

## Pultruded Carbon Rods & Tubes

Pultruded Carbon Rods and Tubes are manufactured for maximum rigidity with minimum mass. Pultrusion orients the fibers lengthwise down the shaft for maximum structural rigidity. Carbon fiber contributes to the rigidity, while minimizing weight. Carbon is 70% lighter than steel, 40% lighter than aluminum, and three times the stiffness of either for the same weight.

Carbon fiber has a negative coefficient of thermal expansion, meaning it expands as the temperature lowers. The resin matrix, on the other hand, has a positive coefficient. The net result is virtually no expansion or contraction of the composite over a wide range of temperatures.

### .070" & .125" Carbon Rod Minimum Properties

	<b>Standard Modulus</b>
Tensile Strength	320 ksi / 2.34 GPa
Tensile Modulus	19.5 msi / 134 GPa
Compressive Strength	270 ksi / 1.90 GPa
Compressive Modulus	19.0 msi / 131 GPa
Fiber Volume	67%
Ultimate Tensile Strain	1.30%
Diameter Tolerance	+/-5%
Glass Transition Temperature	100° C
Matrix Material	Bis F Epoxy

### .240" Carbon Rod Minimum Properties

Tensile Strength	250 ksi / 1.72 GPa
Tensile Modulus	20.0 msi / 138 GPa
Ultimate Shear Strength	6.0 ksi / 41.3 Mpa
Ultimate Tensile Strain	1.50%
Flexural Strength	265 ksi / 1.83 GPa
Flexural Modulus	19.0 msi / 131 GPa
Fiber Volume	62%
Thermal Expansion Coefficient	-0.1 ppm/cm3 / -0.2 ppm/°C
Density	.054 lbs/in3 / 1.5 g/cm3
Diameter Tolerance	+ .000 / -.003"
Glass Transition Temperature	100° C
Matrix Material	Bisphenol Epoxy Vinyl Ester

### Carbon Tube Minimum Properties

Tensile Strength	240 ksi / 1.65 GPa
Tensile Modulus	19.5 msi / 134 GPa
Ultimate Shear Strength	6.0 ksi / 41.3 Mpa
Ultimate Tensile Strain	1.40%
Flexural Strength	200 ksi / 1.37 GPa

## Pultruded Carbon Rods & Tubes

Flexural Modulus	18.5 msi / 127 GPa
Fiber Volume	60%
Thermal Expansion Coefficient	-0.1 ppm/cm <sup>3</sup> / -0.2 ppm/°C
Density	.054 lbs/in <sup>3</sup> / 1.5 g/cm <sup>3</sup>
Diameter Tolerance	+.000/-0.003"
Glass Transition Temperature	100° C
Matrix Material	Bisphenol Epoxy Vinyl Ester