

PES - Polyethersulphone

Facts:

PES is typically expensive but its properties make it ideal for metal replacement stretching the boundaries of polymer applications.

PES is an amorphous material with low moisture absorption and are characterised by high strength, very high surface-temperature limits. PES exhibits low creep, good electrical characteristics, transparency, self-extinguishing ability, resistance to common greases, many solvents and chemicals. Glass reinforcement further improves toughness and enhances dimensional stability.

Applications:

High temperature metal replacement, medical, automotive and electrical appliances.

Limitations:

- Attacked by some solvents
- Poor weatherability
- Subject to stress cracking
- High process temperatures

Radel® R-5100

polyphenylsulfone

Radel R-5100 is an opaque, general purpose polyphenylsulfone (PPSU) for injection molding, that offers exceptional hydrolytic stability, and toughness superior to other commercially-available, high-temperature engineering resins. This resin also offers a high deflection temperature and outstanding resistance to environmental stress cracking. Radel polymers are inherently flame retardant, provide excellent thermal stability and possess good electrical properties.

- Black: Radel R-5100 BK937

- Bone: Radel R-5100 NT15
- Grey: Radel R-5100 GY1137
- Grey: Radel R-5100 GY1037
- Grey: Radel R-5100 GY874
- Red: Radel R-5100 RD 1018
- Orange: Radel R-5100 OR1145
- Yellow: Radel R-5100 YL1337
- Green: Radel R-5100 GN1007
- Blue: Radel R-5100 BU1027
- Violet: Radel R-5100 VT2582
- Brown: Radel R-5100 BN1164

General

Material Status	• Commercial: Active		
Availability	• Asia Pacific	• North America	• South America
Filler / Reinforcement	• Unspecified Filler\Reinfor.		
Features	• Acid Resistant	• General Purpose	• Hydrolytically Stable
	• Autoclave Sterilizable	• Good Chemical Resistance	• Radiation (Gamma) Resistant
	• Base Resistant	• Good Sterilizability	• Radiation Sterilizable
	• Biocompatible	• Good Thermal Stability	• Radiotranslucent
	• E-beam Sterilizable	• Heat Sterilizable	• Steam Resistant
	• Ethylene Oxide Sterilizable	• High ESCR (Stress Crack Resist.)	• Steam Sterilizable
	• Flame Retardant	• High Heat Resistance	• Ultra High Toughness
Uses	• Aerospace Applications	• Food Service Applications	
	• Aircraft Applications	• Hospital Goods	• Plumbing Parts
	• Connectors	• Medical Appliances	• Surgical Instruments
	• Dental Applications	• Medical/Healthcare Applications	
Agency Ratings	• FAA FAR 25.853a	• NSF 51 ²	
	• ISO 10993 ¹	• NSF 61 ³	
RoHS Compliance	• RoHS Compliant		
Automotive Specifications	• ASTM D6394 SP0312		
Appearance	• Black	• Light Beige	
	• Colors Available	• Opaque	
Forms	• Pellets		
Processing Method	• Blow Molding	• Injection Molding	• Sheet Extrusion
	• Extrusion	• Machining	• Thermoforming
	• Film Extrusion	• Profile Extrusion	

Physical

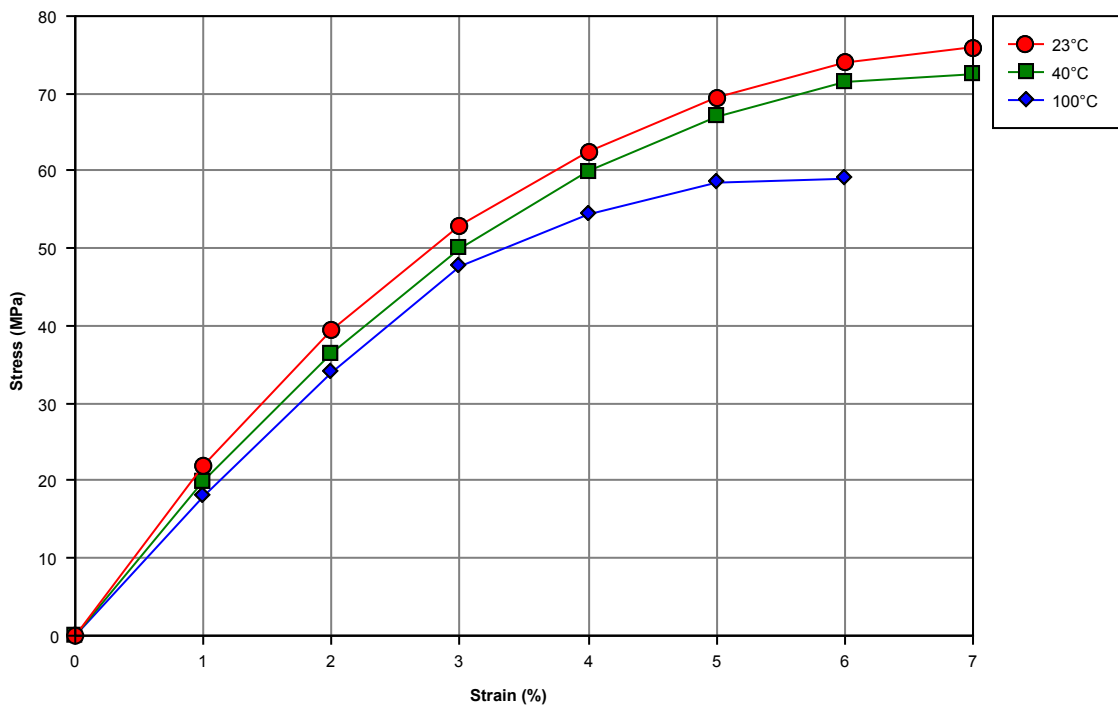
	Typical Value	Unit	Test Method
Specific Gravity	1.30	g/cm ³	ASTM D792
Melt Mass-Flow Rate (MFR)	14 to 20	g/10 min	ASTM D1238
Molding Shrinkage - Flow	0.70	%	ASTM D955
Water Absorption (24 hr)	0.37	%	ASTM D570

