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Scotchcast™ Electrical Resin 280

Two-Part, Oven-Curing, Class F, Semiflexible, Unfilled Epoxy Liquid Resin

Data Sheet

Product Description

3M™ Scotchcast™ Electrical Resin 280 is characterized by a high temperature rating, outstanding physical and electrical stability and superior resistance to moisture. The Scotchcast Resin 280 system remains flexible even after prolonged heat aging, while its low viscosity and fine wetting properties allow complete impregnation of fine wires in coils. Scotchcast Resin 280 is well suited to impregnating, potting and encapsulating applications that require superior electrical performance, maximum resistance to moisture and thermal shock resistance. These include impregnation and encapsulation of coils, transformers, strain-sensitive circuitry, modules and other electrical and electronic components. Scotchcast Resin 280 can be cured at 65°C (150°F) and still exhibit excellent electrical properties in applications where components require low temperature cures.

- High temperature rated (155°C)
- Thermal shock resistant
- Physically and electrically stable

Handling Properties

Mix Ratio (A:B)	Wt 2:3
	Vol (%) 37:63
Initial Viscosity	A = 12,500 cps
@ 23°C (73°F)	B = 2,500 cps
	Mixed = 4,000 cps
Density	A = 1.15 kg/l (9.7 lbs/gal)
	B = 1.01 kg/l (8.45 lbs/gal)
Flash Point	A = 204°C (400°F)
	B = 188°C (370°F)
Gel Time	20 min. @ 121°C (250°F)
Curing Guide	120°C (248°F) 2-3 hrs.
	95°C (203°F) 6-8 hrs.
	75°C (167°F) 24 hrs.

Test Methods

[1]3M Test Method
[2]MIL-I-16923E
[3]Fed. Std. No. 406, Method 1021
[4]Fed. Std. No. 406, Method 1011
[5]Fed. Std. No. 406, Method 1031
[6]Fed. Std. No. 406, Method 4021
[7]Fed. Std. No. 406, Method 4041
[8]Fed. Std. No. 406, Method 4031

Typical Properties

*Not recommended for specification purposes. Product specifications will be provided upon request.

Property	Value*
Color	Clear Amber
Specific Gravity (Cured)	1.08
Flammability[2]	Self-extinguishing
Compressive Strength[3]	2400 psi
10% Compression	(168 kg/cm²)
Tensile Strength[4]	1950 psi
	(310 kg/cm²)
Elongation[4]	
(% @ break)	85
Flexural Strength[5]	950 psi
	(137 kg/cm²)
Electric Strength[8]	375V/mil
1/8" (3.175 mm) sample	(14.8 kV/mm)
Hardness (Shore D)	65
Thermal Conductivity[2]	5.23 x 10^{-4}
(cal · cm/cm2 · sec · °C)	
Coefficient of Linear Thermal Expansion[2]	21 x 10^{-5}
(23° C to 113°C)	
(length/unit length/°C)	
Thermal Shock[1]	
10 cycles - 65°C to 130°C	
1/4" (6.35 mm) Olyphant Insert	Fails
Thermal Shock[2]	Passes
Moisture Absorption[2]	
%Weight Gain	
(240 hrs. @96 % R.H.)	0.5
Water Immersion (Sample cured 3 hrs. @ 120°C)	
% Weight Gain	
(1000 hrs. @ 23°C)	0.6
% Weight Gain	
(500 hrs. @ 23°C)	1.8
% Weight Gain	
(200 hrs. @ 100°C)	2.8
Thermal Aging	
1000 hrs. @130°C	
% Weight Loss	.51
Hardness Change, Shore D	5
Dielectric Constant[6]	
(100 Hz @ 23°C)	3.66
Dissipation Factor[6]	
(100 HZ @ 23 °C)	.012
Volume Resistivity[7]	
(ohm-cm @ 23°C)	1 x 10^{15}
Thermal Aging	
1000 hrs. @155°C	
% Weight Loss	4.3
Hardness Change, Shore D	15
Dielectric Constant[6]	
(100 Hz @ 23°C)	4.07
Dissipation Factor[6]	
(100 HZ @ 23 °C)	.008
Volume Resistivity[7]	
(ohm-cm @ 23°C)	1 x 10^{15}
Thermal Aging	
1000 hrs. @180°C	
% Weight Loss	6.7
Hardness Change, Shore D	20
Dielectric Constant[6]	
(100 Hz @ 23°C)	3.50
Dissipation Factor[6]	
(100 HZ @ 23 °C)	.006
Volume Resistivity[7]	
(ohm-cm @ 23°C)	1 x 10^{15}

Note: These are typical values and should not be used for specification purposes.

