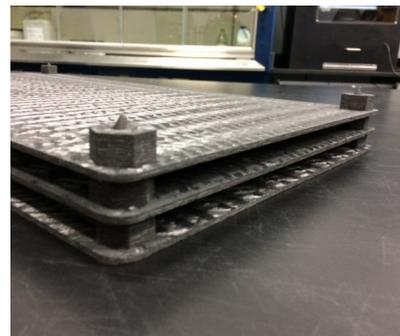
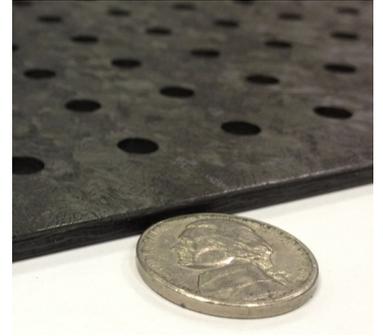


**FRACTURE TOUGH ◦ LONG LIFE ◦ SUPER FLAT ◦ LOW THERMAL MASS**

## Performance Gains

- **Longer Life:** Carlisle's C/C composite plates and fixtures do not crack, warp, distort, or "foot-print" like graphite, molybdenum or ceramic.
- **Increased Furnace Capacity:** Gain capacity because composite plates are thin with or without stand-offs for stacking; 0.118" (3mm).
- **Reduced Scrap:** Composite plates, trays or fixtures have reduced scrap by over 25% because they do not crack, warp, or distort like graphite, ceramic, or molybdenum.
- **Lower Operating Costs:** Carlisle C/C plates reduce energy consumption & downtime, have less furnace jams, scrap & rework, and part sorting which lower maintenance time. Less chain stretch is possible with C/C plates.
- **Safer Ergonomics:** Composite plates can be made thin and lighter which makes furnace loading safer and easier.
- **Improved Cycle Time:** Carlisle's C/C composite plates have less thermal mass, and conductive fibers for faster heat-up and cool-down times when compared to pressed graphite and ceramic materials.
- **Thermal Shock Resistant:** Reinforced graphite material does not shatter from quick temperature changes.



### Offering:

- Sheets to 17.0" square
- Thickness 0.118" to 5.0"
- Discs to 24.0" diameter

### Standard Sizes:

8.3"x17", 17"x17" and 11"x20"  
 Thickness 0.118" to 0.250"  
 Flatness to 0.010" to 0.015"

### Options:

- Eutectic barrier coatings, rounded corners, and chamfered edges
- Holes, grooves, pusher plates, trays, threaded rods, and custom shapes available

### Considerations:

Carlisle's C/C material coefficient of thermal expansion (CTE) is similar to graphite but less than ceramic and molybdenum. Therefore, testing and evaluation is recommended and Carlisle Engineering consultations are available.

# Carlisle Carbon/Carbon Material Properties for Sintering Trays\*

Property	Units	Direction	HD	HL
Bulk Density	g / cc		1.75	1.65
Total Porosity	%		8%	13%
Flexural Strength	ksi	in plane	21.0	15.0
	ksi	perpendicular	17.0	12.0
Compressive Strength	ksi	in plane	17.0	12.0
	ksi	perpendicular	10.0	8.0
Tensile Strength	ksi	in plane	22.0	13.0
Thermal Conductivity	W / m-K	in plane	60.0	50.0
	W / m-K	perpendicular	25.0	20.0
Heat Capacity	J / kg-K	50 deg. C	820	720
	J / kg-K	250 deg. C	1240	1100
Secant Value CTE (ambient to 1500°C)	(deg C) <sup>-1</sup>	in plane	1.0 x 10 <sup>-6</sup>	1.0 x 10 <sup>-6</sup>
	(deg C) <sup>-1</sup>	perpendicular	7.0 x 10 <sup>-6</sup>	7.0 x 10 <sup>-6</sup>
Flexural Modulus	msi		4.1	3.0
Young's Modulus	msi		5.2	3.2
Electrical Resistivity @ 17C	ohm-cm	in plane	1.35 x 10 <sup>-3</sup>	2.40 x 10 <sup>-3</sup>
Hardness	Rockwell 15X		90	65
Ash Content	ppm		21	21

## Notes:

- H Series (HD, HL) has greater oxidation resistance, higher thermal conductivity and is stable to 3600°F (2000°C)
- D = densified for strength and thermal conductivity
- g / cc = grams per cubic centimeter
- ksi = 1,000 pounds per square inch (21 ksi = 21,000 psi)
- W / m-k = watts per meter kelvin
- J / kg-K = joule per kilogram kelvin
- msi = 1,000,000 pounds per square inch (4 msi = 4,000,000 psi)
- CTE = coefficient of thermal expansion
- 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
- ppm = parts per million
- made in Cleveland, Ohio USA

\*Typical Values



MADE IN  
  
 U. S. A.



Questions? Contact the Carlisle Carbon Group:  
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