

PERLITE PRODUCT GUIDE 8A

PERLITE FOR NONEVACUATED CRYOGENIC AND LOW TEMPERATURE SERVICE

What is Perlite?

Perlite is not a trade name but a generic term for naturally occurring siliceous volcanic rock. The distinguishing feature which sets perlite apart from other volcanic glasses is that when heated to a suitable point in its softening range, it expands four to twenty times its original volume.

This expansion is due to the presence of two to six percent combined water in the crude perlite rock. When quickly heated to above 1600°F (870°C) the crude rock pops in a manner similar to popcorn as the combined water vaporizes and creates countless tiny bubbles in the heat softened glassy particles. It is these tiny glass-sealed bubbles which account for the excellent insulating properties and light weight of expanded perlite.

Expanded perlite can be manufactured to weigh from 2 lb/ft³ (32 kg/m³) to 15 lb/ft³ (240 kg/m³) making it especially suitable for use in insulating applications. Perlite is used in the manufacture of cryogenic, low temperature and high temperature insulation, lightweight perlite insulating concrete, insulating board, insulating plasters, masonry wall insulation and as underfloor insulation.

Cryogenic Applications for Perlite Insulation

Because of its unique properties, perlite insulation has found wide acceptance in the insulat-



Crude
Perlite

Crushed
Crude
Perlite

Expanded
Perlite

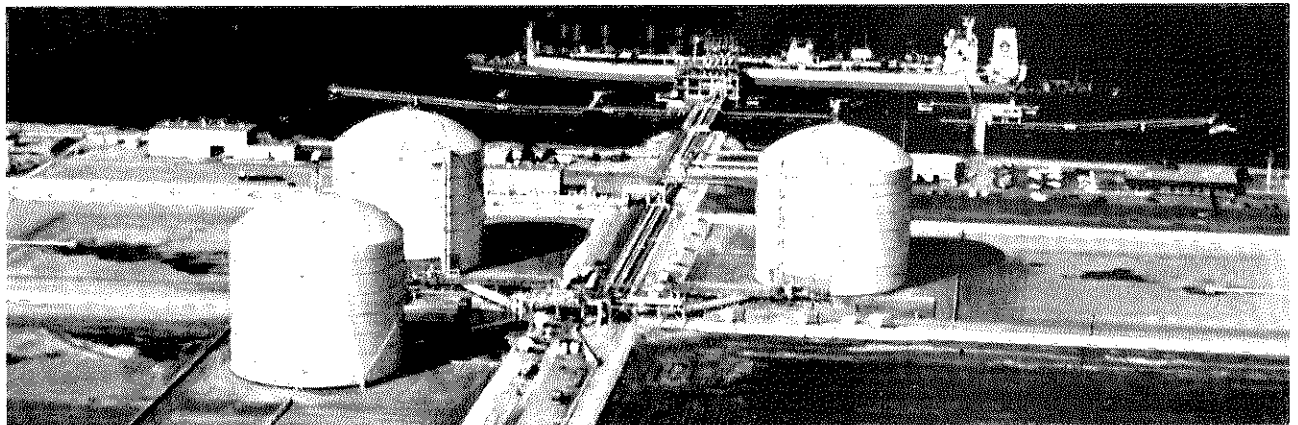
Three stages of perlite production shown above illustrate the great increase in volume after furnacing. The same weight of perlite, 1 oz (28 gm) is shown in each photo.

ing of cryogenic and low temperature storage tanks, in shipping containers, cold boxes, test chambers and in food processing.

Storage temperatures of -150°F (-100°C) and below are considered cryogenic. Storage temperatures of -150°F (-100°C) and above to +40°F (+4°C) are considered low temperature. Super cold or extremely cold cryogenic fluids such as hydrogen and helium are normally stored in spherical, double walled vessels with evacuated annular spaces using evacuated perlite.

Properties of Perlite Insulation

Perlite insulation suitable for nonevacuated cryogenic or low temperature use exhibits low



**NONEVACUATED PERLITE CRYOGENIC
AND LOW TEMPERATURE
INSULATION SPECIFICATIONS**

Density 3 to 6 lb/ft³
(48 to 96 kg/m³)

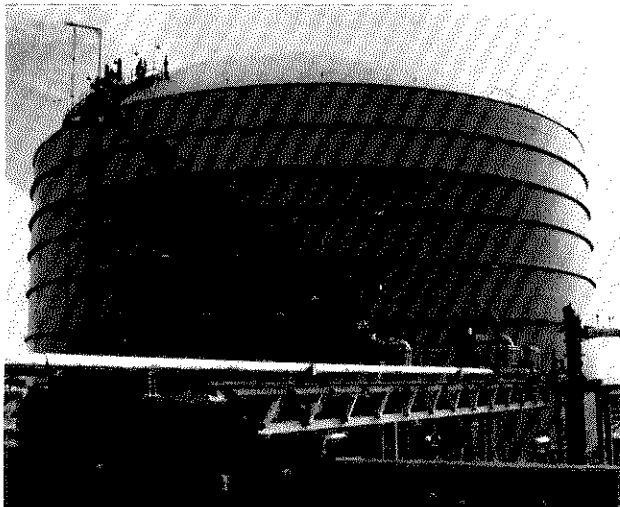
Sieve Analysis (mesh is U.S. Standard)
Percent Weight Retained
Max. 10% + 16 mesh (1.18 mm)
Min. 50% + 100 mesh (0.15 mm)

Thermal Conductivity*
Low Temperature Applications
(at mean temperature -40 °F, -40 °C)
0.24-0.27 Btu·in/h·ft²·°F
(0.035-0.039 W/m·K)

Nonevacuated Cryogenic Applications
(at mean temperature -195 °F, -126 °C)
0.17-0.20 Btu·in/h·ft²·°F
(0.025-0.029 W/m·K)

*Thermal conductivity varies with temperature, density, pressure, and conductivity of the gas which fills the annulus or insulation space.

thermal conductivity throughout a range of densities, however, the normal recommended density range is 3 to 4.5 lb/ft³ (48 to 72 kg/m³). In addition to its excellent thermal properties, perlite insulation is relatively low in cost, easy to handle and install, noncombustible and meets fire regulations, lowers insurance rates, does not shrink, swell, warp or slump. Because



it is an inorganic material, it is rot and vermin proof. As a result of its closed cell structure, the material does not retain moisture.

Typical Nonevacuated Installation

There are many different design concepts for low temperature and cryogenic storage vessels. However, most are of double wall construction with the annulus filled with expanded perlite. Packaged or bulk perlite may be used to insulate smaller vessels by pouring or blowing the insulation in place. Portable perlite expansion plants are usually used to insulate storage tanks, cold boxes, ships, and other double wall vessels and pipes. In these applications perlite ore is expanded on-site and the expanded perlite insulation is conveyed pneumatically into the annulus.



Typical portable perlite expanding plant.



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