



# THE GUND COMPANY

MANUFACTURERS & FABRICATORS OF ENGINEERED MATERIAL SOLUTIONS

## NEMA G-11/G-11H

<b>Item:</b>	<b>NEMA Grade G-11/G-11H</b>		
<b>Description:</b>	NEMA Grade G-11 materials are continuous filament woven fiberglass sheet bonded with high temperature epoxy resin. The material has the ability to maintain excellent mechanical, electrical, and physical properties at elevated temperatures to 180°C. NEMA G-11 from The Gund Company is RoHS and REACH compliant to ensure reliability, safety, and consistency.		
<b>Standards:</b>	NEMA IM 60000: Grade G-11 • IEC 60893: EP GC 308 & 203 (sheet), IEC 61212: EPGC22 (tube)		
<b>Availability:</b>	<b>Laminate Sheets:</b>	Thickness:	English Units (in) 0.010 to 5.0
		Sheet Size:	SI Units (mm/cm) 0.25 to 127 (mm) 76 x 122 / 122 x 152, 122 x 244 / 122 x 305 (cm)
	<b>Convolute Tubing:</b>	G-11 convolute tubes are available from The Gund Company in nearly any custom size of inside and outside diameter, per customer requirements.	
	<b>Fabricated Parts:</b>	The Gund Company custom fabricates insulation materials to the exact specifications and drawings specified by our customers. <sup>1</sup>	

<sup>1</sup> Currently there is no standard for NEMA G-11 Tube. All properties meet G10 Class H (180 °C) and EPGC22

Key Characteristics	Units - English (SI)	Typical Values
Standard Color	--	Green <sup>2</sup>
Density	lbs/in <sup>3</sup> (g/cc)	0.069 (1.9)

<sup>2</sup> Custom colors available upon request

### Additional Engineering Properties

Key Characteristics	Test Method	Units - English (SI)	Typical Values
Tensile Strength   (0.125"), Lengthwise	ASTM D-638	ksi (MPa)	41 (283)
Compressive Strength (0.500")	ASTM D-695	ksi (MPa)	70 (483)
Flexural Modulus (0.062")	ASTM D-790	ksi (GPa)	Lengthwise 4,200 (29)
			Crosswise 4,000 (27.6)
Coefficient of Thermal Expansion	--	"/°C x 10 <sup>-6</sup>	10
Comparative Tracking Index (0.125")	ASTM D-3638	V	180
Dielectric Strength (0.062"), Condition A, Oil	ASTM D-149	V/mil	485



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## NEMA LI-1 G-11 Required Properties

Key Characteristics		Test Method	Units	NEMA Required	Typical Values
Breakdown Voltage (0.062")	Condition A	ASTM D-149	kV	45.0 min	>50
	Condition D-48/50			40.0 min	>50
Permittivity at 1 MHz (0.125")	Condition A	ASTM D-150	--	5.20	4.7
	Condition D-24/30			5.40	4.8
Dissipation Factor at 1 MHz (0.187")	Condition A	ASTM D-150	--	0.025 max	0.014
	Condition D-24/30			0.035 max	0.017
IZOD Impact Strength (0.125")	LW Condition E-48/50	ASTM D-256	ft-lb/in, Notched	7.0 min	11
	CW Condition E-48/50			5.5 min	10
Flexural Strength (0.062")	LW Condition A	ASTM D-790	ksi (MPa)	60.0 (414) min	80.0 (552)
	CW Condition A			50.0 (345) min	70.0 (486)
	LW Condition E-150/T150			30.0 (207) min	40.0 (276)
Bonding Strength (0.500")	Condition A	ASTM D-229	Lb (kg)	1,600 min	2,200 (998)
	Condition D-48/50			1,500 min	2,000 (907)
Moisture Absorption (0.062")		ASTM D-570	%	0.25 max	0.01
Flammability (0.250")		UL94	Class	HB	VO <sup>3</sup>

<sup>3</sup>G-11H from The Gund Company is VO at 0.25" and greater thickness. Below this thickness is HB

## IEC 60893 EPGC 308 Required Properties

Key Characteristics		Test Method	Units	IEC Requirement	Typical Values
Flexural Strength	LW Condition A	ISO 178	MPa	340 min	486
	LW Condition E-150/T-150			170 min	276
Charpy Impact Strength		ISO 179	kJ/m <sup>2</sup>	34 min	45
Perpendicular Electric Strength (90°C in Oil, 1.5 mm)		IEC 60243-1	kV/mm	13 min	15
Parallel Breakdown Voltage (Stepped 90°C in Oil, 3 mm)		IEC 60243-1	kV	35 min	>45
Insulation Resistance (After Water Immersion)		IEC 60167	MΩ	5 x 10 <sup>4</sup> min	>10 <sup>7</sup>
Thermal Endurance		IEC 60216	°C	180	180
Water Absorption (4 mm)		ISO 62	mg	23 max	4.2

Data supplied above are typical values and are not to be considered specification values. 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 contemplated application, 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.