# EVACUATED PERLITE

Perlite is a naturally occurring siliceous volcanic rock containing two to six per cent combined water. When the crude rock is crushed and heated above 1600°F (871°C), the combined water vaporizes and the perlite expands four to twenty times its original volume. This expansion process creates countless cells in the glassy particles, which account for the excellent thermal conductivity of expanded perlite.

Perlite loose fill insulation provides dependable results at temperatures ranging from -452°F to +2000 °F (-269 °C to + 1093 °C).

**Evacuated Service**

Expanded perlite is non-hygroscopic, which adapts it for use under vacuum conditions. If evacuation is to be accomplished in a minimum amount of time, the perlite must be kept dry and the interstitial gas should have a low heat of adsorption.

Heat transfer through an evacuated perlite filled annulus is a combination of solid conduction and thermal radiation. Gas conduction is also an important transfer mechanism if the interstitial gas pressure is not reduced to a suitable level. The effect of interstitial gas pressure on thermal conductivity is shown in Figure 1.

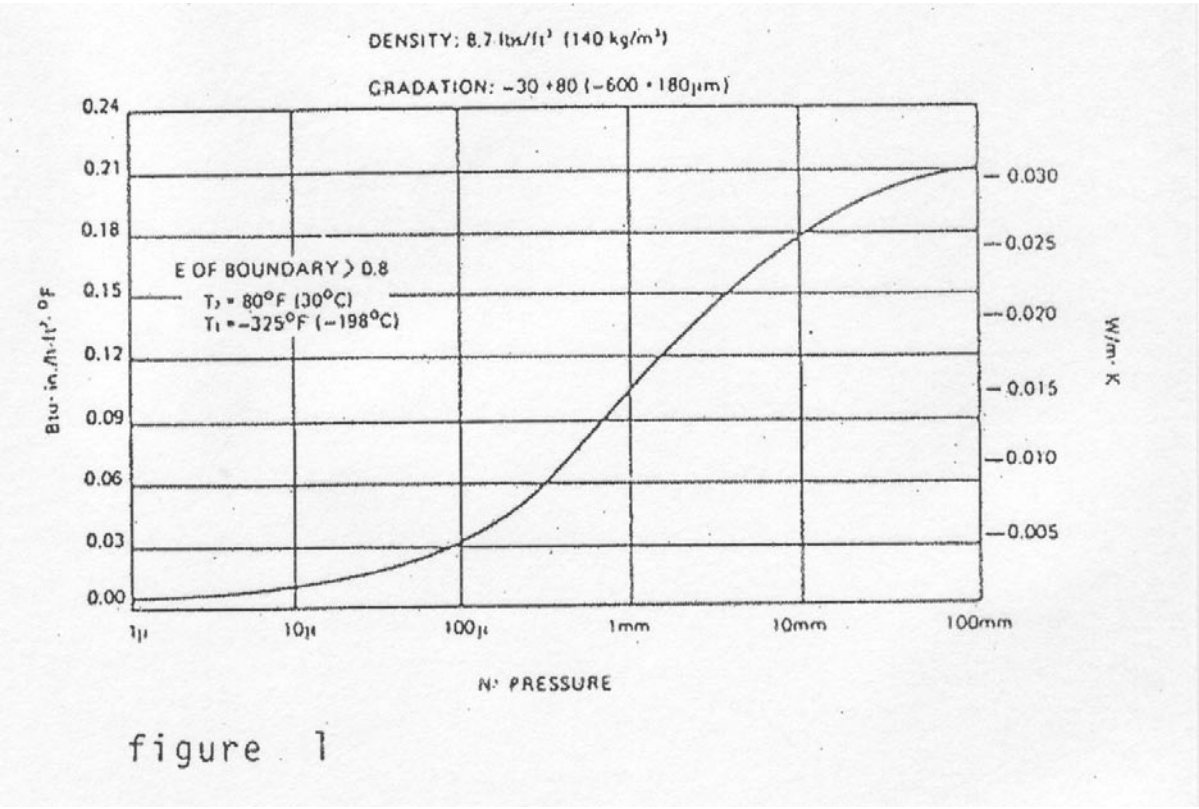


figure 1

Figure 2 includes thermal conductivity data under evacuated conditions for expanded perlite having a density of 8.7 lbs/ft$^3$ (140 kg/m$^3$). Thermal conductivity increases with increasing density at atmospheric pressure but decreases with increasing density at low pressures. This inversion phenomenon prevents correlation of the variation of thermal conductivity with density, pressure and temperature under evacuated conditions.

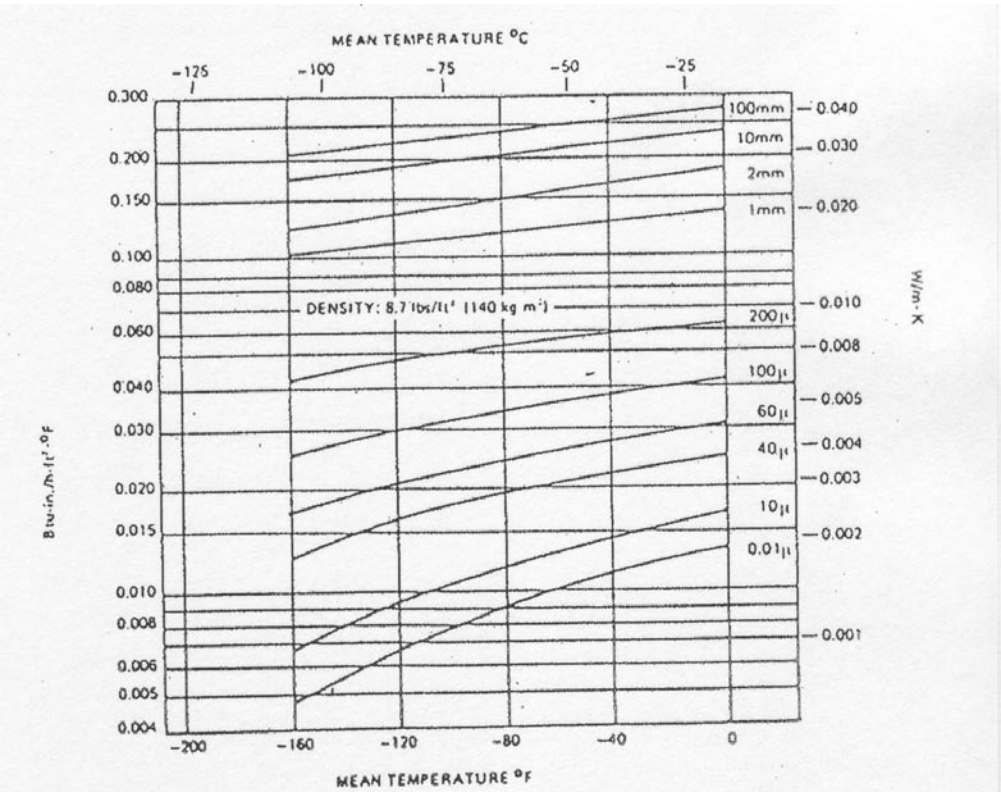


figure 2

**Sources**

1. "Evacuated Powder Insulation for Low Temperatures," M. M. Fulk, Progress in Cryogenics, Vol. 1, Academic Press, 1959.
2. "Thermal Conductivity of Evacuated. Perlite,"
L. Adams, Cryogenic Technology. Vol. 1, No. 6, 1965

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