

Industrial Laminates/Norplex ES-2 Engraving Stock

Category : Polymer , Thermoset , Phenolic

Material Notes:

Description: Composed of black phenolic paper core, sub surfaces of white melamine, and various pigmented cover plies.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Industrial-LaminatesNorplex-ES-2-Engraving-Stock.php

Physical Properties	Metric	English	Comments
Specific Gravity	>= 1.40 g/cc	>= 1.40 g/cc	
Moisture Absorption at Equilibrium	2.5 % @Thickness 1.57 mm	2.5 % @Thickness 0.0620 in	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell M	100 @Thickness 1.57 mm	100 @Thickness 0.0620 in	
Tensile Strength, Yield	63.4 MPa @Thickness 3.17 mm	9200 psi @Thickness 0.125 in	CW
	72.4 MPa @Thickness 3.17 mm	10500 psi @Thickness 0.125 in	LW
Flexural Strength	93.1 MPa @Thickness 1.57 mm	13500 psi @Thickness 0.0620 in	CW
	93.1 MPa @Thickness 1.57 mm	13500 psi @Thickness 0.0620 in	LW
Flexural Modulus	10.3 GPa @Thickness 1.57 mm	1500 ksi @Thickness 0.0620 in	CW
	10.3 GPa @Thickness 1.57 mm	1500 ksi @Thickness 0.0620 in	LW
Compressive Strength	172 MPa @Thickness 12.7 mm	25000 psi @Thickness 0.500 in	Flatwise
Izod Impact, Unnotched	0.294 J/cm @Thickness 12.7 mm	0.550 ft-lb/in @Thickness 0.500 in	CW, E-48/50
	0.320 J/cm	0.600 ft-lb/in	LW, E-48/50

Mechanical Properties	@Thickness 12.7 mm Metric	@Thickness 0.500 in English	Comments
Thermal Properties	Metric	English	Comments
CTE, linear	10.0 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$ @Temperature 20.0 $\text{Å}^\circ\text{C}$	5.56 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$ @Temperature 68.0 $\text{Å}^\circ\text{F}$	x-axis
CTE, linear, Transverse to Flow	14.0 $\mu\text{m}/\text{m}\cdot\text{Å}^\circ\text{C}$ @Temperature 20.0 $\text{Å}^\circ\text{C}$	7.78 $\mu\text{in}/\text{in}\cdot\text{Å}^\circ\text{F}$ @Temperature 68.0 $\text{Å}^\circ\text{F}$	y-axis
Maximum Service Temperature, Air	120 $\text{Å}^\circ\text{C}$	248 $\text{Å}^\circ\text{F}$	Maximum Operating Temperature
Flammability, UL94	V-1	V-1	

Electrical Properties	Metric	English	Comments
Dielectric Breakdown	5000 V @Thickness 1.57 mm	5000 V @Thickness 0.0620 in	D-48/50
	50000 V @Thickness 1.57 mm	50000 V @Thickness 0.0620 in	Condition A
Arc Resistance	120 sec @Thickness 3.17 mm	120 sec @Thickness 0.125 in	ASTM D495

Descriptive Properties	Value	Comments
Bond Strength	1,000 lb	0.5"

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