Mechanical

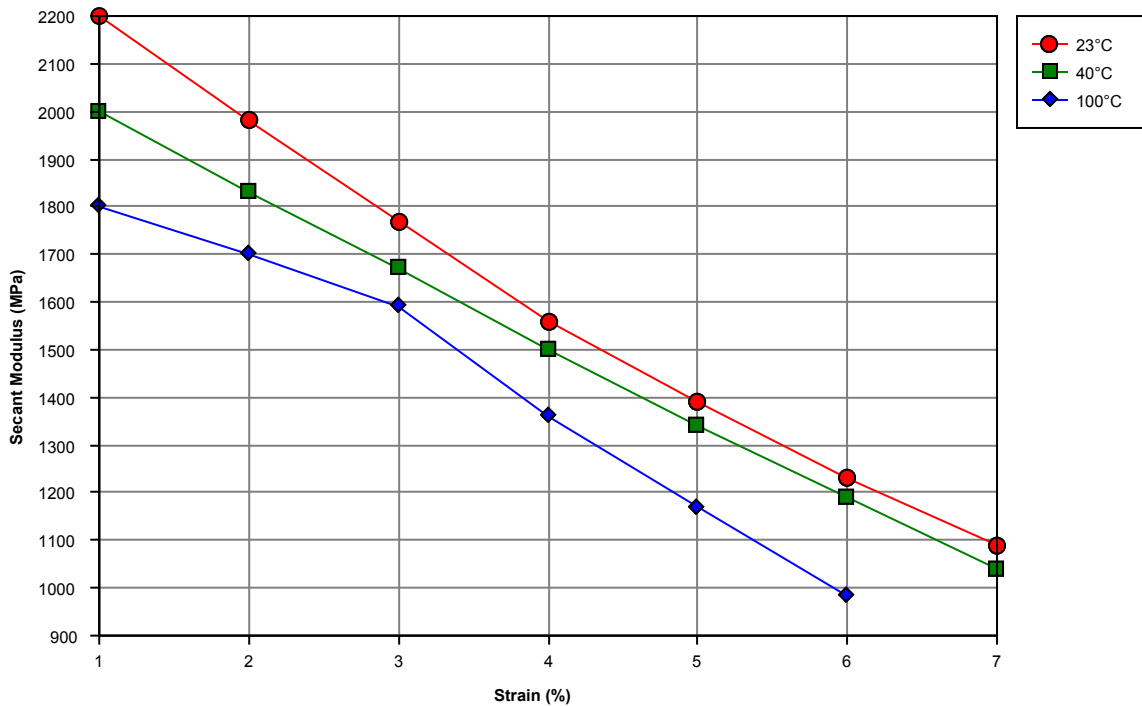
	Typical Value	Unit	Test Method
Tensile Modulus	2340	MPa	ASTM D638

