

# ULTEM™ RESIN 1010TC

REGION ASIA

## DESCRIPTION

ULTEM™ 1010TC resin is an amorphous, transparent polyetherimide (PEI) plastic offering a glass transition temperature (T<sub>g</sub>) of 217°C, with UL94 V0 and 5VA ratings offering high heat resistance and infrared transmission.

## 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 Stress, brk, Type I, 5 mm/min        | 105            | 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, 1.3 mm/min, 50 mm span | 174            | MPa               | ASTM D 790   |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 3420           | MPa               | ASTM D 790   |
| Hardness, Rockwell M                         | 109            | -                 | ASTM D 785   |
| Taber Abrasion, CS-17, 1 kg                  | 10             | mg/1000cy         | ASTM D 1044  |
| Tensile Stress, yield, 5 mm/min              | 105            | MPa               | ISO 527      |
| Tensile Stress, break, 5 mm/min              | 85             | MPa               | ISO 527      |
| Tensile Strain, yield, 5 mm/min              | 6              | %                 | ISO 527      |
| Tensile Strain, break, 5 mm/min              | 60             | %                 | 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      |
| <b>IMPACT</b>                                |                |                   |              |
| Izod Impact, unnotched, 23°C                 | 1335           | J/m               | ASTM D 4812  |
| Izod Impact, notched, 23°C                   | 32             | J/m               | ASTM D 256   |
| Izod Impact, notched, -30°C                  | 35             | J/m               | ASTM D 256   |
| Izod Impact, Reverse Notched, 3.2 mm         | 1174           | J/m               | ASTM D 256   |
| Gardner, 23°C                                | 33             | J                 | ASTM D 3029  |
| Instrumented Impact Total Energy, 23°C       | 33             | J                 | ASTM D 3763  |
| Izod Impact, notched 80*10*4 +23°C           | 5              | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80*10*4 -30°C           | 5              | kJ/m <sup>2</sup> | ISO 180/1A   |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm   | 3              | kJ/m <sup>2</sup> | ISO 179/1eA  |
| <b>THERMAL</b>                               |                |                   |              |

| PROPERTIES                                  | TYPICAL VALUES | UNITS                   | TEST METHODS |
|---|----------------|-------------------------|--------------|
| Vicat Softening Temp, Rate B/50             | 218            | °C                      | ASTM D 1525  |
| HDT, 0.45 MPa, 6.4 mm, unannealed           | 207            | °C                      | ASTM D 648   |
| HDT, 1.82 MPa, 6.4 mm, unannealed           | 198            | °C                      | ASTM D 648   |
| CTE, -40°C to 40°C, xflow                   | 5.E-05         | 1/°C                    | ASTM E 831   |
| CTE, -20°C to 150°C, flow                   | 5.58E-05       | 1/°C                    | ASTM E 831   |
| Thermal Conductivity                        | 0.22           | W/m-°C                  | ASTM C177    |
| CTE, -40°C to 40°C, flow                    | 5.E-05         | 1/°C                    | ISO 11359-2  |
| CTE, -40°C to 40°C, xflow                   | 5.E-05         | 1/°C                    | ISO 11359-2  |
| Vicat Softening Temp, Rate B/50             | 211            | °C                      | ISO 306      |
| Vicat Softening Temp, Rate B/120            | 212            | °C                      | ISO 306      |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm       | 193            | °C                      | ISO 75/Af    |
| 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   |
| 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               | 17.8           | g/10 min                | ASTM D 1238  |
| Density                                     | 1.27           | g/cm <sup>3</sup>       | ISO 1183     |
| Water Absorption, (23°C/sat)                | 1.25           | %                       | ISO 62       |
| Moisture Absorption (23°C / 50% RH)         | 0.7            | %                       | ISO 62       |
| Melt Volume Rate, MVR at 220°C/5.0 kg       | 25             | cm <sup>3</sup> /10 min | ISO 1133     |
| <b>ELECTRICAL</b>                           |                |                         |              |
| Volume Resistivity                          | 1.E+17         | Ohm-cm                  | ASTM D 257   |
| Dielectric Strength, in air, 1.6 mm         | 32.6           | kV/mm                   | ASTM D 149   |
| Dielectric Strength, in oil, 1.6 mm         | 27.9           | kV/mm                   | ASTM D 149   |
| Relative Permittivity, 1 kHz                | 3.15           | -                       | ASTM D 150   |
| Dissipation Factor, 1 kHz                   | 0.0013         | -                       | 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-0 Flame Class Rating (3) | 1.5            | mm                      | UL 94        |

| PROPERTIES                           | TYPICAL VALUES | UNITS | TEST METHODS |
|--------------------------------------|----------------|-------|--------------|
| UL Recognized, 94-5VA Rating (3)     | 3              | mm    | UL 94        |
| Oxygen Index (LOI)                   | 44             | %     | ASTM D 2863  |
| NBS Smoke Density, Flaming, Ds 4 min | 2              | -     | 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   |              |
| Screw Speed                          | 40 – 70        | rpm   |              |
| Shot to Cylinder Size                | 40 – 60        | %     |              |
| Vent Depth                           | 0.025 – 0.076  | mm    |              |

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