Product Data

RADEL® R
polyphenylsulfone

R-5000, R-5100 NT15, R-5500

Radel R polyphenylsulfone resins offer exceptional hydrolytic stability, and toughness superior to other commercially-available, high-temperature engineering resins. They offer high deflection temperatures and outstanding resistance to environmental stress cracking. The polymer is inherently flame retardant, and also has excellent thermal stability and good electrical properties.

Radel R resins are available as an opaque general purpose injection molding grade–R-5100 NT15, a transparent injection molding grade–R-5000, and a transparent extrusion grade–R-5500.

Typical Properties of Radel R-5000, R-5100 NT15, and R-5500 Resins

Property	ASTM Test Method	Typical Values[1] U.S. Customary Units Value	Units	SI Units Value	Units
Mechanical					
Tensile Strength	D 638	10.1	kpsi	70	MPa
Tensile Modulus	D 638	340	kpsi	2.3	GPa
Tensile Elongation at yield	D 638	7.2	%	7.2	%
Tensile Elongation at break	D 638	60-120	%	60-120	%
Flexural Strength[2]	D 790	13.2	kpsi	91	MPa
Flexural Modulus	D 790	350	kpsi	2.4	GPa
Tensile Impact Strength	D 1822	190	ft-lb/in^2	400	kJ/m^2
Izod Impact, Notched	D 256	13	ft-lb/in	690	J/m
Thermal					
Deflection Temperature at 264 psi (1.82 MPa)	D 648	405	°F	207	°C
Flammability Rating[3]	UL-94	V-0	0.030 in	V-0	0.75 mm
Coefficient of Thermal Expansion	D 696	31	ppm/°F	56	ppm/°C
Glass Transition Temperature[4]		428	°F	220	°C
Electrical					
Dielectric Strength at 0.125 in. (3.2 mm)	D 149	380	V/mil	15	kV/mm
Dielectric Strength at 0.001 in. (0.02 mm)		>5,000	V/mil	>200	kV/mm
Dielectric Constant at 60 Hz	D 150	3.44		3.44	
Volume Resistivity	D 257	9 x 10^{15}	ohm-cm	9 x 10^{15}	ohm-cm
Chemical					
Steam Sterilization [5] w/ Morpholine, cycles passed without cracking, crazing, or rupture		>1000	cycles	>1000	cycles
Water Absorption at 24 hours	D 570	0.37	%	0.37	%
Water Absorption at Equilibrium	D 570	1.10	%	1.10	%

General and Fabrication		R-5000	R-5100 NT15	R-5500
Specific Gravity	D 792	1.29	1.30	1.29
Refractive Index	D 542	1.672	opaque	1.672
Melt Flow at 689°F (365°C), 5.0 kg, g/10 min	D 1238	17	17	11.5
Mold Shrinkage, %	D 955	0.7	0.7	0.7

[1] Actual properties of individual batches will vary within specification limits. Unless otherwise specified, properties were measured using one-eighth inch (3.2 mm) thick injection molded specimens.

[2] at 5% strain

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

[4] Measured by differential scanning calorimetry at a heating rate of 36°F (20°C) per minute.

[5] 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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Drying

Radel R polyphenylsulfone resins must be dried completely prior to melt processing. Incomplete drying will result in defects in the formed part ranging from surface streaks to severe bubbling. However, such parts may be recovered as regrind, since there will be no loss of properties. Pellets of Radel R resins can be dried on trays in a circulating air oven or in a hopper dryer.

Recommended drying conditions for injection molding are 300°F (149°C) for 2.5 hours. For extrusion purposes, more thorough drying is needed. Hopper drying for a minimum of 4 hours at 340°F (171°C) is recommended, dessicated inlet air temperatures up to 360°F (182°C) are usable.

Injection Molding

Radel R-5000 and R-5100 NT15 resins can be readily injection molded in most screw injection molding machines to close part tolerances. Stock temperature requirements will generally range from 680° to 735°F (360° to 390°C), depending on mold design and the type of equipment being used. A general purpose 2.2:1 compression screw is recommended, with minimum back pressure. Mold temperatures of at least 280°F(138°C) are suggested. For long-flow or thin-walled parts, or where low residual stresses are required use mold temperatures as high as 300° to 325°F (150° to 165°C).

Extrusion

Radel R-5500 resin is easily extrudable into sheet, film, profile or tubing. Extrusion temperature ranges are broad, depending on thickness of sheet or profile being extruded. Typical temperature profiles for extrusion range from 640°F (340°C) to 730°F (395°C) on the barrel. Useful adapter and die temperatures are in the range 620°–700°F (325° -370°C) with melt temperatures being in the range 650°–750°F (345°–400°C). Radel R resins are stable thermoplastics. Accordingly, up to 25% clean reground R-5500 resin, in a mix with new material, can be used with little, if any, property effects except for a slight darkening in color. Udel® polysulfone is recommended as a start-up and purge resin for extrusion of Radel R resins.

Standard Packaging and Labeling

Radel R resins are packaged in multiwall paper bags containing 25 kg (55.115 pounds) of material. Special packaging can be supplied upon request.

Individual packages will be plainly marked with the product number, the color, the lot number, and the net weight.

Product Safety and Emergency Service

For product safety information or a Material Safety Data Sheet on a product of Solvay Advanced Polymers

1 (800) 621-4557
1 (770) 772-8880 outside of U.S.

For information or help in an emergency such as a spill, leak, fire or explosion, call day or night:

Emergency Health Information

1 (800) 621-4590
1 (770) 772-5177 outside of U.S.

Emergency Spill Information

CHEMTREC 1 (800) 424-9300
1 (703) 527-3887 outside of U.S.
collect calls accepted

For Additional Information

Technical Service
1 (800) 621-4557

Customer Service
1 (800) 848-9744