



Carlisle Carbon Group Material Properties							Materials in Comparison						
Property	Units	Direction	HD	HL	LD	LL	Graphite (particle size 0.8mm)	Silicon Carbide (a)	Alumina (94%)	Mullite	Molybdenum	304 SS	330 SS
Bulk Density	g/cc		1.75	1.65	1.75	1.65	1.72	3.21	3.65	2.8	10.3	8.0	8.1
Operating Temperature Range			2000°C / 3600°F Inert Atmosphere		1500°C / 2700°F Inert Atmosphere			Max 1650°C Air	Max 1700°C Air	Max 1650°C Air	2625°C Melt Pt	1000°C Air	1200°C Air
Total Porosity	%		8%	13%	8%	13%	10%	0%	0%	0%	0%	0%	0%
Flexural Strength	ksi	in plane	21.0	15.0	25.0	20.0	16.0	46.0	47.0	26.0	N/A	N/A	N/A
	ksi	perpendicular	17.0	12.0	18.7	15.0							
Compressive Strength	ksi	in plane	17.0	12.0	29.0	25.0	35.0	310.0	305.0	80.0	58.0	30.0	
	ksi	perpendicular	10.0	8.0	12.4	10.0							
Tensile Strength	ksi	in plane	15.0	10.0	15.0	10.0	13.0	45.0	28.0	15.0	47.0	31.0	70.0
Izod Impact Resistance in-plane shear strength	J/m	perpendicular					17.0						
Thermal Conductivity	W/m-K	in plane	60.0	50.0	11.0	7.0	160.0	41.0	18.0	3.5	138.0	16.2	12.5
	W/m-K	perpendicular	25.0	20.0	8.0	3.1							
Heat Capacity	J/kg-K	50 deg. C	850	850	850	850		630	880	963	254	500	460
	J/kg-K	250 deg. C	1300	1300	1300	1300							
Secant Value CTE	x 10 ⁻⁶ /deg C	in plane	1.0	1.0	1.9	1.9	2.5	5.1	8.1	5.4	5.3	17.2	14.4
	x 10 ⁻⁶ /deg C	perpendicular	7.0	7.0	9.3	9.3							
Flexural Modulus	msi		4.0	4.0	4.0	4.0		4.0 - 5.0	3.0 - 4.0				
Young's Modulus	msi		5.2	5.2	5.2	5.2		69.0	43.5	22.0	46.4	28.0	28.0
Electrical Resistivity @ 17C	μohm-cm	in plane	1350	2400	2800	3870	850	>10 ¹⁴	>10 ¹⁹	>10 ¹⁹	5.17	72	102
Hardness	Rockwell 15X		90	65	95	70	80 Rockwell R	2800 knoop	1175 knoop	1450 knoop	98 Rockwell B	70 Rockwell B	80 Rockwell B
Ash Content	ppm		21	21	7,000	7,000	1,200	N/A	N/A	N/A	N/A	N/A	N/A

- 1) H Series (HD, HL) has greater oxidation resistance, higher thermal conductivity and is stable to 3,700°F / 2,000°C
- 2) L Series (LD, LL) has lower conductivity, higher strength and is stable to 2,700°F / 1,500°C
- 3) HL and LL have shorter lead times and lower price
- 4) CTE = coefficient of thermal expansion
- 5) Rockwell 15X = Hardness Test HR15X = depth of indentation made by a 0.250" diameter steel ball with 15 Kilograms force applied and expressed in 0.001 mm.
- 6) ppm = parts per million

- 7) g / cc = grams per cubic centimeter
- 8) ksi = 1,000 pounds per square inch (21 ksi = 21,000 psi)
- 9) W / m-k = watts per meter kelvin
- 10) J / kg-K = joule per kilogram kelvin
- 11) msi = 1,000,000 pounds per square inch (4 msi = 4,000,000 psi)
- 12) Made in Cleveland, OH USA

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