



Scotchcast™ Electrical Resins 241, 243

Two-Part, Oven-Curing, Class B, Semiflexible, Filled Epoxy Liquid Resin

Data Sheet

Product Description

3M™ Scotchcast™ Electrical Resin 241 is a medium viscosity, semiflexible, two-part, heat-curing, brown pigmented, 100% solids epoxy resin system. Resin 243 is identical to 241, except it is unpigmented so it can be colored at any shade desired. This general purpose resin system has built-in flexibility, good adhesion, terminal shock and impact resistance, and stable electrical and physical properties at 130°C (Class B) continuous operation. This filled resin system is used where higher thermal conductivity and greater mechanical strength are required (as compared to the unfilled Scotchcast 235 resin). It is frequently used for motor encapsulation, transformer potting, and insulating other electrical and electronic components.

- Brown pigmented (Resin 241)
- Unpigmented (Resin 243)
- Class B rated
- Flexible

Handling Properties

Mix Ratio (A:B)	Wt 1:2
	Vol (%) 31:69
Viscosity	A = 175,000 cps
@ 23°C (73°F)	B = 9,000 cps
	Mixed = 15,000 cps
Density	A = 1.53 kg/l (12.71 lbs/gal)
	B = 1.36 kg/l (11.3 lbs/gal)
Flash Point	A = 202°C (395°F)
	B = 171°C (340°F)
Gel Time	22 min. @ 121°C (250°F)
Curing Guide	75°C (167°F) 15-20 hrs.
	95°C (203°F) 6-8 hrs.
	121°C (250°F) 2-3 hrs.

Test Methods

¹ 3M Test Methods	⁵ Fed. Std. No. 406, Method 1031
² MIL-I-16923E	⁶ Fed. Std. No. 406, Method 4031
³ Fed. Std. No. 406, Method 1022	⁷ Fed. Std. No. 406, Method 4021
⁴ Fed. Std. No. 406, Method 1011	⁸ Fed. Std. No. 406, Method 4041

Typical Properties

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

Property	Value*
Color 241	Brown
243	Cream
Specific Gravity (Mixed)	1.42
Flammability ²	Self-extinguishing
Compressive Strength ³ (10% Compression)	2000 psi (141 kg/cm ²)
Tensile Strength ⁴ (1/8" x 1/2" Sample)	1300 psi (91 kg/cm ²)
Elongation ⁴ (% @ break)	45
Flexural Strength ⁵	6000 psi (422 kg/cm ²)
Electric Strength ⁶ (1/8" [3.175 mm] Sample)	375 V/mil (14.8 kv/mm)
Hardness (Shore D)	65
Thermal Conductivity ² (cal · cm/cm ² · sec · °C)	8.0 x 10 ⁻⁴
Coefficient of Linear Thermal Expansion ² (23° C to 113°C) (length/unit length/°C)	13.6 x 10 ⁻⁶
Thermal Shock ¹ 10 cycles - 55C to 130°C 1/4" (6.35 mm) Olyphant Inserts	Passes
Thermal Shock ² Mechanical Shock ² (Ball drop, lbs.)	Passes > 7.8 (3.5 kg)
Moisture Absorption ² %Weight gain, 240 hrs. @96 % R.H.	.60
Water Immersion (sample cured 3 hrs. @ 120°C) 1000 hrs. @ 23°C % weight gain	0.85
Thermal Aging 1000 hrs. @ 130°C % Weight Loss	2.3
Hardness Change, Shore D	0
Dielectric Constant ⁷ (100 Hz @ 23°C)	5.6
Dissipation Factor ⁷ (100 Hz @ 23 °C)	.08
Volume Resistivity ⁸ (Ohm-cm @ 23°C)	1.6 x 10 ¹⁵
1000 hrs. @ 155°C % Weight Loss	9.6
Hardness (Shore D) Change	+16
Dielectric Constant ⁷ (100 Hz @ 23°C)	4.9
Dissipation Factor ⁷ (100 Hz @ 23 °C)	0.04
Volume Resistivity ⁸ (Ohm-cm @ 23°C)	2.9 x 10 ¹⁵

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

Usage Information

Mixing

Mix the separate parts before removing them from their containers. They may be warmed to 60°C (140°F) 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

Entrained air can be removed by evacuating for 5 to 15 minutes at 5 to 10 mm of mercury (Hg) absolute pressure. Warming the mixed resin to 60°C (140°F) facilitates air removal. Container side walls should be four times the height of 3M™ Scotchcast™ Electrical Resin to contain the foaming that takes place under vacuum.

