

**TYPICAL PROPERTIES OF POLYPHENYLENE ETHER (PPE) RESINS**

| ASTM or UL Test | Property  | Standard         | Glass Reinforced | Extrusion        | Platable |
|-----------------|---|------------------|------------------|------------------|----------|
| PHYSICAL        |   |                  |                  |                  |          |
| D792            | <b>Specific gravity</b>   | 1.06-1.10        | 1.21-1.36        | 1.06-1.10        | 1.05     |
| D792            | <b>Specific volume</b> (in <sup>3</sup> /lb)                        | 25.2-26.2        | 20.4-22.9        | 25.2-26.2        | —        |
| D570            | <b>Water absorption</b> , 24 h, 1/8-in thk (%)                      | 0.07             | 0.07             | 0.07             | 0.07     |
| MECHANICAL      |   |                  |                  |                  |          |
| D638            | <b>Tensile strength</b> (psi)                                       | 7,000-9,600      | 14,500-17,800    | 7,800-11,000     | 7,000    |
| D638            | <b>Elongation</b> (%)   | 50-60            | 4.6              | 15-60            | 60       |
| D638            | <b>Tensile modulus</b> (10 <sup>5</sup> psi)                        | 3.55-3.80        | 9.25-1.2         | 3.55-3.80        | —        |
| D790            | <b>Flexural strength</b> (psi)                                      | 8,200-15,000     | 18,500-20,000    | 12,800-16,000    | 9,800    |
| D790            | <b>Flexural modulus</b> (10 <sup>5</sup> psi)                       | 3.0-3.6          | 7.5-11           | 3.6              | 3.0      |
| D256            | <b>Impact strength</b> , Izod (ft-lb/in of notch)                   | 5.0-10.0         | 2.3              | 3.10             | 5.0      |
| D671            | <b>Fatigue endurance limit</b> , 2x10 <sup>6</sup> cycles (psi)     | 1,850-2,500      | 4,000-5,000      | 1,850-2,500      | —        |
| D785            | <b>Hardness</b> , Rockwell  | R115-119         | L106-108         | R115-119         | —        |
| THERMAL         |   |                  |                  |                  |          |
| C177            | <b>Thermal conductivity</b> (Btu-in/hr-ft <sup>2</sup> -°F)         | 1.50             | 1.10             | 1.50             | —        |
| D696            | <b>Coefficient of thermal expansion</b> (10 <sup>-5</sup> in/in-°C) | 3.3-3.8          | 1.4-2.0          | 3.3-3.8          | 3.5      |
| D648            | <b>Deflection temperature</b> (°F)                                  |                  |                  |                  |          |
|                 | At 264 psi  | 190-300          | 270-300          | 185-300          | 235      |
|                 | At 66 psi   | 220-315          | 280-317          | 230-315          | —        |
| UL 94           | <b>Flammability class</b>   | HB, V-1, V-0     | HB, V-1          | HB-V-1, V-0      | HB       |
| ELECTRICAL      |   |                  |                  |                  |          |
| D149            | <b>Dielectric strength</b> (V/mil)                                  |                  |                  |                  |          |
|                 | Short time, 1/8-in thk  | 400-630          | 420-600          | 400-550          | —        |
| D150            | <b>Dielectric constant</b>  |                  |                  |                  |          |
|                 | At 1 MHz  | 2.64-2.68        | 2.85-3.11        | 2.64-2.68        | —        |
| D150            | <b>Dissipation factor</b>   |                  |                  |                  |          |
|                 | At 1 MHz  | 0.0009-0.0024    | 0.0014-0.0021    | 0.0009-0.0047    | —        |
| D257            | <b>Volume resistivity</b> (ohm-cm)                                  |                  |                  |                  |          |
|                 | At 73°F, 50% RH   | 10 <sup>17</sup> | 10 <sup>17</sup> | 10 <sup>17</sup> | —        |
| D495            | <b>Arc resistance</b> (s)   | 75               | 70-120           | 75               | —        |

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| ISO or UL Test | Property   | Standard         | Glass Reinforced | Extrusion        | Platable |
|----------------|--|------------------|------------------|------------------|----------|
| PHYSICAL       |  |                  |                  |                  |          |
| ISO1183        | Specific gravity   | 1.06-1.10        | 1.21-1.36        | 1.06-1.10        | 1.05     |
| ISO1183        | Specific volume (cm <sup>3</sup> /g)                       | 0.907-0.943      | 0.734-0.824      | 0.907-0.943      | —        |
| ISO62          | Water absorption, 24 h, 3.1 mm thk (%)                     | 0.07             | 0.07             | 0.07             | 0.07     |
| MECHANICAL     |  |                  |                  |                  |          |
| ISO527         | Tensile strength (MPa)                                     | 48.26-66.19      | 100.0-122.7      | 53.78-75.8       | 48.26    |
| ISO527         | Elongation (%)   | 50-60            | 4.6              | 15-60            | 60       |
| ISO527         | Tensile modulus (10 <sup>3</sup> MPa)                      | 2.45-2.62        | 6.37-8.27        | 2.45-2.62        | —        |
| ISO178         | Flexural strength (MPa)                                    | 56.54-103.42     | 127.55-137.90    | 88.25-110.32     | 67.57    |
| ISO178         | Flexural modulus (10 <sup>3</sup> MPa)                     | 2.07-2.48        | 5.17-7.58        | 2.48             | 2.07     |
| ISO180         | Notched Izod impact strength (J/m)                         | 267-534          | 123              | 165              | 267      |
| ASTM D671      | Fatigue endurance limit, 2x10 <sup>6</sup> cycles (bar)    | 127-170          | 275-344          | 127-170          | —        |
| ISO2039        | Hardness, Rockwell   | R115-119         | L106-108         | R115-119         | —        |
| THERMAL        |  |                  |                  |                  |          |
| ISO8302        | Thermal conductivity (W/mK)                                | —                | —                | —                | —        |
| ISO11359       | Coefficient of thermal expansion (10 <sup>-4</sup> m/m-°C) | 0.59-0.68        | 0.25-0.36        | 0.59-0.68        | 0.63     |
| ISO75          | Deflection temperature (°C)                                |                  |                  |                  |          |
|                | At 1.80 MPa  | 88-149           | 132-149          | 85-149           | 113      |
|                | At 0.45 MPa  | 104-157          | 138-158          | 110-157          | —        |
| UL 94          | Flammability class   | HB, V-1, V-0     | HB, V-1          | HB-V-1, V-0      | HB       |
| ELECTRICAL     |  |                  |                  |                  |          |
| IEC243         | Dielectric strength (kV/mm)                                |                  |                  |                  |          |
|                | Short time, 3.1 mm thk                                     | 15.7-24.8        | 16.5-23.6        | 15.7-21.6        | —        |
| IEC250         | Dielectric constant  |                  |                  |                  |          |
|                | At 1 MHz   | 2.64-2.68        | 2.85-3.11        | 2.64-2.68        | —        |
| IEC250         | Dissipation factor   |                  |                  |                  |          |
|                | At 1 MHz   | 0.0009-0.0024    | 0.0014-0.0021    | 0.0009-0.0047    | —        |
| IEC93          | Volume resistivity (ohm-cm)                                |                  |                  |                  |          |
|                | At 23°C, 50% RH  | 10 <sup>17</sup> | 10 <sup>17</sup> | 10 <sup>17</sup> | —        |
| ASTM D495      | Arc resistance (s)   | 75               | 70-120           | 75               | —        |