

# Radel® R-5000

## 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.

- Smoke: Radel® R-5000 CL 301
- Amber: Radel® R-5000 NT
- Blue: Radel® R-5000 TR BU391

### General

Material Status	• Commercial: Active	
Availability	<ul style="list-style-type: none"> <li>• Asia Pacific</li> <li>• Europe</li> </ul>	<ul style="list-style-type: none"> <li>• Latin America</li> <li>• North America</li> </ul>
Features	<ul style="list-style-type: none"> <li>• Acid Resistant</li> <li>• Autoclave Sterilizable</li> <li>• Base Resistant</li> <li>• Biocompatible</li> <li>• Chemical Resistant</li> <li>• Detergent Resistant</li> <li>• E-beam Sterilizable</li> <li>• Ethylene Oxide Sterilizable</li> <li>• Flame Retardant</li> <li>• General Purpose</li> <li>• Good Dimensional Stability</li> <li>• Good Electrical Properties</li> <li>• Good Sterilizability</li> </ul>	<ul style="list-style-type: none"> <li>• Good Thermal Stability</li> <li>• Heat Sterilizable</li> <li>• High ESCR (Stress Crack Resist.)</li> <li>• High Heat Resistance</li> <li>• Hydrolytically Stable</li> <li>• Radiation (Gamma) Resistant</li> <li>• Radiation Sterilizable</li> <li>• Radiotranslucent</li> <li>• Steam Resistant</li> <li>• Steam Sterilizable</li> <li>• Thermal Aging Resistant</li> <li>• Ultra High Toughness</li> </ul>
Uses	<ul style="list-style-type: none"> <li>• Automotive Applications</li> <li>• Dental Applications</li> <li>• Food Service Applications</li> <li>• Hospital Goods</li> </ul>	<ul style="list-style-type: none"> <li>• Medical Devices</li> <li>• Medical/Healthcare Applications</li> <li>• Membranes</li> <li>• Surgical Instruments</li> </ul>
Agency Ratings	<ul style="list-style-type: none"> <li>• FAA FAR 25.853a</li> <li>• ISO 10993</li> </ul>	<ul style="list-style-type: none"> <li>• NSF STD-51 <sup>1</sup></li> <li>• NSF STD-61 <sup>2</sup></li> </ul>
RoHS Compliance	• RoHS Compliant	
Automotive Specifications	• ASTM D6394 SP0312	
Appearance	• Clear/Transparent	
Forms	• Pellets	
Processing Method	<ul style="list-style-type: none"> <li>• Blow Molding</li> <li>• Extrusion</li> <li>• Film Extrusion</li> <li>• Injection Molding</li> </ul>	<ul style="list-style-type: none"> <li>• Machining</li> <li>• Profile Extrusion</li> <li>• Sheet Extrusion</li> <li>• Thermoforming</li> </ul>

### Physical

	Typical Value	Unit	Test method
Density / 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

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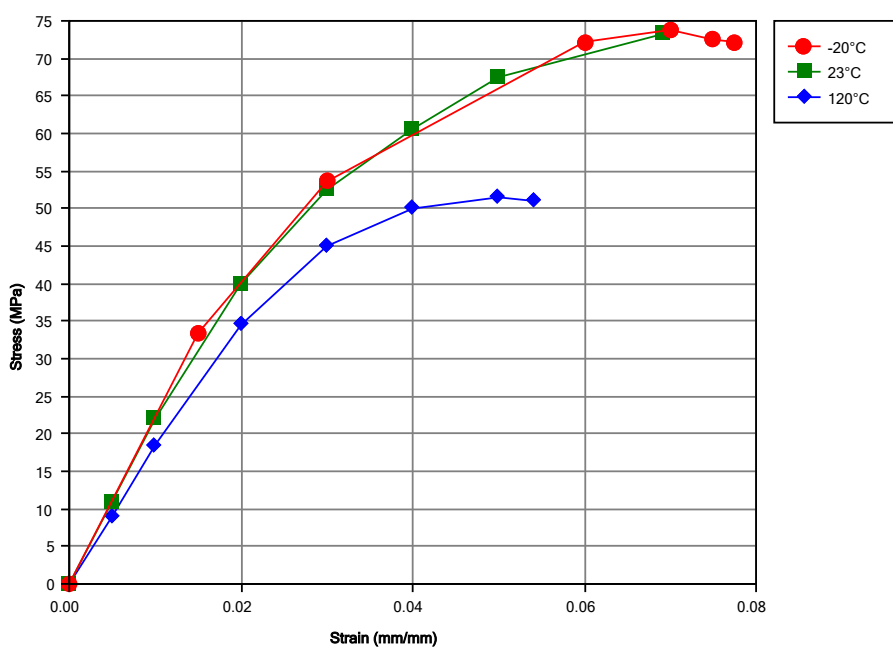
Physical	Typical Value	Unit	Test method
Water Absorption			ASTM D570
24 hr	0.37	%	
Equilibrium	1.1	%	
Mechanical	Typical Value	Unit	Test method
Tensile Modulus (3.18 mm)	2340	MPa	ASTM D638
Tensile Strength (3.18 mm)	69.6	MPa	ASTM D638
Tensile Elongation			ASTM D638
Yield, 3.18 mm	7.2	%	
Break, 3.18 mm	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/m <sup>2</sup>	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> (0.76 mm)	V-0		UL 94
Optical	Typical Value	Unit	Test method
Refractive Index	1.672		ASTM D542
Additional Information	Typical Value	Unit	Test method
Steam Sterilization - w/ Morpholine <sup>4</sup>	> 1000	Cycles	
Injection	Typical Value	Unit	Test method
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	Test method
Drying Temperature	171	°C	
Drying Time	4.0	hr	
Cylinder Zone 1 Temp.	338 to 388	°C	

