

ULTEM 1010 Resin



ULTEM™ 1010 resin is a high-performance FDM® thermoplastic that offers excellent strength, thermal stability and the ability to withstand steam autoclaving. ULTEM 1010 resin is available in a general-purpose grade as well as a certified grade (CG) for those customers who want to take advantage of food-contact certification for special applications including food production tools and custom medical applications. ULTEM 1010 resin offers the highest heat resistance, chemical resistance and tensile strength of any FDM thermoplastic and is ideal for aerospace and automotive applications.

| Mechanical Properties ¹ | Test Method | Value | |
|--|-------------|-------------------------------|----------------------------|
| | | XZ Orientation | ZX Orientation |
| Tensile Strength, Yield (Type 1, 0.125", 0.2"/min) | ASTM D638 | 64 MPa (9,300 psi) | 41 MPa (5,990 psi) |
| Tensile Strength, Ultimate (Type 1, 0.125", 0.2"/min) | ASTM D638 | 81 MPa (11,700 psi) | 48 MPa (7,000 psi) |
| Tensile Modulus (Type 1, 0.125", 0.2"/min) | ASTM D638 | 2,770 MPa (402,000 psi) | 2,200 MPa (322,000 psi) |
| Tensile Elongation at Break (Type 1, 0.125", 0.2"/min) | ASTM D638 | 3.3% | 2.0% |
| Tensile Elongation at Yield (Type 1, 0.125", 0.2"/min) | ASTM D638 | 2.2% | 1.5% |
| Flexural Strength (Method 1, 0.05"/min) | ASTM D790 | 144 MPa (21,000 psi) | 77 MPa (11,100 psi) |
| Flexural Modulus (Method 1, 0.05"/min) | ASTM D790 | 2,820 MPa (409,000 psi) | 2,230 MPa (324,000 psi) |
| Flexural Strain at Break (Method 1, 0.05"/min) | ASTM D790 | No break | 3.5% |
| IZOD Impact, notched (Method A, 23 °C) | ASTM D256 | 41 J/m (0.8 ft-lb/in) | 24 J/m (0.4 ft-lb/in) |
| IZOD Impact, un-notched (Method A, 23 °C) | ASTM D256 | 326 J/m (6.1 ft-lb/in) | 138 J/m (2.6 ft-lb/in) |
| Compressive Strength, Yield (Method 1, 0.05"/min) | ASTM D695 | 134 MPa (19,500 psi) | 107 MPa (15,100 psi) |
| Compressive Strength, Ultimate (Method 1, 0.05"/min) | ASTM D695 | No break | 1,125 MPa (15,500 psi) |
| Compressive Modulus (Method 1, 0.05"/min) | ASTM D695 | 10,000 MPa (1,450,000 psi) | 1,120 MPa (305,000 psi) |

| Thermal Properties ¹ | Test Method | Value |
|--|-------------|--------------------------------|
| Heat Deflection (HDT) @ 66 psi, 0.125" | ASTM D648 | 216 °C (421 °F) |
| Heat Deflection (HDT) @ 264 psi, 0.125" | ASTM D648 | 213 °C (415 °F) |
| Vicat Softening Temperature (Rate B/50) | ASTM D1525 | 214 °C (416 °F) |
| Glass Transition Temperature (Tg) | DSC (SSYS) | 215 °C (419 °F) |
| Coefficient of Thermal Expansion | ASTM E831 | 47 µm/(m·°C) 26 µin/(in·°F) |
| Coefficient of Thermal Expansion (xflow) | ASTM E831 | 41 µm/(m·°C) 23 µin/(in·°F) |

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| Electrical Properties | Test Method | Value Range |
|-----------------------|------------------------|---|
| Volume Resistivity | ASTM D257 | 1.0×10^{14} - 8.96×10^{15} ohm-cm |
| Dielectric Constant | ASTM D150-98 | 2.67 |
| Dissipation Factor | ASTM D150-98 | .001 |
| Dielectric Strength | ASTM D149-09, Method A | 240 V/mil |

| Other ² | Test Method | Value |
|--|--------------------------------------|----------------------------|
| Specific Gravity | ASTM D792 | 1.27 |
| Oxygen Index | ASTM D2863 | 0.44 |
| Vertical Burn | FAR 25.853 (Test a (60s), passes at) | 4 seconds |
| OSU Total Heat Release (2 min test, .060" thick) | FAR 25.853 | 35.7 kW min/m ² |
| Food Safety Certification ³ | NSF 51 | Certified |
| Bio-Compatibility Certification ³ | ISO 10993 | Certified |

| Burn Testing | | |
|---------------------------------|-------------------|-------------------------|
| Horizontal Burn (15 sec) | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| Vertical Burn (60 sec) | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| Vertical Burn (12 sec) | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| 45° Ignition | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| Heat Release | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| NBS Smoke Density (flaming) | 14 CFR/FAR 25.853 | Passed (.060" thick) |
| NBS Smoke Density (non-flaming) | 14 CFR/FAR 25.853 | Passed (.060" thick) |

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| System Availability | Layer Thickness Capability | Support Structure | Available Colors |
|----------------------------------|---|-------------------|------------------|
| Fortus 450mc™ Stratasys F900™ | 0.010 inch (0.254 mm) 0.013 inch (0.333 mm) 0.020 inch (0.508 mm) ⁴ | Breakaway | ■ Natural |

The performance characteristics of these materials may vary according to application, operating conditions, or end use. The information presented are typical values intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. End-use material performance can be impacted (+/-) by, but not limited to, part design, end-use conditions, test conditions, etc. Actual values will vary with build conditions. Tested parts were built on Fortus 400mc™ @ 0.010" (0.254 mm) slice. Product specifications are subject to change without notice.

The performance characteristics of these materials may vary according to application, operating conditions, or end use. Each user is responsible for determining that the Stratasys material is safe, lawful, and technically suitable for the intended application, as well as for identifying the proper disposal (or recycling) method consistent with applicable environmental laws and regulations. Stratasys makes no warranties of any kind, express or implied, including, but not limited to, the warranties of merchantability, fitness for a particular use, or warranty against patent infringement.

¹ Build orientation is on side long edge.

² Literature value unless otherwise noted

³ Available for ULTEM 1010 CG (certified grade) canisters.

⁴ Available on the Stratasys F900 only.

Orientation: See Stratasys Testing white paper for more detailed description of build orientations.

- XZ = X or "on edge"
- XY = Y or "flat"
- ZX = or "upright"

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