



# CE 221

CE 221 is a high performance material with excellent strength, stiffness, and temperature resistance (231 °C).



**CarbonResin CE 221**

DOC #103474 REV D  
TECHNICAL DATA SHEET, LAST UPDATED 08/14/2017

<b>Tensile Properties</b> ASTM D638, Type V, 1 mm/min	Metric	U.S.
Tensile Modulus	3870 ± 140 MPa	561 ± 20 ksi
Ultimate Tensile Strength	92 ± 13 MPa	13 ± 2 ksi
Elongation at Break	3.3 ± 0.8 %	
<b>Flexural Properties</b> ASTM D790-A	Metric	U.S.
Flexural Strength	131 ± 27 MPa	19 ± 4 ksi
Flexural Modulus (chord, 0.5-1 % strain)	3780 ± 113 MPa	548 ± 16 ksi
<b>Impact Properties</b>	Metric	U.S.
Notched Izod (Machined), ASTM D256	15 ± 1 J/m	0.28 ± 0.02 ft-lb/in
Unnotched Izod, ASTM D4812	291 ± 46 J/m	5.5 ± 0.9 ft-lb/in
Notched Charpy, ISO 179-1/1eA	1.23 ± 0.22 kJ/m <sup>2</sup>	0.585 ± 0.105 ft-lb/in <sup>2</sup>
<b>Thermal Properties</b>	Metric	U.S.
Heat Deflection Temperature @ 0.455 MPa/66 psi, ASTM D648	231 °C	448 °F
Heat Deflection Temperature @ 1.82 MPa/264 psi, ASTM D648	201 °C	394 °F
Coefficient of Thermal Expansion (-60, 100 °C), ASTM E831	52 ppm/°C	29 ppm/°F
Coefficient of Thermal Expansion (100, 180 °C), ASTM E831	90 ppm/°C	50 ppm/°F
Coefficient of Thermal Expansion (180, 200 °C), ASTM E831	147 ppm/°C	82 ppm/°F
Heat Capacity, 23 °C, ASTM E1269	1.17 J/g-°C	0.279 BTU/lb-°F
Thermal Conductivity, ASTM C518	0.167 W/m-k	0.097 BTU/hr-ft-°F
<b>Electrical Properties</b>	Metric	
Dielectric Strength, ASTM D149	22.0 kV/mm	
Dielectric Constant, 1 kHz, ASTM D150	3.12	
Dissipation Factor, 1 kHz, ASTM D150	0.00456	
Volume Resistivity, ASTM D257	2.24E+14 ohm-cm	
<b>General Properties</b>	Metric	
Hardness, ASTM D2240	92, Shore D	
Density, ASTM D792	1.210 g/cm <sup>3</sup>	
Density (liquid resin)	1.15 g/cm <sup>3</sup>	
Water Absorption, 23 °C, 24 hours, ASTM D570	0.21 %	
Water Absorption, 23 °C, long term, ASTM D570	0.55 %	
Taber Abrasion, ASTM D4060, CS-17, 1 kg, 100 % vacuum	36 mg / 1000 cycles	

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