; light phenolic odor          |

## Representative Specimen Conditions

| PARAMETER             | SOURCE CONDITION                    |
|-----------------------|-------------------------------------|
| Nozzle temperature    | 270 C                               |
| Bed temperature       | 100 C                               |
| Printing speed        | 200 mm/s                            |
| Infill density        | 100%                                |
| Pre-test conditioning | Annealed and dried at 80 C for 12 h |

## Design and Validation Considerations

- Design for anisotropy: published tensile strength is relatively similar between X/Y and Z, but flexural strength is 108 MPa in X/Y and 55 MPa in Z.
- Use X/Y-oriented load paths where maximum stiffness, flexural strength, and impact performance are important.
- Dry and store material below 20% RH with desiccant; moisture can affect extrusion quality, dimensions, and mechanical performance.
- Use an enclosed, temperature-controlled build environment to manage shrinkage, interlayer bonding, and dimensional stability.
- Validate the final part for sustained temperature, chemical exposure, creep, impact, flammability, and safety-critical loading in the intended service environment.

## Published Data and Qualification

The values in this sheet are based on standardized specimen testing documented by the material source and are provided for design reference and material comparison. Lucent Additive has not independently generated every published value. Final-part performance can differ because of geometry, orientation, processing, moisture conditioning, and service environment. This document does not create a material warranty or replace qualification of the customer's finished component.

## Start an Application Review

Send Lucent Additive your CAD model, quantity, load conditions, operating temperature, inspection needs, chemical exposure, and target schedule. Our team can review material fit, build orientation, production strategy, and validation needs before quoting.

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