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Usage Information

Mixing
Mix the separate parts before removing them from their containers. They may be warmed to 60ºC (140ºF) to aid mixing. Weigh the correct proportions of the separate parts to within 2% accuracy and combine them. Thoroughly blend the mixture until the color is absolutely uniform, or until a homogeneous mixture is attained.

Deaerating
Entrained air can be removed by evacuating for 5 to 15 minutes at 5 to 10 mm of mercury absolute pressure. Warming the resin to 60°C (140°F) facilitates this process. Container side walls should be four times the height of liquid resin to contain the foaming that takes place under vacuum.

Casting and Impregnating
Pour the warm resin into the preheated 100°C mold. If no mold is used, dip the preheated part into the resin. Heating the resin and mold aids impregnation. For maximum impregnation, evacuate for 5 to 15 minutes at 5 mm of mercury absolute pressure, or pour under vacuum and hold for several minutes before releasing.

Curing
Where minimum stress and maximum thermal shock resistance are required, the lower temperature cure cycle is recommended. (See "Curing Guide" of **Handling Properties** section.) Time should be added to the cure cycle to allow the resin to reach the curing temperature.

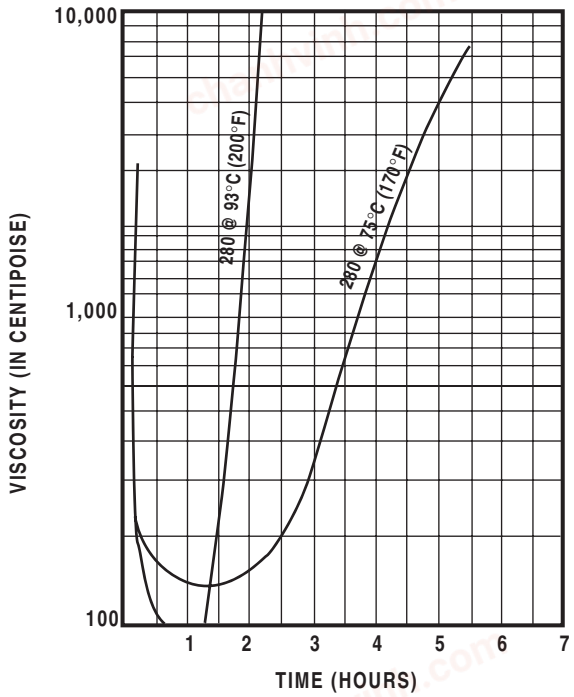
Storage
Both parts of this resin system should be stored at temperatures between 20 to 30 degrees Celsius, and 30% to 60% relative humidity. When not in use, containers should be kept tightly closed. Storage at conditions outside those suggested may compromise the performance of the resin.

Handling and Safety Precautions

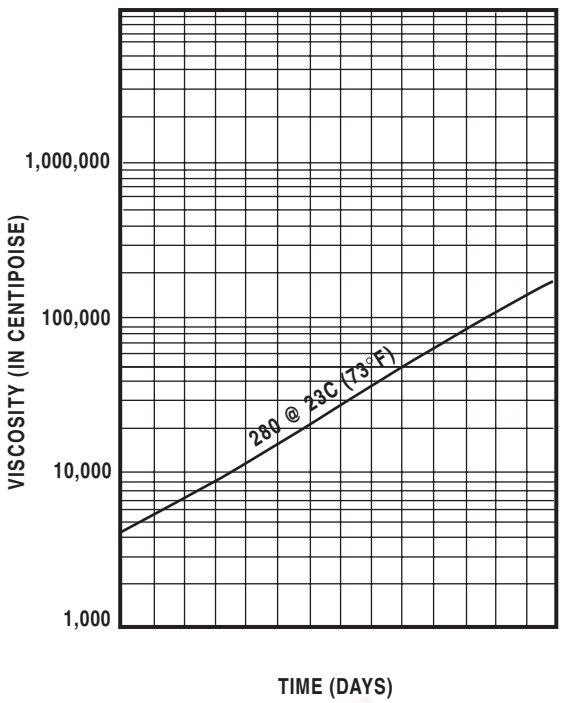
Read all Health Hazard, Precautionary and First Aid statements found in the Material Safety Data Sheets (MSDS) and/or product label of chemicals prior to handling or use.