Coloring

Inorganic color concentrates are recommended to color unpigmented resin 243. These concentrates are dispersed in epoxy resin and should be added to part A of the Scotchcast resins or to the mixed resin. Up to 3% by weight of the concentrate can be added to the total of the resin being blended. Following the manufacturer's directions, the user should first experiment with small batches of resin until the desired color is achieved before coloring the entire quantity.

Casting and Impregnating

Pour the warm resin into the preheated 100°C (212°F) 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 5mm of mercury (Hg) absolute pressure, or pour under vacuum and hold for several minutes before releasing. If impregnation is thought to be more important than thermal conductivity and mechanical strengths, the user should consider Scotchcast resins 235 and 237.

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 resin to reach curing temperatures.

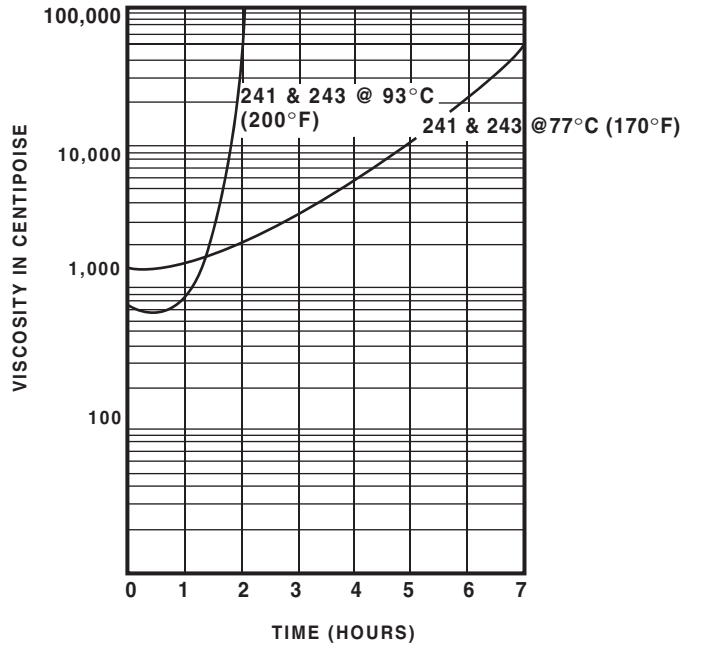
Storage

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.

