

FR-4 Glass/Epoxy Phenolic

FR-4 is a woven glass fabric with epoxy resin system. It is primarily used in the printed circuit board industry. It is flame retardant, meeting UL94 flammability classification of V-0. It is designated by MIL-I-24768/27 Type GEE-F and the NEMA grade is FR-4.

Property	Units	FR-4 Glass/Epoxy Phenolic
Physical		
Specific Gravity	-	1.80
Moisture Absorption (.062")	%	0.15
Mechanical		
Rockwell Hardness (.062")	M Scale	110
Flexural Strength (.062") LW	psi	70,000
CW	psi	60,000
Flexural Modulus (.062") LW	psi	2,700,000
CW	psi	2,400,000
Tensile Strength (.125") LW	psi	45,000
CW	psi	38,000
Izod Impact Strength E-48/50 (.500") LW	ft-lb/in	14.0
CW	ft-lb/in	12.0
Compressive Strength flatwise (.500")	psi	55,000
Bond Strength (.500")	lbs	2,200
Shear Strength (perpendicular) (.062")	psi	22,000
Thermal		
Maximum Operating Temperature	°F	284
Coefficient of Thermal Expansion (.062") X-axis	in/in/°F	5.5×10^{-6}
Y-axis	in/in/°F	6.6×10^{-6}
Flammability Rating - U. L. 94		V-0
Electrical		
Permittivity (.062") Condition D-24/23	-	4.80
Dissipation Factor (.062") Condition D-24/23	-	.025
Breakdown Voltage Condition - A (.062") D-48/50	V	65,000 54,000
Electric Strength Condition - A (.062") D-48/50	V/mil	800 750
Arc Resistance (.125") D-495	sec	100
Comparative Tracking Index (.125") D3638	-	150
Tg	°F	261

LW – Length Wise of the sheet, direction of manufacturing
CW – Cross Wise, perpendicular to Length Wise

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.