Extrusion

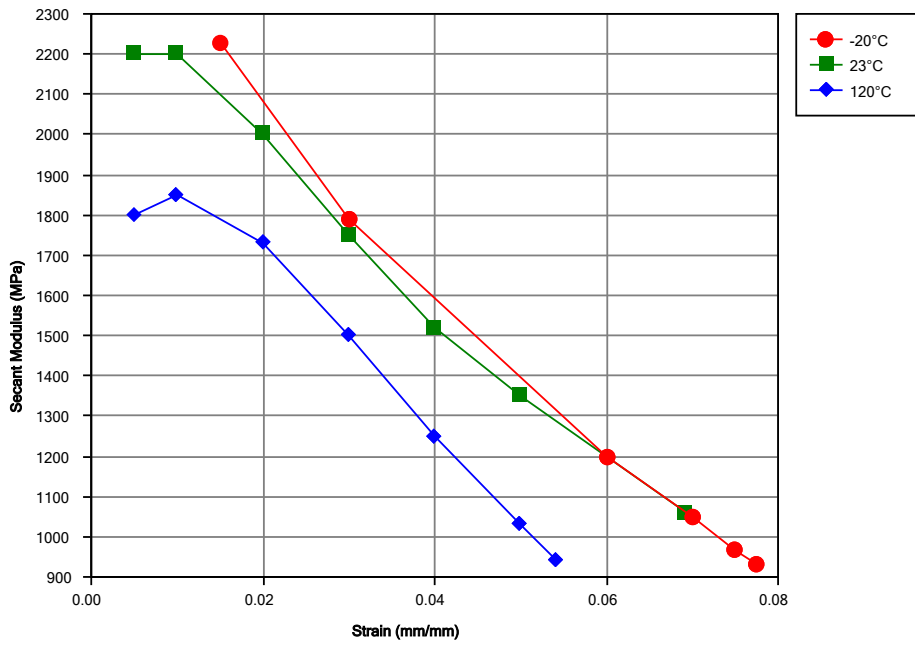
Typical Value Unit

Cylinder Zone 2 Temp.	338 to 388 °C
Cylinder Zone 3 Temp.	338 to 388 °C
Cylinder Zone 4 Temp.	338 to 388 °C
Cylinder Zone 5 Temp.	338 to 388 °C
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)



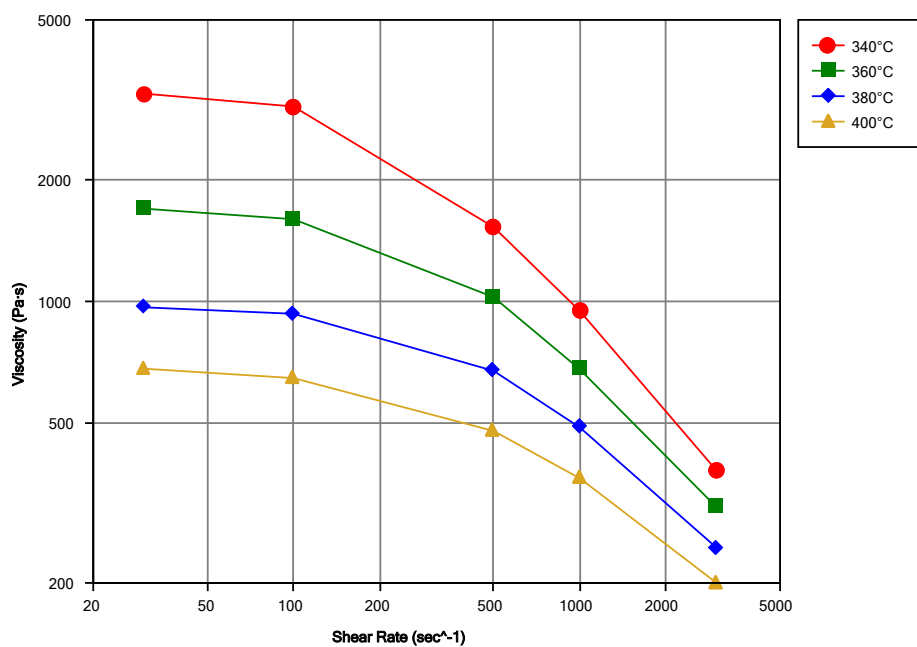
Secant Modulus vs. Strain (ISO 11403-1)



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



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### Notes

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

<sup>1</sup> NSF STD-51 compliant for NT only.

<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

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