

# UV Resistant Polycarbonate (PC)

## Technical Data Sheet

UV resistant polycarbonate (PC) is a high-performance engineering plastic modified with advanced UV stabilizers and light stabilizers. It retains the excellent impact resistance, transparency, dimensional stability and electrical insulation of standard PC, while providing outstanding weatherability and UV radiation resistance, effectively preventing yellowing, brittleness and performance degradation caused by long-term outdoor exposure. It is widely used in outdoor lighting, automotive exterior parts, building materials, electronic displays and other fields requiring long-term weather resistance.

### 1. Basic Physical Properties

| Property Item                | Unit              | General Grade UV Resistant PC | High Transparency UV Resistant PC | Flame Retardant UV Resistant PC | Test Standard |
|------------------------------|-------------------|-------------------------------|-----------------------------------|---------------------------------|---------------|
| Density                      | g/cm <sup>3</sup> | 1.18-1.20                     | 1.18-1.19                         | 1.20-1.22                       | ISO 1183-1    |
| Water Absorption (24h, 23°C) | %                 | 0.15-0.20                     | 0.14-0.18                         | 0.16-0.22                       | ISO 62        |
| Melting Point                | °C                | 220-230                       | 220-230                           | 220-230                         | DSC Test      |
| Glass Transition Temperature | °C                | 145-155                       | 145-155                           | 145-155                         | DSC Test      |
| Transmission Rate (3mm)      | %                 | 88-90                         | 89-91                             | 85-88                           | ASTM D1003    |
| Haze (3mm)                   | %                 | 0.8-1.2                       | 0.5-0.8                           | 1.0-1.5                         | ASTM D1003    |

|                           |   |   |   |   |            |
|---------------------------|---|---|---|---|------------|
| UV Resistance Performance | - | $\Delta YI \leq 3.0$<br>(1000h Xenon Arc) | $\Delta YI \leq 2.5$<br>(1000h Xenon Arc) | $\Delta YI \leq 3.5$<br>(1000h Xenon Arc) | ISO 4892-2 |
|---------------------------|---|---|---|---|------------|

## 2. Core Mechanical Properties (Key Indicators)

| Performance Indicator            | Unit              | General Grade UV Resistant PC | High Impact UV Resistant PC | Glass Fiber Reinforced UV PC (10%) | Test Standard |
|----------------------------------|-------------------|-------------------------------|-----------------------------|------------------------------------|---------------|
| Tensile Strength                 | MPa               | 60-70                         | 65-75                       | 80-90                              | ISO 527-1/-2  |
| Elongation at Break              | %                 | 100-150                       | 150-200                     | 30-50                              | ISO 527-1/-2  |
| Flexural Strength                | MPa               | 90-100                        | 95-105                      | 120-130                            | ISO 178       |
| Flexural Modulus                 | GPa               | 2.4-2.6                       | 2.3-2.5                     | 3.5-4.0                            | ISO 178       |
| Notched Impact Strength (23°C)   | kJ/m <sup>2</sup> | 60-80                         | 80-100                      | 40-50                              | ISO 179-1     |
| Unnotched Impact Strength (23°C) | kJ/m <sup>2</sup> | No Break                      | No Break                    | 150-200                            | ISO 179-1     |
| Rockwell Hardness                | M                 | 75-80                         | 70-75                       | 85-90                              | ISO 2039-2    |
| Coefficient of Friction          | -                 | 0.30-0.35                     | 0.28-0.32                   | 0.32-0.38                          | ASTM D1894    |

## 3. Thermal Properties

| Thermal Performance Indicator              | Unit                       | General Grade UV Resistant PC | High Heat UV Resistant PC | Test Standard         |
|--|----------------------------|-------------------------------|---------------------------|-----------------------|
| Heat Deflection Temperature (HDT, 1.82MPa) | °C                         | 125-130                       | 135-140                   | ISO 75-1/-2           |
| Continuous Service Temperature             | °C                         | -40 to 120                    | -40 to 130                | Long-term Test        |
| Short-term Peak Temperature                | °C                         | 140-150                       | 150-160                   | Instant Thermal Shock |
| Brittleness Temperature                    | °C                         | -100                          | -100                      | ISO 974               |
| Coefficient of Thermal Expansion           | $10^{-5}/^{\circ}\text{C}$ | 6.0-7.0                       | 5.5-6.5                   | ISO 11359-2           |
| Thermal Conductivity                       | W/(m·K)                    | 0.19-0.22                     | 0.20-0.23                 | ISO 22007-2           |
| Thermal Decomposition Temperature          | °C                         | >300                          | >310                      | TGA Test              |

## 4. Electrical Properties

| Electrical Performance Indicator | Unit | UV Resistant PC (General Grade) | Test Standard |
|----------------------------------|------|---------------------------------|---------------|
| Dielectric Constant (1MHz)       | -    | 3.0-3.2                         | ASTM D150     |
| Dielectric Loss                  | -    | 0.005-0.010                     | ASTM D150     |

|                        |                          |                 |             |
|------------------------|--------------------------|-----------------|-------------|
| Factor (1kHz)          |                          |                 |             |
| Volume Resistivity     | $\Omega \cdot \text{cm}$ | $>10^{16}$      | ASTM D257   |
| Surface Resistivity    | $\Omega/\text{sq}$       | $>10^{15}$      | ASTM D257   |
| Arc Resistance         | sec                      | 120-140         | ASTM D495   |
| Dielectric Strength    | kV/mm                    | 18-22           | IEC 60243-1 |
| Flame Retardant Rating | -                        | UL94 HB (1.6mm) | UL94 Test   |

