

Starting Formulation

SF 7008

Flame Retardant Epoxy Premix Molding Compound EPON™ Resin 828 / HELOXY™ Modifier 505

Introduction This formulation illustrates the preparation of a stable, low cost, flame retardant epoxy premix, molding compound. It is based on a stress relieving epoxy resin and modified with a vinyl chloride polymer to eliminate binder “squeeze-out” at the mold part line. Parts molded with this compound exhibit good thermal shock resistance.

- Suggested Uses**
- Electrical component encapsulation, such as motors and coils requiring up to 5 pounds of compound per unit
 - Foundry sand-core boxes, pipe fittings and cases

Formula	Material	Supplier	Pounds	Gallons
	EPON Resin 828	Hexion	90	9.32
	HELOXY Modifier 505	Hexion	10	1.17
	Geon 440 x 24	B. F. Goodrich Co.	9	0.77
	Black Iron Oxide	Akrochem Corp.	9	0.22
	Candelilla Wax (powdered)	Cornelius Wax Refining Co.	3	0.43
	ASP 101 Aluminum Silicate	J. M. Huber Corp.	91	4.23
	Novacite 325 Silica	Malvern Chemicals Co.	227	10.09
	Tetrachlorophthalic Anhydride	Monsanto Co.	84	5.15
	Zinc, Stearate, (powdered)	Witco Chemical Corp.	9	0.99
	1/8-inch Chopped Glass, with compatible finish	Owens Corning Fiberglas Co.	<u>28</u>	<u>1.33</u>
			560	33.70

Typical Handling Properties Table 1 / Handling Properties

Form	fiber-filled cake, extruded rope, or preform		
Density		lbs/gal	16.7
Color			black
Spiral Flow (EMMI 1-66) at 1000 psi/150 °C	Storage 23 °C	Temperature 38 °C	
Initial	43	43	
1 week	38	37	
2 weeks	35	32	

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3 weeks	35	28
4 weeks	35	25
5 weeks	35	24

Compounding Blend the epoxy resins and Geon 440 x 24 in a high shear mixer with a heating/cooling jacket, such as a J. H. Day Mixtruder. Heat to 107° or 121 °C and continue agitation until the vinyl polymer dissolves. Add and disperse the pigments and fillers while lowering the batch temperature to 79 °C or below. Then add candelilla wax and zinc stearate, and disperse thoroughly. Maintain the temperature at 79 °C, and add the tetrachlorophthalic anhydride and chopped glass fibers. For structural applications, use additional glass fibers up to 1-inch in length for increased impact resistance. Continue mixing, for 5 to 10 minutes, until all components are thoroughly wetted out. Discharge into shallow trays to cool and cover with plastic film to prevent hydrolysis of the anhydride by atmospheric moisture. Store the premix as a loose cake, extruded rope, or preforms in sealed containers under refrigeration or at normal room temperature.

Molding This premix can be transfer or compression molded. Transfer pressures ranging from 500 to 1000 psi at mold temperatures ranging from 135 to 180°C are typical. Practical press cycles at these temperatures are 1 to 5 minutes in duration. Dielectric preheating will facilitate low pressure transfer molding.

Typical Cured State Properties Table 2 / Cured State Properties¹

	<u>Units</u>	<u>Value</u>
Tensile Strength, Ultimate	psi	6,500
Tensile Elongation	%	0.3
Tensile Modulus, Initial	ksi	2100
Flexural Strength, Ultimate	psi	12,500
Flexural Modulus, Initial	10 ⁶ psi	1.5
Compressive Strength, Ultimate	psi	21,400
Izod Impact, notched	ft•lb/in.	0.4
Water Absorption ²	%	0.04
Weight Loss ³	%	0.46
Flame Retardancy per ASTM D-635		self-extinguishing ⁴
Linear Shrinkage	inch/inch	0.007
Electrical Properties		
<u>Volume Resistivity</u>		
at 23°C	ohm•cm	3(10) ¹⁵
at 66°C	ohm•cm	7(10) ¹⁴
at 93°C	ohm•cm	4(10) ¹⁴
at 130°C	ohm•cm	8(10) ¹³
at 150°C	ohm•cm	4(10) ¹²
at 180°C	ohm•cm	9(10) ¹⁰

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<u>At 60 Hertz</u>	<u>Dielectric Constant</u>	<u>Dissipation Factor</u>
at 25 °C	4.56	0.004
at 40 °C	4.60	0.007
at 60 °C	4.66	0.010
at 80 °C	4.82	0.012
at 100 °C	5.00	0.017
at 120 °C	4.59	0.031
at 140 °C	4.94	0.035
at 160 °C	6.08	0.047

¹ Determined on specimens that were press cured for 3 minutes at 150 °C and 1,000 psi.

² Percent weight gain after immersion for 24 hours at 25 °C.

³ Percent weight loss determined over 24 hours at 150 °C.

⁴ A non-burning rating can be achieved by incorporating 5 parts by weight of antimony oxide into the formulation.

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, 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.

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Contact Information

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

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For literature and technical assistance, visit our website at www.hexion.com

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