Scotchcast™ 5166 Electrical Resin

Two-Part, Semi-Flexible, Filled, Epoxy Liquid Resin

Data Sheet

Product Description

3M™ Scotchcast™ 5166 Electrical Resin is characterized by high temperature physical and electrical stability, with retention of flexibility after prolonged heat aging. It can be cured at low temperatures and still yield excellent electrical and physical properties. The resin should be selected for uses where mechanical strength, tensile strength, thermal shock and high thermal conductivity are required. Some suggested applications for this resin system are impregnation and encapsulation of coils, transformers, motors and other electrical and electronic components.

- Class F temperature rating (155˚C)
- Excellent high-temperature physical and electric stability
- Good retention of flexibility
- Excellent electrical and physical properties

Handling Properties

Properties	Value
Mix Ratio (A:B)	Wt 2:3 Vol (%) 37:63
Viscosity @ 23°C (73°F)	 Mixed = 48,000 cps
Specific Gravity	Mixed = 1.43
Gel Time	21 min. @ 121°C (250°F)
Curing Guide	2-3 hrs. @ 120°C (248°F) 6-8 hrs. @ 95°C (203°F) 24 hrs. @ 65°C (150°F)

Typical Properties

*All values shown are typical. They are based on several determinations and are not intended for specification purposes. Product specifications will be provided upon request.

Property	Value*
Color	Black
Flammability[1]	Self-extinguishing
Compressive Strength[2] 10% Compression	3500 psi 245 kg/cm^2
Tensile Strength[3] (1/8" x 1/2" Sample)	2100 psi (147 kg/cm^2)
Elongation[3] (% @ break)	45
Flexural Strength[4] (1/2" x 1/2" Sample)	1250 psi 87.5 kg/cm^2
Hardness (Shore D)	65
Thermal Conductivity[1] (Cal/sec/cm2/°C/cm)	12 x 10^{-4}
Coefficient of Linear Thermal Expansion[2] (23°C to 113°C) (length/unit length/°C)	15 x 10^{-5}
Thermal Shock[5] 10 cycles - 65C to 130°C 1/4" (6.350 mm) Olyphant Inserts	 Pass
Thermal Shock[1]	Pass
Moisture Absorption[4] (%weight increase, 240 hrs. @96 % R.H.)	 0.32
Water Immersion (sample cures 3 hrs. @ 120°C) 1000 hrs. @23°C % weight gain 500 hrs. @ 70°C % weight gain 200 hrs. @ 100°C % weight gain	 0.4 6.2 8.0
Thermal Aging (21/4" x 21/4" x 1/8" sample, 1000 hrs. @130°C) % Weight Loss Hardness Change, Shore D Dielectric Constant (100 cycles @ 23°C) Dissipation Factor (100 cycles @ 23 °C) Volume Resistivity (ohm-cm @ 23°C)	 0.17 7 3.56 0.054 10^{15}
Thermal Aging (2 1/4" x 2 1/4" x 1/8" sample, 1000 hrs. @155°C) % Weight Loss Hardness Change, Shore D Dielectric Constant (100 cycles @ 23°C) Dissipation Factor (100 cycles @ 23 °C) Volume Resistivity (ohm-cm @ 23°C)	 2.2 15 4.03 0.032 10^{15}
Thermal Aging (2 1/4" x 2 1/4" x 1/8" sample, 1000 hrs. @180°C) % Weight Loss Hardness Change, Shore D Dielectric Constant (100 cycles @ 23°C) Dissipation Factor (100 cycles @ 23 °C) Volume Resistivity (ohm-cm @ 23°C)	 3.5 18 4.71 0.041 10^{15}
Electrical Strength[2] (Volts/mil 1/8" [3.175mm] sample)	 375 14,800 volts/m

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

Test Methods

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

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 a homogeneous mixture is attained.

Deaerating

Air introduced during mixing can be removed by evacuating at 5 to 15 minutes at 5 to 10 mm of mercury absolute pressure. Warming the resin to 60°C (140°F) aids air removal. The container side wall should be four times the height of the liquid resin to contain foaming that takes place under vacuum.

Casting and Impregnating

Pour the warm resin into the preheated 100ºC 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 (Hg) absolute pressure, or pour under vacuum and hold for several minutes before releasing.

Curing

Where minimum stress and maximum shock resistance are required, the lower temperature cure cycle is recommended. Time should be added to the cure cycle to allow the resin to reach the curing temperature.

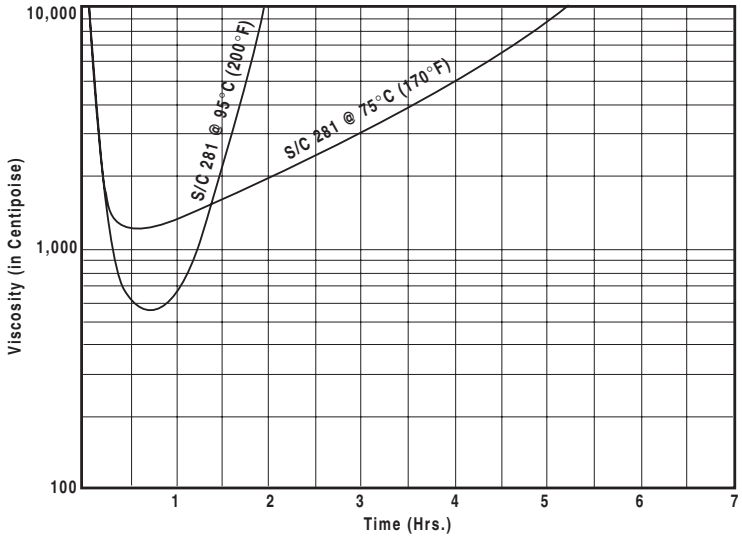
Storage

This resin system has a minimum shelf life of one year. Both parts should be stored in a cool, dry place. When not in use, containers should be kept tightly closed.