## 5. Chemical Properties & Environmental Resistance

| Medium Type                         | Corrosion Resistance | Remarks   |
|-------------------------------------|----------------------|---|
| Water & Water Vapor                 | Excellent            | Low water absorption, no dimensional change after long-term contact |
| Weak Acid (pH > 4)                  | Good                 | Stable at room temperature, no obvious corrosion                    |
| Strong Acid (pH < 4)                | Poor                 | Hydrolysis and performance degradation at high temperature          |
| Weak Alkali (pH < 10)               | Good                 | Stable under normal use conditions                                  |
| Strong Alkali (pH > 10)             | Poor                 | Easy to corrode and cause stress cracking                           |
| Alcohol Solvents                    | Excellent            | No swelling, no performance change                                  |
| Ester & Ketone Solvents             | Poor                 | Swelling, softening and cracking may occur                          |
| Aromatic & Chlorinated Hydrocarbons | Poor                 | Dissolution and structural damage                                   |

|                          |           |   |
|--------------------------|-----------|---|
| Mineral Oil & Grease     | Good      | No obvious swelling, suitable for industrial applications                                 |
| UV Radiation (290-400nm) | Excellent | UV stabilizer effectively blocks UV rays, $\Delta YI \leq 3.0$ after 1000h xenon arc test |
| Outdoor Weathering       | Excellent | Service life up to 5-10 years outdoors, far exceeding standard PC                         |

## 6. Processing Properties (Injection Molding & Extrusion)

| Processing Parameter          | Unit    | Injection Molding Grade | Extrusion Sheet Grade | Remarks  |
|-------------------------------|---------|-------------------------|-----------------------|--|
| Barrel Processing Temperature | °C      | 260-290                 | 250-280               | Avoid overheating to prevent UV stabilizer decomposition |
| Mold Temperature              | °C      | 80-100                  | -                     | Improve surface finish and dimensional stability         |
| Melt Flow Index (300°C/1.2kg) | g/10min | 8-25                    | 5-15                  | Stable melt viscosity, suitable for various processing   |
| Injection Pressure            | MPa     | 70-100                  | -                     | Adjust according to product thickness and complexity     |

|                  |     |            |            |   |
|------------------|-----|------------|------------|---|
| Holding Pressure | MPa | 30-50      | -          | Reduce shrinkage and warpage                    |
| Cooling Time     | sec | 20-40      | -          | Extended properly for thick-walled products     |
| Drying Condition | -   | 120°C×4-6h | 120°C×6-8h | Moisture content must be controlled below 0.02% |
| Screw Speed      | rpm | 40-80      | 30-60      | Avoid high shear causing material degradation   |

## 7. Key Quality Indicators of High-Quality UV Resistant PC

- **UV Stability:** Excellent UV resistance,  $\Delta YI \leq 3.0$  after 1000h xenon arc aging test, transmission rate retention  $\geq 90\%$
- **High Transparency:** Transmission rate  $\geq 88\%$  (3mm), haze  $\leq 1.2\%$ , maintaining optical clarity for long-term outdoor use
- **Thermal & Processing Stability:** No obvious yellowing, degradation or performance attenuation during processing
- **Environmental Compliance:** Meet RoHS, REACH standards; free of heavy metals and harmful additives
- **Impact Resistance:** Unnotched impact strength no break at room temperature, excellent toughness retention after aging
- **Dimensional Stability:** Low shrinkage rate (0.5%-0.7%), low warpage, suitable for precision parts

## 8. Common Modified Grades & Typical Applications

| Modified Grade                | Core Performance Improvement                | Typical Applications                    |
|-------------------------------|---|---|
| General Grade UV Resistant PC | Balanced UV resistance, impact strength and | Outdoor lamp covers, electronic display |

|                                   |  |  |
|-----------------------------------|--|--|
|                                   | processability   | housings, safety helmets   |
| High Transparency UV Resistant PC | Ultra-high light transmission ( $\geq 89\%$ ), low haze ( $\leq 0.8\%$ ) | Automotive headlight lenses, optical components, solar panel covers          |
| Flame Retardant UV Resistant PC   | UL94 V-0 grade (1.5mm), excellent UV resistance and fire safety          | Electrical enclosures, outdoor lighting fixtures, building materials         |
| Glass Fiber Reinforced UV PC      | High rigidity, high heat resistance, improved dimensional stability      | Automotive exterior parts, outdoor equipment frames, structural components   |
| High Flow UV Resistant PC         | Good fluidity, suitable for thin-walled and complex parts                | Thin-walled lamp covers, precision electronic components, mobile phone cases |

## Important Notes

1. UV resistant PC must be sufficiently dried before processing, with moisture content controlled below 0.02% to avoid silver streaks, bubbles and other defects caused by moisture.
2. Processing temperature should be strictly controlled between 260-290°C for injection molding and 250-280°C for extrusion. Long-term processing above 300°C should be avoided to prevent thermal decomposition of UV stabilizers and reduction of weather resistance.
3. The UV resistance performance is closely related to the thickness of the product; thicker products generally have better UV protection effect. The thickness should be reasonably designed according to the outdoor service life requirements.
4. UV resistant PC has good chemical resistance, but should avoid long-term contact with strong acids, strong alkalis, esters and ketone solvents to prevent stress cracking and performance degradation.
5. All data listed in this document are typical industrial standard values, which may vary slightly with different formulations, processing equipment and test conditions.
6. Custom grades with specific UV resistance levels, transparency, flame retardancy and processing performance can be developed according to customer requirements.