

### Mechanical Properties of Carbon Fiber Composite Materials, Fiber / Epoxy resin (120°C Cure)

Property	Symbol	Units	Std CF Fabric	HMCF Fabric	E glass Fabric	Kevlar Fabric	Std CF UD	HMCF UD	M55** UD	E glass UD	Kevlar UD	Boron UD	Steel S97	Al. UD L65	Tit. Dtd 5173
Young's Modulus 0°	E1	GPa	70	85	25	30	135	175	300	40	75	200	207	72	110
Young's Modulus 90°	E2	GPa	70	85	25	30	10	8	12	8	6	15	207	72	110
In-plane Shear Modulus	G12	GPa	5	5	4	5	5	5	5	4	2	5	80	25	
Major Poisson's Ratio	v12		0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.25	0.34	0.23			
Ult. Tensile Strength 0°	Xt	MPa	600	350	440	480	1500	1000	1600	1000	1300	1400	990	460	
Ult. Comp. Strength 0°	Xc	MPa	570	150	425	190	1200	850	1300	600	280	2800			
Ult. Tensile Strength 90°	Yt	MPa	600	350	440	480	50	40	50	30	30	90			
Ult. Comp. Strength 90°	Yc	MPa	570	150	425	190	250	200	250	110	140	280			
Ult. In-plane Shear Stren.	S	MPa	90	35	40	50	70	60	75	40	60	140			
Ult. Tensile Strain 0°	ext	%	0.85	0.4	1.75	1.6	1.05	0.55		2.5	1.7	0.7			
Ult. Comp. Strain 0°	exc	%	0.8	0.15	1.7	0.6	0.85	0.45		1.5	0.35	1.4			
Ult. Tensile Strain 90°	eyt	%	0.85	0.4	1.75	1.6	0.5	0.5		0.35	0.5	0.6			
Ult. Comp. Strain 90°	eyc	%	0.8	0.15	1.7	0.6	2.5	2.5		1.35	2.3	1.85			
Ult. In-plane shear strain	es	%	1.8	0.7	1	1	1.4	1.2		1	3	2.8			
Thermal Exp. Co-ef. 0°	Alpha1	Strain/K	2.1	1.1	11.6	7.4	-0.3	-0.3	-0.3	6	4	18			
Thermal Exp. Co-ef. 90°	Alpha2	Strain/K	2.1	1.1	11.6	7.4	28	25	28	35	40	40			
Moisture Exp. Co-ef 0°	Beta1	Strain/K	0.03	0.03	0.07	0.07	0.01	0.01		0.01	0.04	0.01			
Moisture Exp. Co-ef 90°	Beta2	Strain/K	0.03	0.03	0.07	0.07	0.3	0.3		0.3	0.3	0.3			
Density		g/cc	1.6	1.6	1.9	1.4	1.6	1.6	1.65	1.9	1.4	2			

Fibers @ 0° (UD), 0/90° (fabric) to loading axis, Dry, Room Temperature, Vf = 60% (UD), 50% (fabric) \*\* Calculated figures

All the information contained in these properties is believed to be reliable. It is intended for comparison purposes only as each manufactured lot will exhibit variations. The user should evaluate the suitability of each product for their application. We cannot anticipate the variations in all end use and we make no warranties and assume no liability in connection with the use of this information.

**Mechanical Properties of Carbon Fiber Composite Materials, Fiber / Epoxy resin (120°C Cure)**

Property	Symbol	Units	Std. CF	HM CF	E Glass	Std. CF fabric	E Glass fabric	Steel	Al
Longitudinal Modulus	E1	GPa	17	17	12.3	19.1	12.2	207	72
Transverse Modulus	E2	GPa	17	17	12.3	19.1	12.2	207	72
In Plane Shear Modulus	G12	GPa	33	47	11	30	8	80	25
Poisson's Ratio	v12		0.77	0.83	0.53	0.74	0.53		
Tensile Strength	Xt	MPa	110	110	90	120	120	990	460
Compressive Strength	Xc	MPa	110	110	90	120	120	990	460
In Plane Shear Strength	S	MPa	260	210	100	310	150		
Thermal Expansion Co-ef	Alpha1	Strain/K	2.15 E-6	0.9 E-6	12 E-6	4.9 E-6	10 E-6	11 E-6	23 E-6
Moisture Co-ef	Beta1	Strain/K	3.22 E-4	2.49 E-4	6.9 E-4				

Fibres @ +/-45 Deg. to loading axis, Dry, Room Temperature, Vf = 60% (UD), 50% (fabric) \*\* Calculated figures

These tables are for reference / information only and are NOT a guarantee of performance

1 GPa = 1000 MPa = 1000 N/mm<sup>2</sup> = 145,000 PSI

These tables relate to only 2 of the many fibre orientations possible. Most components are made using combinations of the above materials and with the fibre orientations being dictated by the performance requirements of the product

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