

### polyphenylsulfone

Radel® R-5000 is a transparent polyphenylsulfone (PPSU) which offers exceptional hydrolytic stability, and toughness superior to other commercially-available, high-temperature engineering resins. This resin also offer high deflection temperatures and outstanding resistance to environmental stress cracking. Radel® polymers are inherently flame

retardant, provide excellent thermal stability and possess good electrical properties.

Clear: Radel® R-5000 CL 301Natural: Radel® R-5000 NT

#### General

Equilibrium

| Material Status                          | <ul> <li>Commercial: Active</li> </ul>   |  |  |
|--|--|--|--|
| Availability                             | <ul><li>Asia Pacific</li><li>Europe</li></ul>  | <ul><li>Latin America</li><li>North America</li></ul>  |  |
| Features                                 | <ul> <li>Acid Resistant</li> <li>Autoclave Sterilizable</li> <li>Base Resistant</li> <li>Biocompatible</li> <li>Detergent Resistant</li> <li>E-beam Sterilizable</li> <li>Ethylene Oxide Sterilizable</li> <li>Flame Retardant</li> <li>General Purpose</li> </ul> | <ul> <li>Good Chemical Resistance</li> <li>Good Dimensional Stability</li> <li>Good Electrical Properties</li> <li>Good Sterilizability</li> <li>Good Thermal Aging Resistance</li> <li>Good Thermal Stability</li> <li>Heat Sterilizable</li> <li>High ESCR (Stress Crack Resist.)</li> <li>High Heat Resistance</li> </ul> | <ul> <li>Hydrolytically Stable</li> <li>Radiation (Gamma)</li> <li>Resistant</li> <li>Radiation Sterilizable</li> <li>Radiotranslucent</li> <li>Steam Resistant</li> <li>Steam Sterilizable</li> <li>Ultra High Toughness</li> </ul> |
| Uses                                     | <ul><li>Automotive Applications</li><li>Dental Applications</li><li>Food Service Applications</li></ul>  | <ul><li>Hospital Goods</li><li>Medical Devices</li><li>Medical/Healthcare</li><li>Applications</li></ul>   | Membranes     Surgical Instruments   |
| Agency Ratings                           | <ul><li>FAA FAR 25.853a</li><li>ISO 10993</li></ul>  | • NSF 51 <sup>1</sup> • NSF 61 <sup>2</sup>  |  |
| RoHS Compliance                          | RoHS Compliant   |  |  |
| Automotive Specifications                | • ASTM D6394 SP0312  |  |  |
| Appearance                               | <ul> <li>Clear/Transparent</li> </ul>  |  |  |
| Forms                                    | • Pellets  |  |  |
| Processing Method                        | <ul><li>Blow Molding</li><li>Extrusion</li><li>Film Extrusion</li></ul>  | <ul><li>Injection Molding</li><li>Machining</li><li>Profile Extrusion</li></ul>  | Sheet Extrusion     Thermoforming  |
| Physical                                 |  | Typical Value Unit   | Test method  |
| Specific Gravity                         |  | 1.29   | ASTM D792  |
| Melt Mass-Flow Rate (MFR) (365°C/5.0 kg) |  | 14 to 20 g/10 min  | ASTM D1238   |
| Molding Shrinkage - Flow (3.18 mm)       |  | 0.70 %   | ASTM D955  |
| Water Absorption                         |  |  | ASTM D570  |
| 24 hr                                    |  | 0.37 %   |  |

1.1 %

## polyphenylsulfone

Revised: 11/18/2014

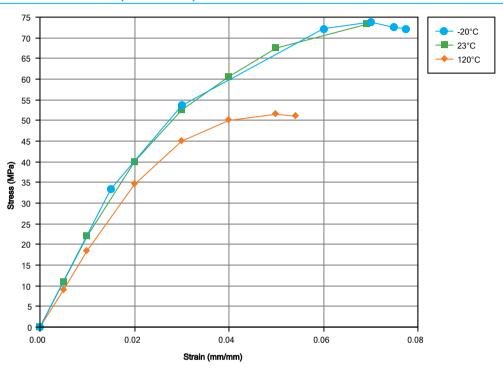
| Mechanical                                       | Typical Value Unit | Test method |
|--|--------------------|-------------|
| Tensile Modulus (3.18 mm)                        | 2340 MPa           | ASTM D638   |
| Tensile Strength (3.18 mm)                       | 69.6 MPa           | ASTM D638   |
| Tensile Elongation                               |                    | ASTM D638   |
| Yield, 3.18 mm                                   | 7.2 %              |             |
| Break, 3.18 mm                                   | 60 to 120 %        |             |
| Flexural Modulus (3.18 mm)                       | 2410 MPa           | ASTM D790   |
| Flexural Strength (5.0% Strain, 3.18 mm)         | 91.0 MPa           | ASTM D790   |
| Impact   | Typical Value Unit | Test method |
| Notched Izod Impact (3.18 mm)                    | 690 J/m            | ASTM D256   |
| Tensile Impact Strength (3.18 mm)                | 399 kJ/m²          | ASTM D1822  |
| Thermal  | Typical Value Unit | Test method |
| Deflection Temperature Under Load                |                    | ASTM D648   |
| 1.8 MPa, Unannealed, 3.18 mm                     | 207 °C             |             |
| Glass Transition Temperature                     | 220 °C             | ASTM E1356  |
| CLTE - Flow (3.18 mm)                            | 5.6E-5 cm/cm/°C    | ASTM D696   |
| Electrical                                       | Typical Value Unit | Test method |
| Volume Resistivity                               | 9.0E+15 ohms·cm    | ASTM D257   |
| Dielectric Strength                              |                    | ASTM D149   |
| 0.0254 mm  | > 200 kV/mm        |             |
| 3.18 mm  | 15 kV/mm           |             |
| Dielectric Constant (3.18 mm, 60 Hz)             | 3.44               | ASTM D150   |
| Flammability                                     | Typical Value Unit | Test method |
| Flame Rating <sup>3</sup> (0.762 mm)             | V-0                | UL 94       |
| Optical  | Typical Value Unit | Test method |
| Refractive Index                                 | 1.672              | ASTM D542   |
| Additional Information                           | Typical Value Unit |             |
| Steam Sterilization - w/ Morpholine <sup>4</sup> | > 1000 Cycles      |             |
| Injection  | Typical Value Unit |             |
| Drying Temperature                               | 149 °C             |             |
| Drying Time                                      | 2.5 hr             |             |
| Processing (Melt) Temp                           | 360 to 391 °C      |             |
| Mold Temperature                                 | 138 to 163 °C      |             |
| Screw Compression Ratio                          | 2.2:1.0            |             |
| Extrusion  | Typical Value Unit |             |
| Drying Temperature                               | 171 °C             |             |
| Drying Time                                      | 4.0 hr             |             |
| Cylinder Zone 1 Temp.                            | 338 to 388 °C      |             |
| Cylinder Zone 2 Temp.                            | 338 to 388 °C      |             |
| Cylinder Zone 3 Temp.                            | 338 to 388 °C      |             |
| Cymraci Zone o remp.                             |                    |             |
| Cylinder Zone 4 Temp.                            | 338 to 388 °C      |             |

