

Starting Formulation

SF 8005

Laminating Compound for Drapable, Tacky Prepregs Used in High Temperature Applications EPON™ Resin SU-8 and SU-3

Introduction This laminating compound is designed for the preparation of drapable, tacky pre-pregs reinforced with fiberglass, graphite, boron, and other high strength fibers for fabrication by low pressure molding techniques into high temperature composites meeting the thermal and physical strength requirements of MIL-R-9300 A, Type II. A unique feature of this formulation is the ability to obtain a relatively long shelf life for B-staged prepregs. Glass fabric prepregs sandwiched between polyethylene release film and stored at 77 °F have retained their initial drapability, tack, and film characteristics for approximately four weeks.

Tape insulation of large electrical conductors by hand wrapping techniques is suggested as another application for this formulation, particularly when Class F or H performance is required.

Formula	<u>Material</u>	<u>Supplier</u>	<u>Pounds</u>	<u>Gallons</u>
	Formulation			
	EPON Resin SU-8	Hexion	60.0	6.06
	EPON Resin SU-3	Hexion	40.0	4.00
	Acetone	Shell Chemical Company	38.0	5.76
	AC Methyl Anhydride	Anhydrides & Chemicals, Inc.	61.0	5.98
	Argus DB VIII	Argus Chemical Company	<u>0.25</u>	<u>0.028</u>
	Total Formulation		199.25	21.828

Typical Formulation Table 1 / Properties of Laminating Solution
Properties

	<u>Units</u>	<u>Value</u>
Viscosity at 77 °F		
Initial	cP	280
After 14 day storage at 77 °F	cP	350
Density	lbs/gal	9.13

Preparation of Laminating Solution Dissolve the EPON Resin SU-8 and EPON Resin SU-3 into the acetone in a closed tank equipped with a condenser, heating jacket and agitator. Acetone solutions of both resins are available, if desired, for convenience. Cool the resin solution below 125 °F and add the AC Methyl Anhydride and Argus DB VIII catalyst. Continue agitation until a uniform, clear solution is obtained.

Impregnation and B-Staging Impregnate the fiber via transfer roll or squeeze roll techniques. Heating of all guide and squeeze rollers facilitates impregnation of the fiber strands.

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Using laboratory scale equipment, pre-preg stock was prepared by impregnation of Style 181 glass cloth. All excess laminating compound was removed with squeeze rolls. The impregnated fabric was B-staged in a forced draft oven for 10 minutes at 225 °F.

Under these conditions a drapable, slightly tacky prepreg was obtained. These characteristics were retained for approximately 4 weeks when the pre-preg was sandwiched between protective polyethylene release film and stored at 77 °F.

Optimum conditions for pre-preg production must be established for each manufacturing line since industrial equipment varies considerably with respect to air velocity, fiber tension, and varnish squeeze off devices.

Cure Conditions and Laminate Properties The following press and post cure conditions were employed with the pre-preg stock described above to fabricate a 12-ply, Style 181 glass laminate for testing versus the requirements of MIL-R-9300 A, Type II:

Platen temperature, °F	300
Contact period, minutes	15
Pressure, psi	30
Time in press, hours	1
Post cure,	hours 6 at 400 °F, plus 2 at 500 °F

Test data is compared with specification requirements in Table 1.

Laminate vs. Requirements Table 2 / Properties of a Glass Laminate¹ vs. MIL-R-9300A, Type II Requirements

Laminate property	Specification Limit	Test Value
Resin content	—	30% by wt.
Flexural strength, psi		
at 77 °F	70,000 Min.	76,000
at 160 °F	65,000 Min.	68,000
at 500 °F	22,000 Min.	25,000
at 500 °F, after 192 hrs at 500 °F	18,000 Min.	24,000
Flexural modulus, 10 ⁶ psi		
at 77 °F	3.2 Min.	3.4
at 160 °F	3.2 Min.	3.4
at 500 °F	2.0 Min.	2.6
at 500 °F, after 192 hrs at 500 °F	1.8 Min.	2.4

Storage Recommendations regarding storage conditions can be obtained by visiting our web site at www.hexion.com

General Information

These are starting formulations and are not proven in the user's particular application but are simply meant to demonstrate the efficacy of the products and to assist in the development of the user's own formulation. It is the user's responsibility to fully-test and qualify the formulation,

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along with the ingredients, methods, applications or equipment identified herein ("Information"), by the user's knowledgeable formulator or scientist, and to determine the appropriate use conditions and legal restrictions, prior to use of any Information.

Safety, Storage & Handling

Please refer to the MSDS for the most current Safety and Handling information.

Exposure to these materials should be minimized and avoided, if feasible, through the observance of proper precautions, use of appropriate engineering controls and proper personal protective clothing and equipment, and adherence to proper handling procedures. None of these materials should be used, stored, or transported until the handling precautions and recommendations as stated in the Material Safety Data Sheet (MSDS) for these and all other products being used are understood by all persons who will work with them. Questions and requests for information on Hexion Inc. ("Hexion") products should be directed to your Hexion sales representative, or the nearest Hexion sales office. Information and MSDSs on non-Hexion products should be obtained from the respective manufacturer.

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For product prices, availability, or order placement, please contact customer service:

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