



Scotchcast™ Electrical Resin 265

Epoxy Powder Resin for the Impregnation and Bonding of Coils and Laminations

Data Sheet

3M™ Scotchcast™ Electrical Resin 265 is a new solution to an old problem. Historically, manufacturers of coils, stators and armatures have used liquid-based varnishes or resins to coat and impregnate the copper windings to obtain better heat transfer, mechanical strength and environmental protection.

However, these liquids—originally natural resins, now mostly synthetic—have presented a number of problems to the user during the manufacturing process. Scotchcast 265 solves many of these problems:

- Does not require any mixing or catalyzation
- Does not contain any solvents
- Is non-flammable

- Has a long shelf life
- Requires storage at ordinary air-conditioned temperature
- Odor-free
- Spills are easy to clean
- Can be applied by trickle, spray or dip processes

Scotchcast 265 is a *powder*. It is simply applied to the heated windings where it melts, flows into the wire interstices and cures. Low melt viscosity and minimum build make this powder ideal for a variety of coating and bonding applications.

Scotchcast™ Electrical Resin 265 – Typical Properties

Property	Value
Color	Clear/White depending on thickness
Specific Gravity ¹ (cured)	1.16
Dielectric Strength ³ 12 to 15 mil coating	1300 v/mil
Thermal Shock ² 10 cycles - 75°C to 155°C 12-15 mil coating 1/8" sandblasted steel	Passes
Impact Resistance ² 12-15 mil coating 1/8" sandblasted steel panel Gardner 5/8" Radius Impact Tester	160 inch-lbs
Thermal Conductivity ⁴	0.18 W/mK
Abrasion Resistance ² - Removed From 12-15 mil coating	0.20 grams
Gel time ² @ 193°C hot plate	60 seconds

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

Test Methods

¹ ASTM D-792

² 3M Test Method

³ ASTM D-149

⁴ ASTM E 1530

In addition to the properties above, Scotchcast 265 has:

- Excellent electrical properties
- Excellent thermal shock and impact resistance
- 2-year shelf life from date of manufacture

Description

3M™ Scotchcast™ Electrical Resin 265 is a one-part, 100% solids insulation that offers superior adhesion, thermal and electrical properties. The resin is manufactured by a fusion blend process which ensures each particle of the powder contains all of the components necessary to completely cure and attain the stated performance properties. The liquid state is attained by melting during application, typically attained when a fluid bed method of application is chosen. Essentially, a fluid bed is simply a tank of the powder with air introduced from underneath through a porous membrane. With the air permeating the powder, the powder acts like a fluid. The resin instantly coats any hot part, such as a coil, when it is placed in the fluidized powder. Melting and impregnation of the resin occurs while the part is immersed in the powder (usually for just a few seconds) and upon removal. Additional heat to the part may be required to complete the cure. Other methods such as a powder spray can also be used.

UL Recognition

3M™ Scotchcast™ Electrical Resin 265 has a UL 1446 thermal classification of 200°C (392°F) helical coil and 180°C (356°F) twisted-pair with MW 35 magnet wire. The product is listed under UL File Number E309208.

Application

Conventional liquid varnish and trickle impregnating resins used for wire holding and anchoring of preformed coil windings can be replaced with Scotchcast 265 resin in applications where complete impregnation of the windings is not required. Fluid-bed dipping is the most common means of applying the powder. Preheating of the coils can be accomplished by conventional means or by resistance heating. The latter allows for selective deposition of the powder on only the windings, as the steel is still relatively cool.

Self-supporting coils can also be fabricated using this resin, thereby eliminating the need for bobbins, strapping and taping. In such a coil-winding application, wire is run through a 15 to 20% solution by weight of resin 265 in acetone and the acetone is then flashed off. (See Note A.) The result is an uncured, heat-activated coating. The coated wire is then formed into the coil shape desired and either resistance or conventionally heated to bond the wire tightly together.

Bonding of stator, rotor and transformer laminations is another use for Scotchcast 265 resin. The advantages are the elimination of bolts, rivets, pins and welds and the elimination of eddy currents and operating noise. A 15 to 20% solution by weight of resin 265 in acetone is applied to individual laminations before stacking. (See Note A.) After a solvent flash, the individual laminations can be handled and stacked as if they were bare laminations. Completed stacks can then be bonded using only contact pressure and heat. (See "Curing Guide.")

Note A: In using solvents, care must be exercised as recommended by their supplier to prevent health or flammability hazards.

Preheat Temperature Range

Before applying 265 resin, the part must be heated to 163°C–232°C (325°F–450°F). The optimum preheat temperature depends upon the size, the heat capacity and configuration of the object to be coated, as well as the method of application. The ideal coating temperature will vary for each individual application and is best determined by experimentation.

Curing Guide

The cure of 265 resin to a thermoset condition involves a time/temperature relationship. The figures below indicate the temperature and time necessary to obtain the resin's adhesion, impact and chemical resistance characteristics.

Temperature	Time*
149°C (300°F)	60 minutes
177°C (350°F)	20 minutes
204°C (400°F)	5 minutes
232°C (450°F)	2 minutes

*Time does not include that required to reach the cure temperature. The user must determine the time required for coated substrate to reach listed temperatures.

