

AVCO DENSE 3D QUARTZ (AD3DQ)



QUICK SUMMARY

- > 3D fused quartz composite with robust active and passive electric (dielectric) performance past 1100°C

Radio Frequency (RF)-transparent thermal protection systems (TPS) are required to control hypersonic vehicles through atmosphere reentry and control their trajectories. Textron Systems' AVCO Dense 3D Quartz (AD3DQ) is unsurpassed in performance in these environments due to its tough and monolithic ceramic material that maintains its electrical and mechanical properties past 1100 degrees Celsius. AD3DQ has been fully qualified in ground-based arc jet and flight tests, resulting in complete mission readiness.

In terms of mechanical, dielectric, and ablative properties, AD3DQ demonstrates at least equivalent and often superior performance compared to similar materials. It remains one of the only proven nuclear-hardened aperture material in production for strategic reentry vehicle applications and is currently manufactured with a cross section of 8x8 inches.

Thermal Properties				
CTE (µm/m-K)	Specific Heat (J/kg-K)	Thermal Conductivity (W/m-K)		
0.53 (260°C)	750 (27°C)	10 (27°C)		
0.56 (815°C)	1100 (1100°C)	17 (815°C)		

Mechanical Properties				
Tensile Strength in Z (MPa)	Compressive Strength in Z (MPa)	Shear Strength in Z (MPa)	Specific Heat in Z (cal/g•°C)	Thermal Conductivity in Z (w/(m-k))
26 (27°C)	165 (27°C)	27 (27°C)	34 (27°C)	41 (27°C)
20 (1100°C)	350 (1100°C)	22 (1100°C)	34 (1100°C)	37 (1100°C)
18 (1370°C)	106 (1370°C)	3.4 (1370°C)	3.2 (1370°C)	19 (1370°C)