Starting Formulation

SF 7011

General Purpose Electric Molding Compounding
EPON™ Resin 1002F

Introduction This general purpose electrical molding compound provides good mechanical and electrical properties for transfer or compression molding of electrical and electronic components. The combination of tetrachlorophthalic anhydride and 3,3' 4,4'-benzophenone tetracarboxylic dianhydride provides acceptable cured state properties at a low press cycle temperature of 150 °C.

Formula

Material	Supplier	Pounds
EPON Resin 1002F	Hexion	100.0
Tetrachlorophthalic Anhydride,(TCPA)	Monsanto Co.	22.7
3,3'4,4'-Benzophenone Tetracarboxylic Dianhydride, (BTDA)	Allco Chemical Co.	11.2
Zinc Stearate	Witco Chemical Corp.	6.0
Carnauba Wax	Frank B. Ross Co., Inc.	1.3
Carbon Black	Columbian Chemical Co.	1.3
Fused Silica, GP-111	Cambell Chemical Co.	317.4
	Total	459.9

Compounding Grind components not supplied in powder form to a particle size finer than 50 mesh using a hammermill. All anhydrides need to be approximately 325 mesh. Add raw materials in the order given and blend to a homogeneous mix. A Twin-Shell blender equipped with an intensifier bar works well for this step. Charge the loose powder in the feed hopper of a single or double screw extruder, or a 2-roll mill, between 71 and 88 °C. Granulate to between 8 and 50 mesh for general purpose use or press into preforms after granulating for subsequent molding.

Typical Handling Properties Table 1 / Handling Properties

	Units	Value
Form		Granular
Color		Black
Gel Time		
at 150 °C	sec.	60
at 180 °C	sec.	28
Specific Gravity at 25 °C	g/ml	1.76

Molding Conditions Satisfactory cures can be achieved in 1 to 4 minutes at 120 to 180 °C in a transfer press. A press cycle time of less than 2 minutes is practical for parts molded in the temperature range of 150 to 180 °C. A useful transfer pressure range is 500 to 2,000 psi.

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Typical Molding Properties

Table 2 / Molded Properties

	Units	Value
Spiral Flow per EMMI 1-66, 1,000 psi at 180 °C	in	46
Hot Hardness upon ejection from 180 °C mold	Shore D	75

Typical Cured State Properties

Table 3 / Cured State Properties [1]

Physical Properties	Units	As Molded	Post Cured [2]
Heat Deflection Temperature	°C	115	130
Tensile Strength	psi	11,000	10,500
Flexural Strength	psi	20,000	18,500
Molded Density	gm/cc	1.76	1.76
Mold Shrinkage	cm/cm	0.006	0.006
Electrical			
Volume Resistivity			
at 25 °C	ohm•cm	1.0×10^{16}	4.0×10^{16}
at 66 °C	ohm•cm	2.8×10^{15}	5.7×10^{15}
at 93 °C	ohm•cm	1.6×10^{14}	4.2×10^{14}
at 130 °C	ohm•cm	5.2×10^{12}	8.7×10^{12}
at 150 °C	ohm•cm	4.5×10^{11}	5.5×10^{11}
at 180 °C	ohm•cm	4.0×10^{10}	4.8×10^{10}
Dielectric Constant			
at 25 °C		3.79	3.71
at 40 °C		3.80	3.72
at 60 °C		3.81	3.71
at 80 °C		3.86	3.74
at 100 °C		3.91	3.76
at 120 °C		4.23	3.96
at 140 °C		4.35	4.16
at 160 °C		4.36	4.19
at 180 °C		4.39	4.21
Dissipation Factor			
at 25 °C		0.002	0.002
at 40 °C		0.002	0.002
at 60 °C		0.002	0.002
at 80 °C		0.004	0.002

at 100 °C	0.009	0.004
at 120 °C	0.025	0.020
at 140 °C	0.020	0.020
at 160 °C	0.040	0.016
at 180 °C	0.076	0.036
Loss Factor		
at 25 °C	0.009	0.007
at 40 °C	0.007	0.006
at 60 °C	0.008	0.006
at 80 °C	0.015	0.009
at 100 °C	0.034	0.015
at 120 °C	0.106	0.081
at 140 °C	0.085	0.084
at 160 °C	0.173	0.087
at 180 °C	0.335	0.151

[1] Values were obtained by testing bars molded from dielectrically heated preforms at 175 °C for 3 minutes at 1,000 psi.

[2] Bars were postcured for 4 hours at 175 °C.

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

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Safety, Storage & Handling

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