

3M™ Scotchcast™

Electrical Resin MR283F075

Two-Part, Oven-Curing, Electrical Grade,
Semi-flexible, Filled, Epoxy Liquid Resin

Data Sheet

October 2014

Description 3M™ Scotchcast™ Electrical Resin MR283FO75 is a filled, epoxy resin system offering excellent physical, electrical and thermal properties. The filler, used in electrical resin MR283F075, is designed to minimize shrinkage and stresses, and provide increased thermal conductivity and thermal shock resistance. Applications include impregnation and encapsulation of coils, transformers, motors and other electrical and electronic components.

- Thermal shock resistant
- Hydrolytically stable
- Temperature rating – Class B or F

Handling Properties

Mix Ratio (A:B)	Wt 5:1 Vol. (%) 36.3 : 10
Viscosity @ 25°C (77°F)	A = 115,000 cPs B = 150 cPs Mixed = 6,800 cPs
Mixed viscosity after 18 hrs @ 25°C (77°F)	69,000 cPs
Specific Gravity @ 25°C (77°F) Part A Part B	1.59 1.16
Flash Point Part A or B	>150°C (302°F)
Gel Time	30 min. @ 121°C (250°F)
Curing Guide	75°C (167°F) 36 - 48 hrs 95°C (203°F) 8 - 10 hrs 120°C (248°F) 3 - 4 hrs

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Typical Properties

Not for specifications. Values are typical, not to be considered minimum or maximum. Properties measured at room temperature 73°F (23°C) unless otherwise stated.

Physical Properties *	Typical Value US units (metric)
Hardness (Shore D)	80
Specific Gravity (cured)³	1.55
Compressive Strength⁶ 10% Compression	5500 psi @ 10% (38.,7 kg/cm ²)
Tensile Strength² Ultimate	3700 psi (260,1 kg/cm ²)
Elongation (% at break)⁵	12
Flexural Strength⁷	3500 psi @ 5% (246.1 kg/cm ²)
Thermal Conductivity⁴ Cal • cm/cm ² • sec • °C Watt/m • k @ 29 °C	11.1 x 10 ⁻⁴ 0.463
Glass Transition Temp (Tg)	22°C
Linear Thermal Expansion (LTE)⁹ (length/unit length/°C) <Tg >Tg	.57 x 10 ⁻⁴ 1.65 x 10 ⁻⁴
Thermal Shock¹ 10 cycles -65 to 155°C 1/8" (3,165 mm) Olyphant Insert	Pass
Thermal Shock¹ 10 cycles – 55 to 130°C ¼" (6,35 mm) Olyphant Insert	Fail
Flame Retardancy²	Self-Extinguishing
Fungus Resistance¹⁰	Fungus Resistant Rating: 2

* For Test Method See Test Method table on next page

Electrical Properties *	Typical Value US units (metric)
Dielectric Strength¹¹ 1/8" (3,175mm) sample	372 V/mil
Dissipation Factor (%)¹²	Frequency > 100 1K
-@23°C	1.9<D.F.>3.3 1.6>D.F.<3.1
-@55°C	4.2<D.F.>5.8 3.5>D.F.<4.6
-@75°C	6.1<D.F.>14.3 4.61>D.F.<5.9
-@100°C	16<D.F.>66 6.2>D.F.<12.7
-@125°C	50<D.F.>-- 1.6>D.F.<--
-@150°C	-- 30> --

* For Test Method See Test Method table on next page

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Typical Properties,
continued

Not for specifications. Values are typical, not to be considered minimum or maximum.
Properties measured at room temperature 73°F (23°C) unless otherwise stated.

