Materials Engineering Branch

TIP*

No. 103 Low Temperature Thermal Conductivity of Non-Metallic Materials

Author(s): Robert E. Shelley and Ed Sanford Contact: (301) 286-6882

Thermal conductance of materials used in the fabrication of space flight hardware is an important property in certain applications. Until recently, thermal conductivity data for some of the nonmetallic materials commonly used for flight hardware was not available, especially at low temperatures. Therefore, accurate thermal modeling and predictions were not possible. To remedy this, we performed thermal conductance measurements on a select list of materials - the ones for which data is most often requested - over a temperature range of -250°F to +100°F. The data are presented in the following table:

THERMAL CONDUCTIVITY (BTU/ft^2/hr/ °F/ft)

T (°F)	Lexan[1]	Lexan+30% Fiberglass[1]	Ultem 1000[1]	Kel-F[2]	Vespel[3] SP-1	G10CR[4] Composite
100	0.127	0.134	0.133	0.177	0.235	0.292
75	0.121	0.127	0.127	0.176	0.224	0.286
0	0.103	0.108	0.116	0.173	0.190	0.265
-100	0.086	0.084	0.104	0.170	0.147	0.236
-200	0.057	0.061	0.094	0.166	0.103	0.207
-250	0.045	0.050	0.091	0.164	0.081	0.190

If you have questions concerning other properties for any of the materials, you can contact either the manufacturer (listed below) or a member of the Materials Engineering Branch.

[1] General Electric Company, Plastics Department, Pittsfield, MA.
[2] 3M Company, Saint Paul, MN.
[3] E. I. DuPont De Nemours & Company Inc., Wilmington, DE.
[4] NEMA G-10 (NIST G10CR).