Handling and Safety Precautions

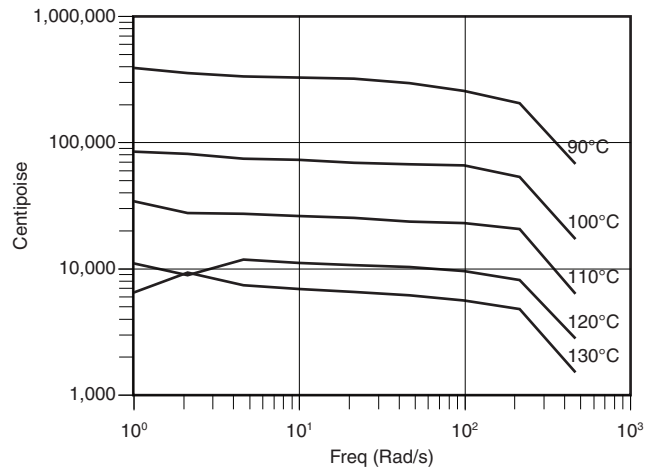
Read all Health Hazard, Precautionary and First Aid statements found in the Material Safety Data Sheet and/or product label of chemicals prior to handling or use.

Storage

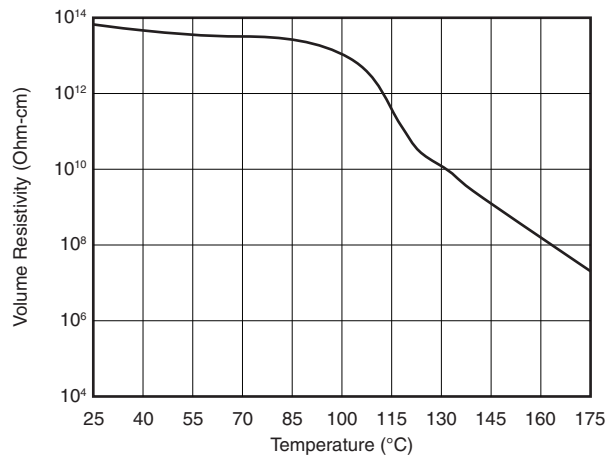
Laboratory evaluation indicates that the usable shelf life of this product is 24 months from date of manufacture when stored at temperatures not exceeding 27°C (80°F) and when the material is stored in its original container. Care should be taken when removing resin from the original container to prevent inclusion of foreign material. The bag should be resealed immediately after removing resin. Excess moisture will cause agglomeration. For best results, store in a cool, dry place.

Viscosity of Scotchcast 265 vs. Temperature

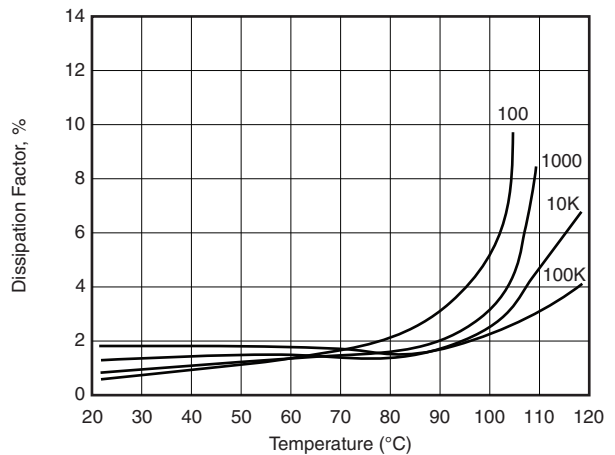
Viscosity vs. shear rate of the 3M powder resin between 90°C (194°F) and 130°C (266°F). The viscosity drops more than one order of magnitude over the temperature range. Assuming a logarithmic dependence on temperature (which is commonly assumed for polymeric fluids), the viscosity of the material would be an order of magnitude lower (700 cps) at 180°C (356°F) than it is at 130°C (266°F). Data up to 130°C (266°F) was collected because the material begins to slowly cure above 130°C (266°F).



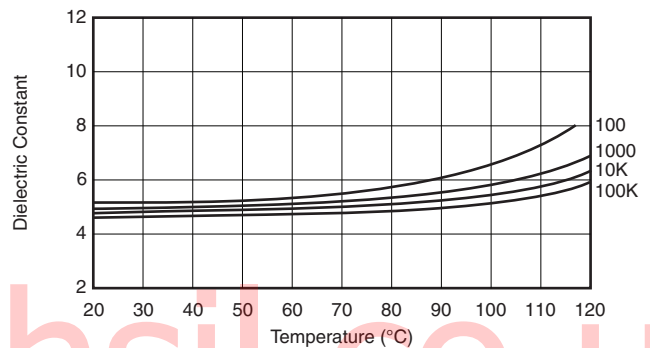
Volume Resistivity (Ohm-cm) ASTM D-257



Dissipation Factor MIL-I-16923E ASTM D-150 (Test frequencies in Hertz)



Dielectric Constant MIL-I-16923E ASTM D-150 (Test frequencies in Hertz)



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