



# Ryton<sup>®</sup> R-4

## polyphenylene sulfide

Ryton<sup>®</sup> R-4 and R-4-02 40% glass fiber reinforced polyphenylene sulfide compounds provide a good combination of mechanical and electrical properties with

outstanding chemical resistance, even at elevated temperatures.

### General

|                           |  |
|---------------------------|--|
| Material Status           | • Commercial: Active   |
| Availability              | • Asia Pacific<br>• Europe<br>• Latin America<br>• North America |
| Filler / Reinforcement    | • Glass Fiber, 40% Filler by Weight                              |
| Features                  | • Chemical Resistant<br>• Good Electrical Properties             |
| Uses                      | • Automotive Applications  |
| RoHS Compliance           | • RoHS Compliant   |
| Automotive Specifications | • FORD ESF-M4D388-A3   |
| Appearance                | • Natural Color  |
| Forms                     | • Pellets  |
| Processing Method         | • Injection Molding  |

### Physical

|                                | Typical Value | Unit | Test method |
|--------------------------------|---------------|------|-------------|
| Density / Specific Gravity     | 1.69          |      | ASTM D792   |
| Molding Shrinkage              |               |      |             |
| Flow : 3.20 mm                 | 0.20          | %    |             |
| Across Flow : 3.20 mm          | 0.50          | %    |             |
| Water Absorption (24 hr, 23°C) | 0.020         | %    | ASTM D570   |

### Mechanical

|                      | Typical Value | Unit | Test method |
|----------------------|---------------|------|-------------|
| Tensile Strength     |               |      |             |
| --                   | 159           | MPa  | ASTM D638   |
| --                   | 150           | MPa  | ISO 527-2   |
| Tensile Elongation   |               |      |             |
| Break                | 1.1           | %    | ASTM D638   |
| Break                | 1.2           | %    | ISO 527-2   |
| Flexural Modulus     |               |      |             |
| --                   | 14500         | MPa  | ASTM D790   |
| --                   | 14000         | MPa  | ISO 178     |
| Flexural Strength    |               |      |             |
| --                   | 221           | MPa  | ASTM D790   |
| --                   | 220           | MPa  | ISO 178     |
| Compressive Strength | 270           | MPa  | ASTM D695   |
| Poisson's Ratio      | 0.38          |      |             |

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| Impact                                    | Typical Value | Unit              | Test method |
|---|---------------|-------------------|-------------|
| Notched Izod Impact                       |               |                   |             |
| 3.18 mm                                   | 91            | J/m               | ASTM D256   |
| --  | 9.0           | kJ/m <sup>2</sup> | ISO 180/A   |
| Unnotched Izod Impact                     |               |                   |             |
| 3.18 mm                                   | 400           | J/m               | ASTM D4812  |
| --  | 25            | kJ/m <sup>2</sup> | ISO 180     |
| Hardness                                  | Typical Value | Unit              | Test method |
| Rockwell Hardness                         |               |                   | ASTM D785   |
| M-Scale                                   | 104           |                   |             |
| R-Scale                                   | 122           |                   |             |
| Thermal                                   | Typical Value | Unit              | Test method |
| Deflection Temperature Under Load         |               |                   | ASTM D648   |
| 1.8 MPa, Unannealed                       | 265           | °C                |             |
| CLTE                                      |               |                   | ASTM E831   |
| Flow : -50 to 50°C                        | 2.0E-5        | cm/cm/°C          |             |
| Flow : 100 to 200°C                       | 1.5E-5        | cm/cm/°C          |             |
| Transverse : -50 to 50°C                  | 4.0E-5        | cm/cm/°C          |             |
| Transverse : 100 to 200°C                 | 8.0E-5        | cm/cm/°C          |             |
| Thermal Conductivity                      | 0.32          | W/m/K             |             |
| UL Temperature Rating                     | 200 to 220    | °C                | UL 746B     |
| Electrical                                | Typical Value | Unit              | Test method |
| Surface Resistivity                       | 1.0E+16       | ohms              | ASTM D257   |
| Volume Resistivity                        | 1.0E+16       | ohms·cm           | ASTM D257   |
| Dielectric Strength                       | 20            | kV/mm             | ASTM D149   |
| Dielectric Constant                       |               |                   | ASTM D150   |
| 25°C, 1 kHz                               | 3.90          |                   |             |
| 25°C, 1 MHz                               | 3.80          |                   |             |
| Dissipation Factor                        |               |                   | ASTM D150   |
| 25°C, 1 kHz                               | 2.0E-3        |                   |             |
| 25°C, 1 MHz                               | 2.0E-3        |                   |             |
| Arc Resistance                            | 125           | sec               | ASTM D495   |
| Comparative Tracking Index (CTI)          | PLC 4         |                   | UL 746A     |
| Comparative Tracking Index                | 175           | V                 | IEC 60112   |
| Insulation Resistance <sup>1</sup> (90°C) | 1.0E+11       | ohms              |             |

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| Flammability          |        | Typical Value | Unit | Test method |
|-----------------------|--------|---------------|------|-------------|
| Flame Rating (1.6 mm) | •<br>• | V-0<br>5VA    |      | UL 94       |
| Oxygen Index          |        | 47            | %    | ASTM D2863  |

## Notes

Typical properties: these are not to be construed as specifications.

<sup>1</sup> 95%RH, 48 hr



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