

# ULTEM™ RESIN 1000

REGION AMERICAS

## DESCRIPTION

ULTEM 1000 resin is an amorphous, transparent polyetherimide (PEI) plastic offering a glass transition temperature (T<sub>g</sub>) of 217°C. This inherently flame retardant resin has UL94 V0, V2 and 5VA ratings and is RoHS compliant. ULTEM 1000 resin is an unreinforced general purpose grade offering high heat resistance, high strength and modulus and broad chemical resistance up to high temperatures.

## TYPICAL PROPERTY VALUES

Revision 20170913

| PROPERTIES                                    | TYPICAL VALUES | UNITS     | TEST METHODS |
|---|----------------|-----------|--------------|
| <b>MECHANICAL</b>                             |                |           |              |
| Tensile Stress, yld, Type I, 5 mm/min         | 110            | MPa       | ASTM D 638   |
| Tensile Strain, yld, Type I, 5 mm/min         | 7              | %         | ASTM D 638   |
| Tensile Strain, brk, Type I, 5 mm/min         | 60             | %         | ASTM D 638   |
| Tensile Modulus, 5 mm/min                     | 3580           | MPa       | ASTM D 638   |
| Flexural Stress, yld, 2.6 mm/min, 100 mm span | 165            | MPa       | ASTM D 790   |
| Flexural Modulus, 2.6 mm/min, 100 mm span     | 3510           | MPa       | ASTM D 790   |
| Hardness, Rockwell M                          | 109            | -         | ASTM D 785   |
| Taber Abrasion, CS-17, 1 kg                   | 10             | mg/1000cy | ASTM D 1044  |
| <b>IMPACT</b>                                 |                |           |              |
| Izod Impact, unnotched, 23°C                  | 1335           | J/m       | ASTM D 4812  |
| Izod Impact, notched, 23°C                    | 53             | J/m       | ASTM D 256   |
| Izod Impact, Reverse Notched, 3.2 mm          | 1335           | J/m       | ASTM D 256   |
| Gardner, 23°C                                 | 36             | J         | ASTM D 3029  |
| <b>THERMAL</b>                                |                |           |              |
| Vicat Softening Temp, Rate B/50               | 218            | °C        | ASTM D 1525  |
| HDT, 0.45 MPa, 6.4 mm, unannealed             | 210            | °C        | ASTM D 648   |
| HDT, 1.82 MPa, 6.4 mm, unannealed             | 201            | °C        | ASTM D 648   |
| CTE, -20°C to 150°C, flow                     | 5.58E-05       | 1/°C      | ASTM E 831   |
| CTE, -20°C to 150°C, xflow                    | 5.4E-05        | 1/°C      | ASTM E 831   |
| Thermal Conductivity                          | 0.22           | W/m-°C    | ASTM C177    |
| Relative Temp Index, Elec                     | 170            | °C        | UL 746B      |
| Relative Temp Index, Mech w/impact            | 170            | °C        | UL 746B      |
| Relative Temp Index, Mech w/o impact          | 170            | °C        | UL 746B      |
| <b>PHYSICAL</b>                               |                |           |              |
| Specific Gravity                              | 1.27           | -         | ASTM D 792   |

| PROPERTIES                                  | TYPICAL VALUES | UNITS    | TEST METHODS |
|---|----------------|----------|--------------|
| Water Absorption, 24 hours                  | 0.25           | %        | ASTM D 570   |
| Water Absorption, equilibrium, 23C          | 1.25           | %        | ASTM D 570   |
| Mold Shrinkage, flow, 3.2 mm (5)            | 0.5 – 0.7      | %        | SABIC method |
| Melt Flow Rate, 337°C/6.6 kgf               | 9              | g/10 min | ASTM D 1238  |
| Poisson's Ratio                             | 0.36           | -        | ASTM E 132   |
| <b>ELECTRICAL</b>                           |                |          |              |
| Volume Resistivity                          | 1.E+17         | Ohm-cm   | ASTM D 257   |
| Dielectric Strength, in air, 1.6 mm         | 32.7           | kV/mm    | ASTM D 149   |
| Dielectric Strength, in oil, 1.6 mm         | 27.9           | kV/mm    | ASTM D 149   |
| Dielectric Strength, in oil, 3.2 mm         | 19.6           | kV/mm    | ASTM D 149   |
| Relative Permittivity, 100 Hz               | 3.15           | -        | ASTM D 150   |
| Relative Permittivity, 1 kHz                | 3.15           | -        | ASTM D 150   |
| Dissipation Factor, 100 Hz                  | 0.0015         | -        | ASTM D 150   |
| Dissipation Factor, 1 kHz                   | 0.0012         | -        | ASTM D 150   |
| Dissipation Factor, 2450 MHz                | 0.0025         | -        | ASTM D 150   |
| Arc Resistance, Tungsten {PLC}              | 5              | PLC Code | ASTM D 495   |
| Hot Wire Ignition {PLC}                     | 1              | PLC Code | UL 746A      |
| High Voltage Arc Track Rate {PLC}           | 2              | PLC Code | UL 746A      |
| High Ampere Arc Ign, surface {PLC}          | 3              | PLC Code | UL 746A      |
| Comparative Tracking Index (UL) {PLC}       | 4              | PLC Code | UL 746A      |
| <b>FLAME CHARACTERISTICS</b>                |                |          |              |
| UL Recognized, 94V-2 Flame Class Rating (3) | 0.4            | mm       | UL 94        |
| UL Recognized, 94V-0 Flame Class Rating (3) | 0.75           | mm       | UL 94        |
| UL Recognized, 94-5VA Rating (3)            | 3              | mm       | UL 94        |
| Oxygen Index (LOI)                          | 47             | %        | ASTM D 2863  |
| NBS Smoke Density, Flaming, Ds 4 min        | 0.7            | -        | ASTM E 662   |
| <b>INJECTION MOLDING</b>                    |                |          |              |
| Drying Temperature                          | 150            | °C       |              |
| Drying Time                                 | 4 – 6          | hrs      |              |
| Drying Time (Cumulative)                    | 24             | hrs      |              |
| Maximum Moisture Content                    | 0.02           | %        |              |
| Melt Temperature                            | 350 – 400      | °C       |              |
| Nozzle Temperature                          | 345 – 400      | °C       |              |
| Front - Zone 3 Temperature                  | 345 – 400      | °C       |              |
| Middle - Zone 2 Temperature                 | 340 – 400      | °C       |              |
| Rear - Zone 1 Temperature                   | 330 – 400      | °C       |              |
| Mold Temperature                            | 135 – 165      | °C       |              |
| Back Pressure                               | 0.3 – 0.7      | MPa      |              |

| PROPERTIES                         | TYPICAL VALUES | UNITS | TEST METHODS |
|------------------------------------|----------------|-------|--------------|
| Screw Speed                        | 40 – 70        | rpm   |              |
| Shot to Cylinder Size              | 40 – 60        | %     |              |
| Vent Depth                         | 0.025 – 0.076  | mm    |              |
| <b>EXTRUSION BLOW MOLDING</b>      |                |       |              |
| 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    |              |

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