

# PERLITE FOR USE IN WELL CEMENTS

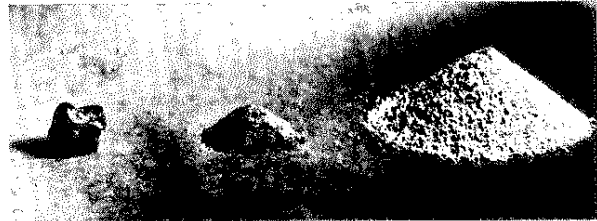
## What is Perlite?

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 amazing physical properties of expanded perlite.

The expansion process also creates one of perlite's most distinguishing characteristics: its white color. While the crude perlite rock may range from transparent to light gray to glossy black, the color of expanded perlite ranges from snowy white to grayish white.

Expanded perlite can be manufactured to weigh from 2 lb/ft<sup>3</sup> (32 kg/m<sup>3</sup>) to 15 lb/ft<sup>3</sup> (240 kg/m<sup>3</sup>) making it adaptable to numerous applications in the construction, industrial, chemical, horticultural and petrochemical industries. A unique use for perlite is in cementing, oil, gas, water and geothermal wells.



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.

## TYPICAL CHEMICAL ANALYSES\*

Silicon .....	33.8
Aluminum .....	7.2
Potassium .....	3.5
Sodium .....	3.4
Iron .....	0.6
Calcium .....	0.6
Magnesium .....	0.2
Traces .....	0.2
Oxygen (by difference) .....	47.5
Net Total .....	97.0
Bound Water .....	3.0
Total .....	100.0%

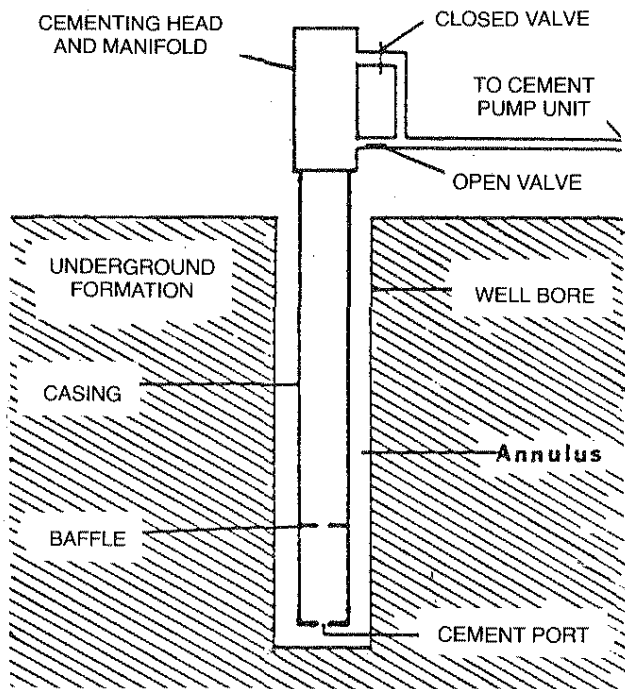
\*All analyses are shown in elemental form even though the actual forms present are mixed glassy silicates. Free silica may be present in small amounts, characteristic of the particular ore body. More specific information can be obtained from the ore supplier involved.

## Well Cementing

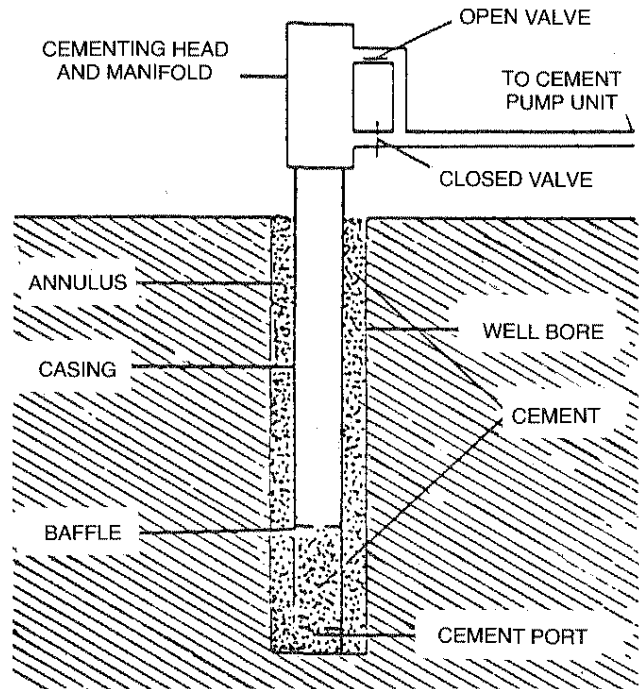
A lubricating mud consisting of water, clay, pozzolans and other materials is used to facilitate drilling of oil, gas, water and geothermal wells. This lubricating mud is forced out through the bottom of the drill casing and the space between the well bore and the casing is cemented to prevent the intrusion of corrosive waters and other contaminants into the well.

## Why Perlite Cement

Well cementing materials such as diatomaceous earth, pozzolan, fly ash and glass beads do not have the lightweight properties exhibited by perlite concrete unless concentrations of bentonite or gel, as it is referred to, are added to the cement. A disadvantage of large concentrations of gel is that they are not compatible with heat. Because perlite cement is not affected by heat and little material is lost in cementing operations due to its ability to bridge voids, perlite cement provides a more effective and less costly well cement. The dry weight of perlite is only 8 lb/ft<sup>3</sup> (128 kg/m<sup>3</sup>) as opposed to 25-100 lb/ft<sup>3</sup> (400-1600 kg/m<sup>3</sup>) - the dry weight of the other materials.



Well prior to cementing.



Well cement in place.

**Advantages of Using Perlite Well Cement**

- Lighter density
- Aids in bridging
- Heat compatible
- Lower costs
- Insulating qualities

**TYPICAL PERLITE WELL CEMENT  
AGGREGATE SCREEN SIZE**

U.S. Mesh	I.S.O. (mm)	% Passing
8	2.38	100.00
16	1.19	74.3
30	.595	40.2
50	.297	13.9
100	.149	4.0
200	.074	1.1



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