

# TECHNICAL DATA SHEET

## Paper Phenolic

A paper base phenolic laminate with good mechanical properties, high dielectric strength, and good resistance to moisture. These materials consist of multiple plies of various paper impregnated with phenolic resins and laminated under heat and pressure to produce a thermoset composite. Both papers and resins can be modified to change the finished properties of the final laminate. These products offer thermal, mechanical isolation, thermal and electrical insulation properties that meet or exceed those of most thermoplastic materials. The properties and cost-effectiveness of these products often make them the insulators of choice in low-voltage, dry-service electrical equipment.

### GENERAL DESCRIPTION

Phenolic Laminates are produced by applying heat and pressure to layers of paper, canvas, linen or glass cloth impregnated with synthetic thermosetting resins. When heat and pressure are applied to the layers, a chemical reaction (polymerization) transforms the separate layers into a single laminated material with a "set" shape that cannot be softened again -- therefore, these materials are called "Thermosets". A variety of resin types and cloth materials can be used to manufacture thermoset laminates with a range of mechanical, thermal, and electrical properties.

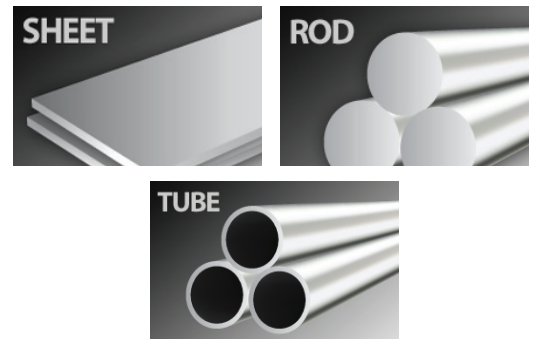
#### Benefits

Good electrical properties  
 Extremely high strength over temperature  
 High dimensional stability over temperature  
 Humidity resistant

#### Applications

Terminal boards  
 Electrical  
 Electronic test equipment  
 Electric rotor insulation  
 High humidity applications

#### SHAPES AVAILABLE



**SEE NEXT PAGE FOR ADDITIONAL INFORMATION**

## TYPICAL PROPERTIES of PHENOLIC LAMINATES ( SHEET FORM )

( mechanical properties of rod and tube forms may differ )

ASTM or UL test	Property	Paper	Canvas	Linen
<b>PHYSICAL</b>				
D792	Density (lb/in <sup>3</sup> ) (g/cm <sup>3</sup> )	0.049 1.35	0.050 1.37	0.048 1.34
D570	Water Absorption, 24 hrs (%)	2.0	2.5	1.8
<b>MECHANICAL</b>				
D638	Tensile Strength (psi) -lengthwise -crosswise	15,000 12,000	11,000 9,000	13,000 9,000
D790	Flexural Strength (psi)-lengthwise -crosswise	16,000 13,200	17,500 15,000	22,000 16,000
D790	Flexural Modulus (psi)-lengthwise -crosswise	1,100,000 900,000	1,600,000 1,500,000	1,600,000 1,200,000
D256	IZOD Notched Impact (ft-lb/in)- lengthwise -crosswise	0.65 0.60	1.70 1.50	1.35 1.10
D695	Compressive Strength (psi)	32,000	37,000	37,000
D785	Hardness, Rockwell M	M100	M100	M100
<b>THERMAL</b>				
D696	Coefficient of Linear Thermal Expansion (x 10 <sup>-5</sup> in./in./°F) -lengthwise -crosswise	0.80 1.20	1.10 1.22	1.00 1.06
-	Max Operating Temp (°F / °C)	257 / 125	257 / 125	285 / 140
C177	Thermal Conductivity (BTU-in/ft <sup>2</sup> -hr-°F) (x 10 <sup>-4</sup> cal/cm-sec-°C)	2.03 7.0	2.03 7.0	2.03 7.0
UL94	Flammability Rating	H-B	H-B	H-B
<b>ELECTRICAL</b>				
D149	Dielectric Strength (V/mil) short time, 1/8" thick	750(XX)	550(CE)	625(LE)
D150	Dielectric Constant at 1 MHz	5	5	6
D150	Dissipation Factor at 1 MHz	0.045	-	0.045
D495	Arc Resistance (sec)	110	15	15

NOTE: The information contained herein are typical values intended for reference and comparison purposes only. They should NOT be used as a basis for design specifications or quality control. Contact us for manufacturers' complete material property datasheets.  
All values at 73°F (23°C) unless otherwise noted.