# ULTEM™ Resin HU1000E

## DESCRIPTION

ULTEM HU1000E resin is an unreinforced amorphous polyetherimide (PEI) resin that may a high glass transition temperature (Tg) of 217°C. The material contains an internal mold release. The intended use for this material is in medical devices and pharmaceutical applications. The material is biocompatible (ISO 10993 or USP Class VI) and Healthcare management of change applies. The material may offer Steam-, Hydrogen Peroxide-, Gamma-, EtO-, UV-C- and E-beam resistance for repeated sterilization cycles. 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. The base material is transparent amber colored but is also available in custom colors - transparent and opaque.

This material is food contact compliant in most jurisdictions – exceptions may exist, request a declaration for details.

| GENERAL INFORMATION | |
|---|---|
| **Features** | Flame Retardant, Chemical Resistance, Good Processability, High Flow, Hydrolytic Stability, Low Warpage, Amorphous, Low Shrinkage, IR Transparent, Low Moisture Absorption, UV-C resistant, Bio-Renewable, Transparent/Translucent, Biocompatability-ISO10993, Food contact, Healthcare/Formula lock, Non Cl/Br flame retardant, Non halogenated flame retardant, Enhanced mold release, Autoclave/Steam sterilizable, Creep resistant, Dimensional stability, High stiffness/Strength, High temperature resistance, Sterilizable, No PFAS intentionally added, Additive Manufacturing |
| **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 |

| INDUSTRY | SUB INDUSTRY |
|---|---|
| Hygiene and Healthcare | Pharmaceutical Packaging and Drug Delivery, Surgical devices, General Healthcare, Patient Testing |

## TYPICAL PROPERTY VALUES

Revision 20260507

| 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 |
| **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 |

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| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| 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/m² | ISO 180/1U |
| 80*10*4 -30°C | NB | kJ/m² | ISO 180/1U |
| 23°C | 1800 | J/m | ASTM D4812 |
| -30°C | 1540 | J/m | ASTM D4812 |
| Izod impact, notched | | | |
| 80*10*4 +23°C | 6 | kJ/m² | ISO 180/1A |
| 80*10*4 -30°C | 6 | kJ/m² | ISO 180/1A |
| 23°C | 53 | J/m | ASTM D256 |
| -30°C | 50 | J/m | ASTM D256 |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm | 4 | kJ/m² | ISO 179/1eA |
| Charpy -30°C, V-notch Edgew 80*10*4 sp=62mm | 4 | kJ/m² | ISO 179/1eA |
| 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/cm³ | ISO 1183 |
| 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 | | | |
| 360°C/5.0 kg | 13 | cm³/10 min | ISO 1133 |

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| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| **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 |
| **ELECTRICAL** [1] | | | |
| **Volume Resistivity** | 1.E+15 | Ω.cm | IEC 60093 |
| **Surface Resistivity, ROA** | >1.E+15 | Ω | IEC 60093 |
| **Dielectric Strength, in oil, 0.8 mm** | 33 | kV/mm | IEC 60243-1 |
| **Dielectric Strength, in oil, 1.6 mm** | 25 | kV/mm | IEC 60243-1 |
| **Dielectric Strength, in oil, 3.2 mm** | 16 | kV/mm | IEC 60243-1 |
| **Relative Permittivity, 1 MHz** | 2.9 | - | IEC 60250 |
| **Dissipation Factor** | | | |
| 50/60 Hz | 0.0005 | - | IEC 60250 |
| 1 MHz | 0.006 | - | IEC 60250 |
| 1.1 GHz [3] | 0.0012 | - | - |
| 5 GHz [3] | 0.0024 | - | - |
| 10 GHz [3] | 0.0027 | - | - |
| 100 Hz | 0.0015 | - | ASTM D150 |
| 1 kHz | 0.0012 | - | ASTM D150 |
| **Relative Permittivity, 50/60 Hz** | 2.9 | - | IEC 60250 |
| **Dielectric Constant** | | | |
| 1.1 GHz [3] | 3.01 | - | - |
| 5 GHz [3] | 3.02 | - | - |
| 10 GHz [3] | 3.02 | - | - |
| **Comparative Tracking Index** [4] | 150 | V | IEC 60112 |
| **Comparative Tracking Index, M** [4] | 100 | V | IEC 60112 |
| **Volume Resistivity** | 1.E+17 | Ω.cm | ASTM D257 |
| **Dielectric Strength, in air, 1.6 mm** | 32.7 | kV/mm | ASTM D149 |
| **Dielectric Strength, in oil, 1.6 mm** | 28.0 | kV/mm | ASTM D149 |
| **Dielectric Strength, in oil, 3.2 mm** | 19.7 | kV/mm | ASTM D149 |
| **Relative Permittivity, 100 Hz** | 3.15 | - | ASTM D150 |
| **Relative Permittivity, 1 kHz** | 3.15 | - | ASTM D150 |
| **INJECTION MOLDING** [5] | | | |
| **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 | |

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| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| 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) Based on SPDR testing technique on dry as molded specimens.

(4) Value shown here is based on internal measurement.

(5) 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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