Electrical Properties *	Typical Value US units (metric)	
Dielectric Constant¹² -@23°C -@55°C -@75°C -@100°C -@125°C -@150°C	Frequency >	
	100	1K
	4.0	3.9
	4.7	4.5
	5.2	4.8
	6.4	5.2
	7.5	5.7
--	6.9	
Volume Resistivity (ohm-cm)¹³ -@23°C -@55°C -@75°C -@100°C -@125°C -@150°C	1.2 x 10 ¹⁵	
	6.4 x 10 ¹²	
	1.3 x 10 ¹¹	
	3.9 x 10 ¹⁰	
	6.7 x 10 ⁹	
	2.2 x 10 ⁹	

* For Test Method See Test Method Table Below

Test Methods

¹ – 3M Text Method	⁸ – MIL-I-22266C
² – MIL-I-16923G	⁹ – ASTM D-696
³ – ASTM D-792	¹⁰ – MIL STD-810G METHOD 508.6
⁴ – ASTM D-2440	¹¹ – ASTM D-149
⁵ – ASTM D-638	¹² – ASTM D-150
⁶ – ASTM D-695	¹³ – ASTM D-257
⁷ – ASTM D-790	

Properties After Thermal Aging for 1000 hrs	Typical Value
% Weight Loss @ 136°C	0.95
@ 155°C	3.43
@ 180°C	4.56
Hardness Change @ 136°C	4
@ 155°C	6
@ 180°C	8
Dissipation Factor (100 Hz) @ 136°C	0.0186
@ 155°C	0.0151
@ 180°C	0.0153
Dielectric Constant (100 Hz) @ 136°C	3.93
@ 155°C	4.15
@ 180°C	4.28
Temperature Class 130° to	155°C

Note: All electricals improve during thermal aging.

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Usage Information

Mixing

The following steps must be taken to insure the proper use and to obtain the optimum inherent properties of this 3M™ Scotchcast™ Electrical Resin MR283F075 system.

- 1.0 The part A may be preheated to 50-60°C (122-140°F) to aid in mixing. Do not heat above these temperatures for long periods as this can cause a tacky surface.
- 2.0 The part A must be thoroughly mixed to insure that no separation of filler or other ingredients has occurred.
- 3.0 Combine parts in the proper ratio to ± 2% by weight or volume.
- 4.0 Mix the combined parts thoroughly using a high speed and high shear mixer (100 to 1600 rpm). Mixing should continue for 4-6 minutes with power mixer. Mixing may be done by hand, but the results may not be consistent.

Mixing is the most important part of getting the most out of the resin system. Most problems are due to incomplete mixing and failure to scrape the sides and bottom of the mixing container. The sides and bottom should be scraped and forced into the bulk of the mixture several times during the mixing process. If this is not done, the units filled with resin from this portion of the container will have soft spots and sticky areas. Incomplete mixing can result in physical failures and less than maximum electrical properties.

De-aerating

Air introduced during mixing can be removed by evacuating for 5 to 15 minutes at 5 to 10 mm of mercury (Hg) absolute pressure (above 29.5 inches on typical dial gauge). Warming the resin to 60°C (140°F) aids air removal. The container sidewalls should be four times the height of the liquid resin to contain the foaming that takes place under vacuum.

Casting and Impregnating

For best results, both the resin and the part should be preheated to 50-100°C (122-212°F). Heating the resin and part aids in impregnation by reducing the viscosity significantly. For maximum impregnation, evacuate for 5 to 15 minutes at 5 to 10 mm of mercury (Hg) absolute pressure (about 29.5 inches on typical dial gauge), or pour under vacuum and hold for several minutes before releasing vacuum.

Curing

Where minimum stress and maximum shock resistance are required, the lower temperature cure cycle is suggested. Time should be added to the cure cycle times to allow the resin to reach the curing temperature. An additional post-cure of 8-16 hours at 110-120°C (230-248°F) will optimize physical and electrical properties regardless of the initial cure temperature.

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.

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Shelf Life & Storage All resins have a 2 year shelf life following the date of manufacture when stored in a humidity controlled storage (10°C/50°F to 27°C/80°F and <75% relative humidity). It is 3M's standard procedure to ship any resin product with at least 50% of its shelf life remaining. Any special request for a specific shelf life requirement may require a larger than stated MOQ that justifies a non-scheduled product run. Contact your 3M sale representative or Customer Service for specific shelf life MOQ requirements. No product returns will be accepted on special shelf life request orders.

Availability Please contact your local distributor; available from 3M.com/electrical/oem [Where to Buy] or call 1-800-676-8381.

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