Mechanical	Typical Value	Unit	Test Method
Tensile Strength			ASTM D638
Yield	69.6	MPa	
Break	69.6	MPa	
Tensile Elongation			ASTM D638
Yield	7.2	%	
Break	60	%	
Flexural Modulus	2410	MPa	ASTM D790
Flexural Strength (Yield)	91.0	MPa	ASTM D790
Compressive Modulus	1730	MPa	ASTM D695
Compressive Strength	98.9	MPa	ASTM D695
Shear Strength	62.7	MPa	ASTM D732
Poisson's Ratio	0.42		ASTM E132
Impact	Typical Value	Unit	Test Method
Notched Izod Impact	690	J/m	ASTM D256
Unnotched Izod Impact	No Break		ASTM D256
Tensile Impact Strength	399	kJ/m ²	ASTM D1822
Thermal	Typical Value	Unit	Test Method
Deflection Temperature Under Load			ASTM D648
0.45 MPa, Unannealed	214	°C	
1.8 MPa, Unannealed	207	°C	
Glass Transition Temperature	220	°C	ASTM E1356
CLTE - Flow	0.000056	cm/cm/°C	ASTM D696
Thermal Conductivity	0.35	W/m/K	ASTM C177
Electrical	Typical Value	Unit	Test Method
Volume Resistivity	9.0E+15	ohm·cm	ASTM D257
Dielectric Strength	14	kV/mm	ASTM D149
Dielectric Constant			ASTM D150
60 Hz	3.44		
1 kHz	3.40		
Flammability	Typical Value	Unit	Test Method
Flame Rating ⁴ (1.57 mm)	V-0		UL 94
Oxygen Index	38	%	ASTM D2863
Optical	Typical Value	Unit	Test Method
Refractive Index	1.672		ASTM D542
Injection	Typical Value	Unit	
Drying Temperature	149	°C	
Drying Time	2.5	hr	
Suggested Max Moisture	0.050	%	
Rear Temperature	321	°C	
Middle Temperature	349	°C	
Front Temperature	349	°C	
Processing (Melt) Temp	343 to 388	°C	
Mold Temperature	138 to 163	°C	
Back Pressure	0.345 to 0.689	MPa	
Screw Compression Ratio	2.2:1.0		

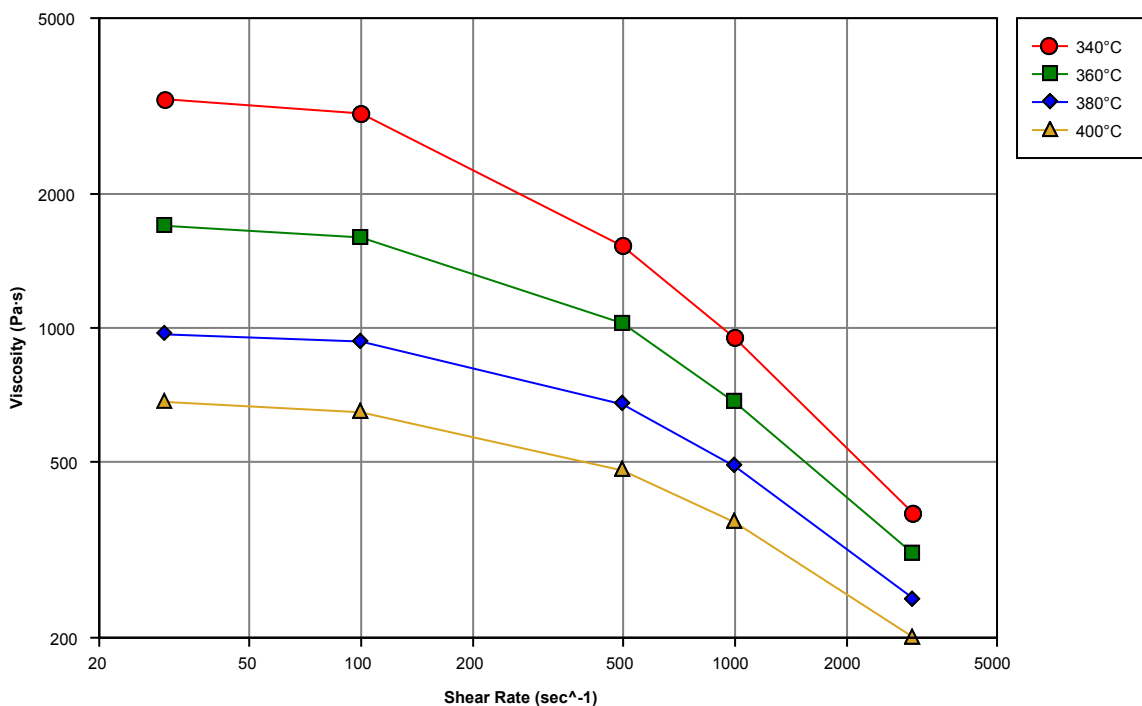
Isothermal Stress vs. Strain (ISO 11403-1)



Secant Modulus vs. Strain (ISO 11403-1)



Viscosity vs. Shear Rate (ISO 11403-2)



Notes

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

¹ For limited exposure (less than 24 hours).

² Maximum Temperature of Use: 190°C (375°F)

³ Tested at 82 °C (180 °F) (Commercial Hot)

⁴ These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

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