

ULTEM™ RESIN 1000EF

DESCRIPTION

ULTEM 1000EF Resin is an unreinforced amorphous polyetherimide (PEI) resin that may offer a high glass transition temperature (Tg) of 217°C and global food compliance (FDA, CN, EC). The material has an internal mold release. Features are excellent mechanical, electrical and dimensional properties up to high temperatures. The material may offer very good chemical resistance for an amorphous material and is inherently flame retardant offering UL94 V0 and 5V ratings. The material is RoHS compliant and the natural. The base material is transparent amber colored but is also available in custom colors - transparent and opaque.

ISCC+ certified renewable bio-based solutions are available for this grade via differentiated color nomenclature.

| GENERAL INFORMATION | |
|-----------------------|--|
| Features | Flame Retardant, Chemical Resistance, Good Processability, Hydrolytic Stability, Low Smoke and Toxicity, Amorphous, Low Shrinkage, IR Transparent, UV-C resistant, Sustainable (bio-based offerings), Transparent/Translucent, Food contact, Non halogenated flame retardant, Electroplatable, Enhanced mold release, Creep resistant, Dimensional stability, High stiffness/Strength, High temperature resistance |
| Fillers | Unreinforced |
| Polymer Types | Polyetherimide (PEI) |
| Processing Techniques | Additive manufacturing, Extrusion Blow Molding, Film Extrusion, Injection Molding, Profile Extrusion, Extrusion, Extrusion compounding, Compression molding, Injection compression molding, Foam Extrusion |
| Regional Availability | Europe, Asia, Americas |

| INDUSTRY | SUB INDUSTRY |
|----------------------------|---|
| Automotive | Heavy Truck, Automotive Under the Hood, Aerospace, Motorcycle, Recreational/Specialty Vehicles |
| Building and Construction | Building Component, Water Management |
| Consumer | Consumer Goods, Sport/Leisure, Personal Accessory, Home Appliances, Commercial Appliance, Furniture |
| Electrical and Electronics | Energy Management, Drone Solutions, Mobile Phone - Computer - Tablets, Circuit Boards/Additives, Lighting, Printer Copier, Speaker - Earphone, Wireless Communication |
| Hygiene and Healthcare | Personal and Professional Hygiene, Pharmaceutical Packaging and Drug Delivery, Surgical devices, General Healthcare, Patient Testing |
| Industrial | Electrical, Material Handling, Textile, Eyewear |
| Mass Transportation | Rail |
| Packaging | Industrial Packaging |

TYPICAL PROPERTY VALUES

Revision 20231109

| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|--|----------------|-------|--------------|
| MECHANICAL ⁽¹⁾ | | | |
| Tensile Stress, yield, 50 mm/min | 110 | MPa | ISO 527 |
| Tensile Strain, yield, 50 mm/min | 6 | % | ISO 527 |
| Tensile Strain, break, 50 mm/min | 50 | % | ISO 527 |
| Tensile Modulus, 1 mm/min | 3200 | MPa | ISO 527 |
| Flexural Stress, yield, 2 mm/min | 160 | MPa | ISO 178 |
| Flexural Modulus, 2 mm/min | 3300 | MPa | ISO 178 |
| Ball Indentation Hardness, H358/30 | 140 | MPa | ISO 2039-1 |
| Hardness, Rockwell M | 106 | - | ISO 2039-2 |
| Tensile Stress, yld, Type I, 50 mm/min | 115 | MPa | ASTM D638 |

| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|----------------|-------------------|----------------|
| Tensile Strain, yld, Type I, 50 mm/min | 7 | % | ASTM D638 |
| Tensile Strain, brk, Type I, 50 mm/min | 60 | % | ASTM D638 |
| Tensile Stress, yld, Type I, 5 mm/min | 110 | MPa | ASTM D638 |
| Tensile Strain, yld, Type I, 5 mm/min | 7 | % | ASTM D638 |
| Tensile Strain, brk, Type I, 5 mm/min | 60 | % | ASTM D638 |
| Tensile Modulus, 5 mm/min | 3350 | MPa | ASTM D638 |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 165 | MPa | ASTM D790 |
| Flexural Modulus, 1.3 mm/min, 50 mm span | 3200 | MPa | ASTM D790 |
| Flexural Stress, yld, 2.6 mm/min, 100 mm span | 160 | MPa | ASTM D790 |
| Flexural Modulus, 2.6 mm/min, 100 mm span | 3400 | MPa | ASTM D790 |
| Hardness, Rockwell M | 109 | - | ASTM D785 |
| Taber Abrasion, CS-17, 1 kg | 10 | mg/1000cy | ASTM D1044 |
| IMPACT ⁽¹⁾ | | | |
| Izod Impact, unnotched 80*10*4 +23°C | NB | kJ/m ² | ISO 180/1U |
| Izod Impact, unnotched 80*10*4 -30°C | NB | kJ/m ² | ISO 180/1U |
| Izod Impact, notched 80*10*4 +23°C | 6 | kJ/m ² | ISO 180/1A |
| Izod Impact, notched 80*10*4 -30°C | 6 | kJ/m ² | ISO 180/1A |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm | 4 | kJ/m ² | ISO 179/1eA |
| Charpy -30°C, V-notch Edgew 80*10*4 sp=62mm | 4 | kJ/m ² | ISO 179/1eA |
| Izod Impact, unnotched, 23°C | 1800 | J/m | ASTM D4812 |
| Izod Impact, unnotched, -30°C | 1540 | J/m | ASTM D4812 |
| Izod Impact, notched, 23°C | 53 | J/m | ASTM D256 |
| Izod Impact, notched, -30°C | 50 | J/m | ASTM D256 |
| Izod Impact, Reverse Notched, 3.2 mm | 1335 | J/m | ASTM D256 |
| Gardner, 23°C | 36 | J | ASTM D3029 |
| THERMAL ⁽¹⁾ | | | |
| HDT/Bf, 0.45 MPa Flatw 80*10*4 sp=64mm | 209 | °C | ISO 75/Bf |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm | 192 | °C | ISO 75/Af |
| Vicat Softening Temp, Rate A/50 | 215 | °C | ISO 306 |
| Vicat Softening Temp, Rate B/50 | 211 | °C | ISO 306 |
| Vicat Softening Temp, Rate B/120 | 212 | °C | ISO 306 |
| CTE, -40°C to 150°C, flow | 5.2E-05 | 1/°C | ISO 11359-2 |
| CTE, -40°C to 150°C, xflow | 5.2E-05 | 1/°C | ISO 11359-2 |
| Ball Pressure Test, 125°C +/- 2°C | PASS | - | IEC 60695-10-2 |
| Thermal Conductivity | 0.22 | W/m·°C | ISO 8302 |
| HDT, 0.45 MPa, 6.4 mm, unannealed | 210 | °C | ASTM D648 |
| HDT, 1.82 MPa, 6.4 mm, unannealed | 201 | °C | ASTM D648 |
| HDT, 0.45 MPa, 3.2 mm, unannealed | 207 | °C | ASTM D648 |
| HDT, 1.82 MPa, 3.2mm, unannealed | 190 | °C | ASTM D648 |
| Vicat Softening Temp, Rate B/50 | 211 | °C | ASTM D1525 |
| CTE, -20°C to 150°C, flow | 5.2E-05 | 1/°C | ASTM E831 |
| CTE, -20°C to 150°C, xflow | 5.2E-05 | 1/°C | ASTM E831 |
| Thermal Conductivity | 0.22 | W/m·°C | ASTM C177 |
| PHYSICAL ⁽¹⁾ | | | |
| Density | 1.27 | g/cm ³ | ISO 1183 |

| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|--|----------------|-------------------------|--------------|
| Moisture Absorption, (23°C/50% RH/24hrs) | 0.2 | % | ISO 62-4 |
| Moisture Absorption, (23°C/50% RH/Equilibrium) | 0.7 | % | ISO 62-4 |
| Water Absorption, (23°C/24hrs) | 0.25 | % | ISO 62-1 |
| Water Absorption, (23°C/saturated) | 1.25 | % | ISO 62-1 |
| Melt Volume Rate, MVR at 360°C/5.0 kg | 13 | cm ³ /10 min | ISO 1133 |
| Specific Gravity | 1.27 | - | ASTM D792 |
| Water Absorption, (23°C/24hrs) | 0.25 | % | ASTM D570 |
| Water Absorption, (23°C/Saturated) | 1.25 | % | ASTM D570 |
| Melt Flow Rate, 337°C/6.6 kgf | 9 | g/10 min | ASTM D1238 |
| Poisson's Ratio | 0.36 | - | ASTM E132 |
| Mold Shrinkage, flow, 3.2 mm ⁽²⁾ | 0.5 – 0.7 | % | SABIC method |
| Mold Shrinkage, xflow, 3.2 mm ⁽²⁾ | 0.5 – 0.7 | % | SABIC method |
| INJECTION MOLDING ⁽³⁾ | | | |
| Drying Temperature | 150 | °C | |
| Drying Time | 4 – 6 | Hrs | |
| Drying Time (Cumulative) | 24 | Hrs | |
| Maximum Moisture Content | 0.02 | % | |
| Melt Temperature | 350 – 410 | °C | |
| Nozzle Temperature | 345 – 405 | °C | |
| Front - Zone 3 Temperature | 345 – 415 | °C | |
| Middle - Zone 2 Temperature | 340 – 405 | °C | |
| Rear - Zone 1 Temperature | 330 – 400 | °C | |
| Mold Temperature | 135 – 180 | °C | |
| Back Pressure | 0.3 – 0.7 | MPa | |
| Screw speed (Circumferential speed) | 0.2 – 0.3 | m/s | |
| Shot to Cylinder Size | 40 – 60 | % | |
| Vent Depth | 0.025 – 0.076 | mm | |
| EXTRUSION BLOW MOLDING | | | |
| Drying Temperature | 140 – 150 | °C | |
| Drying Time | 4 – 6 | Hrs | |
| Drying Time (Cumulative) | 24 | Hrs | |
| Maximum Moisture Content | 0.01 – 0.02 | % | |
| Melt Temperature (Parison) | 320 – 355 | °C | |
| Barrel - Zone 1 Temperature | 325 – 350 | °C | |
| Barrel - Zone 2 Temperature | 330 – 355 | °C | |
| Barrel - Zone 3 Temperature | 330 – 355 | °C | |
| Barrel - Zone 4 Temperature | 330 – 355 | °C | |
| Adapter - Zone 5 Temperature | 330 – 355 | °C | |
| Head - Zone 6 - Top Temperature | 330 – 355 | °C | |
| Head - Zone 7 - Bottom Temperature | 330 – 355 | °C | |
| Screw Speed | 10 – 70 | rpm | |
| Mold Temperature | 65 – 175 | °C | |
| Die Temperature | 325 – 355 | °C | |

- (1) The information stated on Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.
- (2) Measurements made from laboratory test coupon. Actual shrinkage may vary outside of range due to differences in processing conditions, equipment, part geometry and tool design. It is recommended that mold shrinkage studies be performed with surrogate or legacy tooling prior to cutting tools for new molded article.
- (3) Injection Molding parameters are only mentioned as general guidelines. These may not apply or may need adjustment in specific situations such as low shot sizes, large part molding, thin wall molding and gas-assist molding.

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