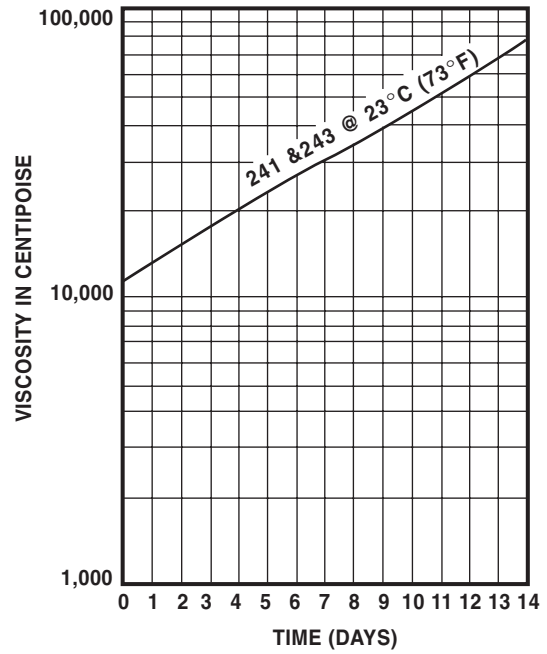
Handling and Safety Precautions

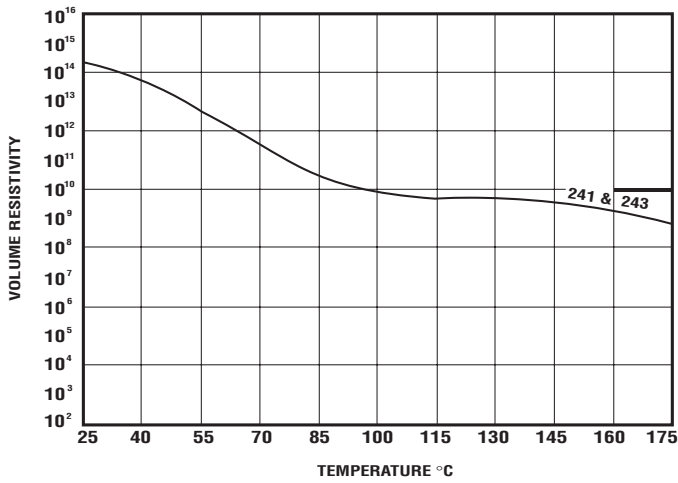
Read all Health Hazard, Precautionary and First Aid statements found in the Material Safety Data Sheet (MSDS) and/or product label of chemicals prior to handling or use.

Brookfield Viscosity vs. Time
 @77°C (170°F) & 93°C (200°F)

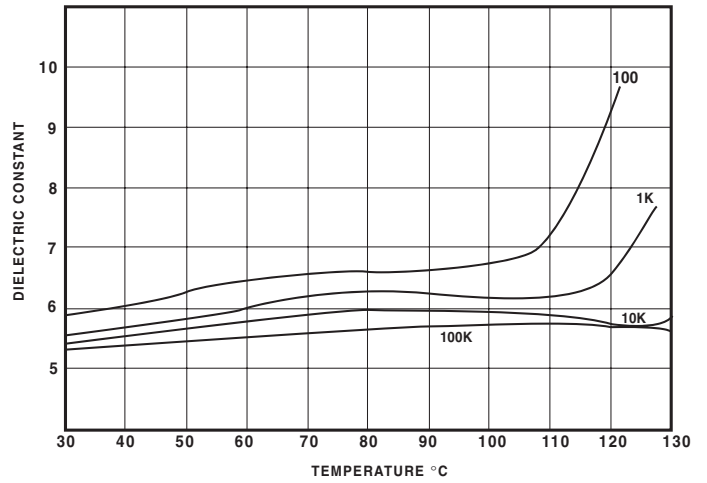


Brookfield Viscosity vs. Time
 @23°C (73°F)



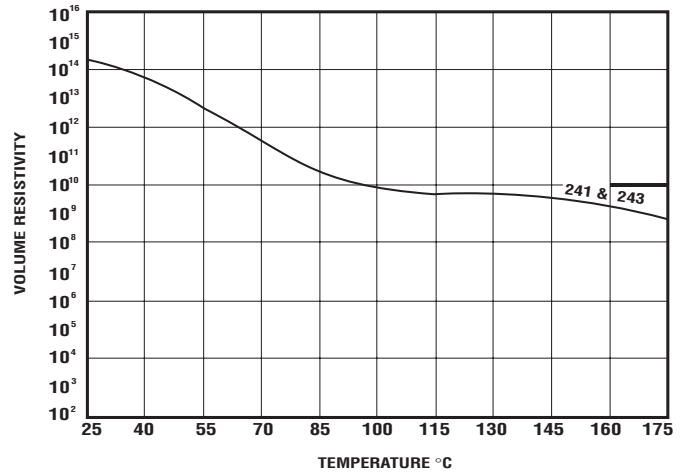


DIELECTRIC CONSTANT
 Fed. Std. 406, Method 4021
 (Test Frequencies in Hertz)



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

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



3M and Scotchcast are trademarks of 3M Company.

Important Notice

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

Warranty; Limited Remedy; Limited Liability. This product will be free from defects in material and manufacture for a period of one (1) year from the date of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. Except where prohibited by law, **3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.**

3M
 Electrical Markets Division
 6801 River Place Blvd.
 Austin, TX 78726-9000
 800/676-8381
 Fax: 800/828-9329
 www.3M.com/electrical/oem



Printed on 50% recycled paper
 with 10% post-consumer

Litho in USA
 © 3M 2004 78-8124-5678-4-B