



THE GUND COMPANY

Manufacturers & fabricators of engineered material solutions

Item:	E311 (G-13) from The Gund Company		
Description:	E311 (G-13) from The Gund Company is a continuous filament woven fiberglass sheet bonded with a special track resistant high temperature epoxy resin. The material has the ability to maintain excellent mechanical, electrical, and physical properties at elevated temperatures to 180°C. E311 (G-13) from The Gund Company can specifically meet 600V track resistance and V-O flame resistance.		
Standards:	NEMA LI-1 (IM 60000): Grade G-11, G-12, G-13, FR5	MIL-I-24768/28: EN 45545 R22/HL3 and R23/HL3	IEC 60893: EP GC 306, 308, 309, 310, 311
Availability:	Laminate Sheets:	Thickness:	English Units (in)
			SI Units (mm/cm)
	Standard Sheet Sizes:	30 x 48, 48 x 60, 48 x 120	76 x 122, 122 x 152, 122 x 305
Fabricated Parts:	The Gund Company custom fabricates insulation materials to the exact specifications and drawings of our customers.		

Key Characteristics	Units - English (SI)	Typical Values
Standard Color	--	Green ²
Specific Gravity	lbs/in ³ (g/cc)	0.069 (1.9)

² Custom colors available upon request

Engineering Properties

Key Characteristics	Test Method	Units - English (SI)	Typical Values
Tensile Strength (0.125") - LW	ASTM D-638	ksi (MPa)	41 (283)
Compressive Strength - <u>L</u> (0.500")	ASTM D-695	ksi (MPa)	70 (483)
Flexural Modulus (0.062")	LW CW ASTM D-790	ksi (GPa)	4,200 (29) 4,000 (27.6)
Coefficient of Thermal Expansion	--	PPM/°C	10
Comparative Tracking Index (0.125")	IEC 60112	V	600
Dielectric Strength (0.062") Condition A, Oil	ASTM D-149	V/mil	485

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Material Data Sheet

Grade: E311 (G-13)

NEMA LI-1 IM 600000 FR5 G-13 Required Properties

Key Characteristics	Test Method	Units	NEMA Required	Typical Values
Breakdown Voltage (0.062") // Condition A Condition D-48/50	ASTM D-149	kV	45.0 min 40.0 min	>50 >50
Permittivity @ 1MHz (0.125") Condition A Condition D-24/30	ASTM D-150	--	5.20 5.40	4.7 4.8
Dissipation Factor@ 1MHz (0.187") Condition A Condition D-24/30	ASTM D-150	--	0.025 max 0.035 max	0.014 0.017
IZOD Impact Strength (0.125") LW Condition E-48/50 CW Condition E-48/50	ASTM D-256	ft.-lb/in Notched	7.0 min 5.5 min	11 10
Flexural Strength (0.062") LW Condition A LW Condition A LW Condition E-150-T150	ASTM D-790	ksi (MPa)	60.0 (414) min 50.0 (345) min 30.0 (207) min	80.0 (552) 70.0 (486) 40.0 (276)
Bonding Strength (0.500") Condition A Condition D-48/50	ASTM D-229	Lb (kg)	1,600 min 1,500 min	2,200 (998) 2,000 (907)
Moisture Absorption (0.062")	ASTM D-570	%	0.25 max	0.01
Flammability	UL94	Class	VO	VO*

* From 3 mm

IEC 60893 EPGC 311 Required Properties

Flammability	Test Method	Units	IEC Required	Typical Values
Flexural Strength LW Condition A LW Condition E-150/T-150	ISO 178	MPa	340 min 170 min	486 276
Charpy Impact Strength	ISO 180	kJ/m ²	34 min	45
Perpendicular Electric Strength (90°C in Oil, 1.5mm)	IEC 60243-1	kV/mm	13 min	15
Parallel Breakdown Voltage (Stepped 90°C in Oil, 3mm)	IEC 60243-1	kV	35 min	>45
Insulation Resistance (After Water Immersion)	IEC 60167	MΩ	5 x 10 ⁴ min	>10 ⁷
Thermal Endurance	IEC 60216	°C	180	180
Water Absorption (4mm)	ISO 62	mg	19 max	4.2
Flammability	UL 94	Class	VO	VO*

* From 3 mm

All of the information, suggestions and recommendations pertaining to the properties and uses of the products herein are based upon tests and data believed to be accurate; however, the final determination regarding suitability of any material described herein for the use contemplated, the manner of such use, and whether the use infringes any patents is the sole responsibility of the user. There is no warranty, expressed or implied, including, without limitation warranty of merchantability or fitness for a particular purpose. Under no circumstances shall we be liable for incidental or consequential loss or damage. TGCR0617