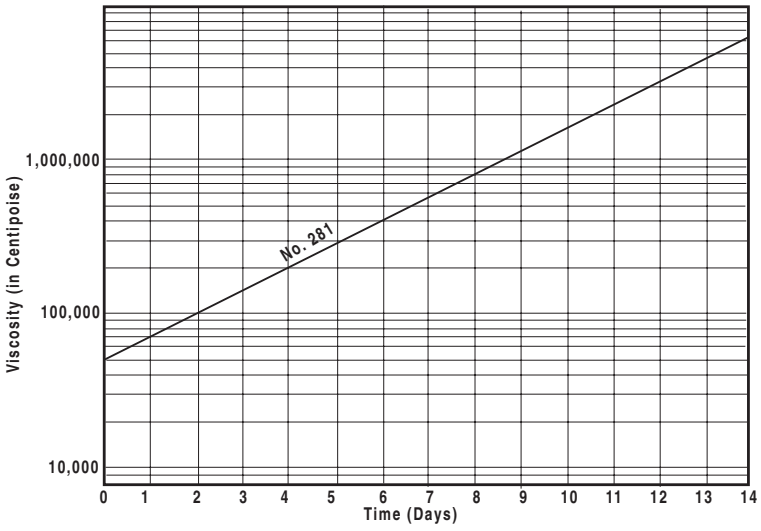
Handling and Safety Precautions

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

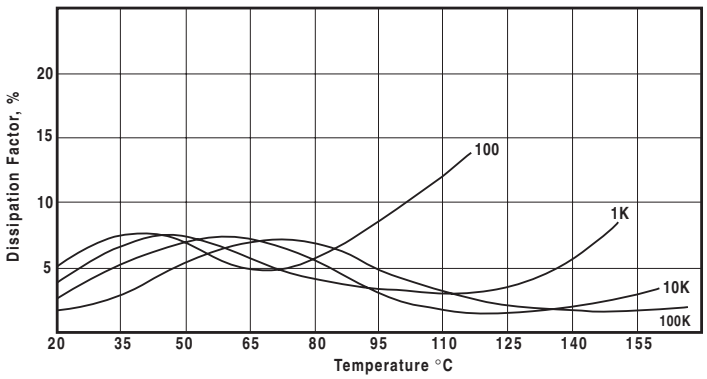
Brookfield Viscosity vs. Time @75°C (170°F) & 95°C (200°F)



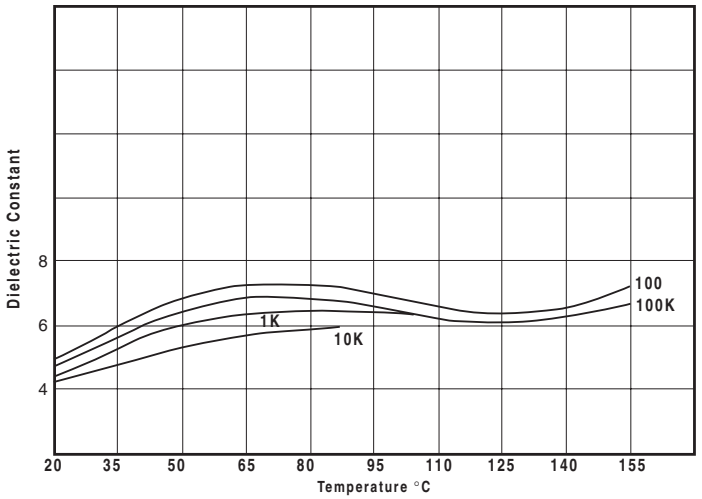
Brookfield Viscosity vs. Time @23°C (73°F)



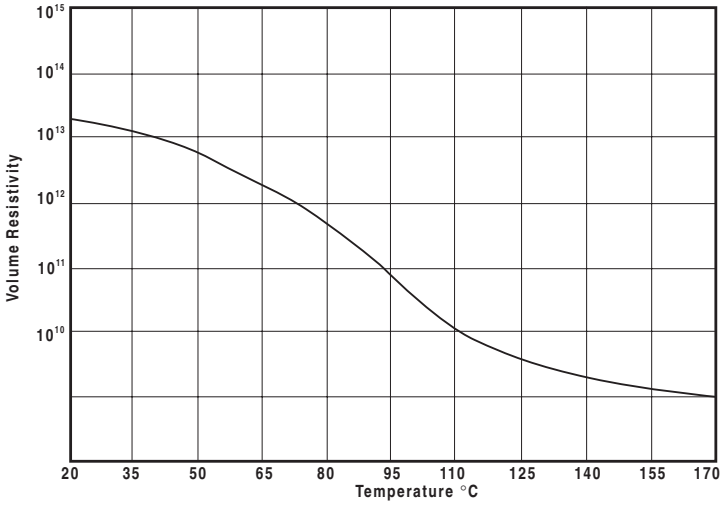
Dissipation Factor
MIL-I-16923E)
(Test Frequencies in Cycles/Sec.)



Dielectric Constant
MIL-I-16923E
(Test Frequencies in Cycles/Sec.)



Volume Resistivity
ohm-cm
MIL-I-16923E



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