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Brookfield Viscosity vs. Time
@75°C (170°F) & 95°C (200°F)

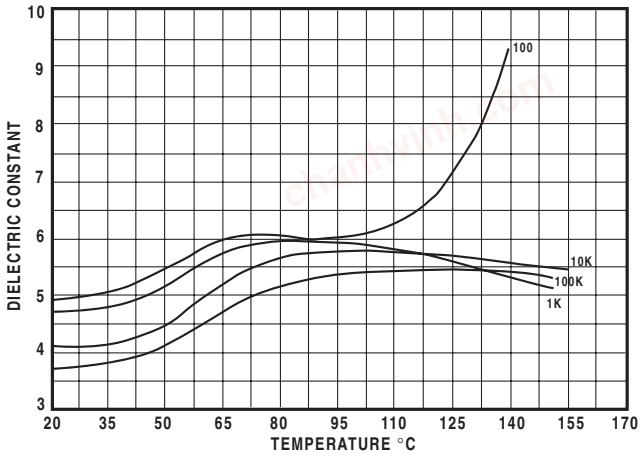


Brookfield Viscosity vs. Time
@23°C (73°F)

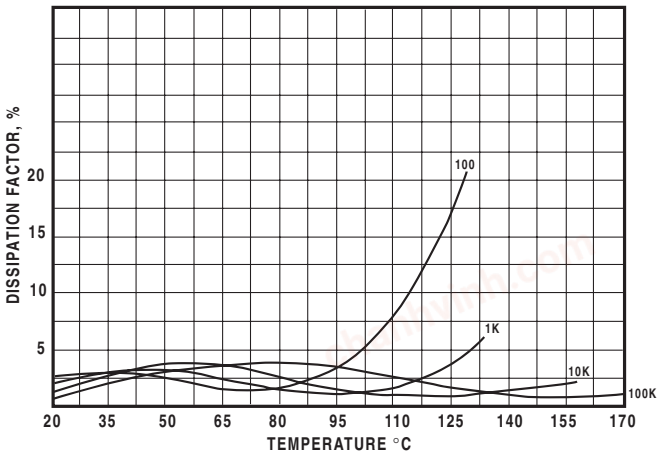


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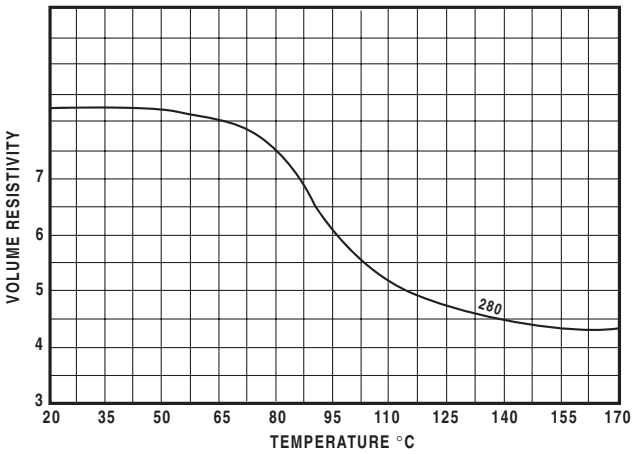
DIELECTRIC CONSTANT
Fed. Std. 406, Method 4021
(Test Frequencies in Hertz)



DISSIPATION FACTOR
Fed. Std. 406, Method 4021
(Test Frequencies in Hertz)



VOLUME RESISTIVITY
(OHM-CM)
Fed. Std. 406, Method 4041



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