

PLASTIC-CRAFT Phenolic

Phenol-Formaldehyde Laminate (Canvas / Linen / Paper)

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A proven thermoset laminate with over a century of industrial use. Phenolic laminates (Micarta® / Garolite®) combine excellent electrical insulation, heat resistance, and mechanical strength at an economical price. The go-to material for electrical insulation boards, structural supports, and wear surfaces.

STOCK AVAILABILITY

Sheets, rods, and tubes in CE, LE, XX, X, and G-10/FR-4 grades. Wide range of thicknesses from stock.

KEY HIGHLIGHTS

Excellent electrical insulation
High heat resistance (thermoset)
Good mechanical strength
Low cost per performance
Will not melt — chars in place
Easy to machine

✓ The industry standard for electrical insulation boards & structural laminates

COMMON APPLICATIONS

Electrical insulation boards
Terminal strips & bus bars
Gears & wear strips
Structural support members
Transformer components
Jigs & fixtures
Circuit board substrates

GRADES AVAILABLE

CE (canvas, mechanical)
LE (linen, fine finish)
XX (paper, electrical)
X (paper, economical)
G-10 (glass/epoxy)
FR-4 (flame retardant glass)

MATERIAL PROPERTIES — TYPICAL VALUES (CE CANVAS GRADE)

PROPERTY	ASTM	TYPICAL VALUE	UNITS
PHYSICAL			
Specific Gravity	D792	1.35 – 1.40	—
Water Absorption, 24h	D570	0.50 – 1.50	%
MECHANICAL			
Tensile Strength (lengthwise)	D638	9,000 – 11,000	psi (62–76 MPa)
Flexural Strength (lengthwise)	D790	16,000 – 18,000	psi (110–124 MPa)
Flexural Modulus	D790	1,100,000	psi (7,580 MPa)
Compressive Strength (flatwise)	D695	30,000 – 35,000	psi (207–241 MPa)
Impact, Izod Notched (edgewise)	D256	3.5 – 5.0	ft-lb/in (187–267 J/m)
Hardness, Rockwell	D785	M100 – M110	—
THERMAL			
Max Continuous Service	—	250 – 300	°F (121–149°C)
Heat Deflection @ 264 psi	D648	> 350	°F (> 177°C)
CTE (Linear)	D696	1.2 – 1.5 × 10 ⁻⁵	in/in/°F
Thermal Conductivity	C177	2.4	BTU·in/hr·ft²·°F
ELECTRICAL			
Volume Resistivity	D257	10 ⁹ – 10 ¹²	ohm·cm
Dielectric Strength (perpendicular)	D149	200 – 400	V/mil
Dielectric Constant, 1MHz	D150	4.0 – 5.5	—
Arc Resistance	D495	~5	seconds
FLAMMABILITY			
Burn Behavior	UL 94	SE / HB	FR-4 = V-0
Limiting Oxygen Index	D2863	25 – 35	%

PROCESSING / FABRICATION NOTES: Thermoset — will not melt or re-form | Machines well with HSS or carbide tools | Generates abrasive dust — use dust extraction | Properties are anisotropic (direction-dependent) | Bonded with epoxy adhesives

CHEMICAL RESISTANCE: Good resistance to oils, greases, and many solvents. Moderate acid resistance. **AVOID:** strong alkalis (NaOH, KOH) which attack the phenolic resin, and prolonged exposure to water/steam at elevated temperatures.

Typical values; not to be used as specifications. Actual values may vary by grade, reinforcement type, and processing conditions. Contact Plastic-Craft for grade-specific data.