RS Stock No. 764-8700
RS Stock No. 764-8703
RS Stock No. 764-8716
RS Stock No. 764-8707

Carbon/Epoxy Composite
Carbon fibre - Epoxy Resin Matrix

Introduction

Carbon fibre reinforced composites have exceptional mechanical properties. These strong, stiff and lightweight materials are an ideal choice for applications where lightweight & superior performance are important, such as components for aircraft, automotive, rail and high quality consumer products.

Composite materials are produced by combining a reinforcing fibre with a resin matrix system such as epoxy. This combination of fibre and resin provides characteristics superior to either of the materials alone and are increasingly being used as replacements for relatively heavy metallic materials. In a composite material, the fibre carries the majority of the load and is the major contributor to the composite material properties. The resin helps to transfer load between fibres, prevents them from buckling and binds the materials together. The range offered is based upon composite sheets produced by stacking carbon fibre fabrics one upon another and then infusing the stack with resin under vacuum. This process produces sheets with one smooth glossy resin rich side and the other rougher side showing the fabric weave detail.

Carbon fibres are produced from polymer fibres such as polyacrylonitrile and from pitch. The initial fibre material is drawn under tension whilst it is heated to around 1000°C causing 2 dimensional carbon-carbon crystals (graphite) to be formed when hydrogen is driven out. The carbon-carbon chain has extremely strong molecular bonds and this is what gives the fibres their high strength.

Properties for Carbon/Epoxy Composite Sheet

Property	Units	Value
Coefficient of thermal expansion - Longitudinal	$x10^{-6}$ K^{-1}	2.1
Coefficient of thermal expansion - Transverse	$x10^{-6}$ K^{-1}	2.1
Compressive Strength - Longitudinal	MPa	570
Compressive Strength – Transverse	MPa	570
Density	g cm^{-3}	1.6
Shear modulus - in-plane	GPa	5
Shear strength - in-plane	MPa	90
Ultimate Compressive Strain - Longitudinal	%	0.8
Ultimate Compressive Strain - Transverse	%	0.8
Ultimate Shear Strain - in-plane	%	1.8
Ultimate Tensile Strain - Longitudinal	%	0.85
Ultimate Tensile Strain - Transverse	%	0.85
Volume fraction of fibres	%	50
Young's Modulus - Longitudinal	GPa	70
Young's Modulus - Transverse	GPa	70