## polyphenylsulfone

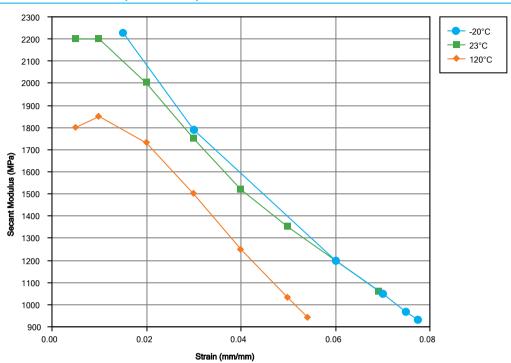
Revised: 11/18/2014

| Extrusion           | Typical Value Unit |  |
|---------------------|--------------------|--|
| Adapter Temperature | 327 to 371 °C      |  |
| Melt Temperature    | 343 to 399 °C      |  |
| Die Temperature     | 327 to 371 °C      |  |

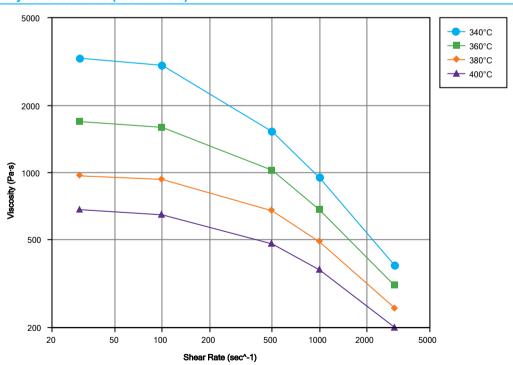
#### Isothermal Stress vs. Strain (ISO 11403-1)



#### Secant Modulus vs. Strain (ISO 11403-1)



#### Viscosity vs. Shear Rate (ISO 11403-2)



#### polyphenylsulfone

#### **Notes**

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

- <sup>1</sup> Maximum Temperature of Use: 190°C (375°F)
- <sup>2</sup> Tested at 82 °C (180 °F) (Commercial Hot)
- <sup>3</sup> These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.
- <sup>4</sup> Cycles passed without cracking, crazing, or rupture.

Steam Autoclave Conditions:

- Temperature: 270°F (132°C)
- Time: 30 minutes/cycle
- Steam Pressure: 27 psig (0.19 MPa)Stress Level: 1000 psi (7.0 MPa) in flexure
- Additive: Morpholine at 50 ppm

### www.solvay.com

SpecialtyPolymers.EMEA@solvay.com | Europe, Middle East and Africa SpecialtyPolymers.Americas@solvay.com | Americas SpecialtyPolymers.Asia@solvay.com | Asia and Australia

Safety Data Sheets (SDS) are available by emailing us or contacting your sales representative. Always consult the appropriate SDS before using any of our products.

Neither Solvay Specialty Polymers nor any of its affiliates makes any warranty, express or implied, including merchantability or fitness for use, or accepts any liability in connection with this product, related information or its use. Some applications of which Solvay's products may be proposed to be used are regulated or restricted by applicable laws and regulations or by national or international standards and in some cases by Solvay's recommendation, including applications of food/feed, water treatment, medical, pharmaceuticals, and personal care. Only products designated as part of the Solviva® family of biomaterials may be considered as candidates for use in implantable medical devices. The user alone must finally determine suitability of any information or products for any contemplated use in compliance with applicable law, the manner of use and whether any patents are infringed. The information and the products are for use by technically skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other substance or any other process. This is not a license under any patent or other proprietary right.

All trademarks and registered trademarks are property of the companies that comprise the Solvay Group or their respective owners.

© 2015 Solvay Specialty Polymers. All rights reserved.

