PERLITE LOOSE – FILL MASONRY INSULATION

The Natural, Durable & Fireproof Thermal Insulation

What is Perlite?

Perlite is a 100% natural siliceous volcanic glass mineral, which traps crystalline water into its mass. Perlite expands when rapidly heated between 800^{0}C - 1,000^{0}C in Gulf Perlite factory. The abrupt, controlled rise of temperature forms a white mass of minuscule glass bubbles. Perlite melts and expands in an extremely porous surface and increases its volume thirteen times. Gulf Perlite Construct lightweight aggregate has superior thermal and acoustic insulation properties, extreme lightness and it is non-combustible.

Gulf Perlite Construct Properties

- **Color:** Pure white
- **Specific Gravity:** 80-100 kg/m3
- pH (of water slurry, 20°C): 6.5 - 7.5
- **Moisture:** 0.3%
- **Softening point:** 850 –1,100°C
- **Melting Range:** 1,260 –1,343°C
- **Thermal Conductivity:** 0.032-0.045 W/mK
- Non – flammable (class A1 - DIN 4102)
- **Explosion limits:** None
- Odourless, chemically inert
- **Asbestos contamination:** None
- **SiO_2 Content:** 76%
- 100% Natural & Eco-friendly product

Perlite Loose-Fill Insulation Benefits

Perlite loose-fill masonry insulation has been proven & used over decades as insulation in liquid gases storage tanks at temperatures as -400°F (-240°C).

INSULATING - Over 50% heat transmission reduction of masonry walls may be obtained with Perlite loose-fill insulation. Thermal performance tests have shown and proved Perlite as the superior concrete block insulation compared to vermiculite, EPS inserts, EPS beads, and foamed-in-place insulations (6 % more effective than vermiculite, 12% more effective than EPS beads, 22% more effective than EPS inserts).

NON-COMBUSTIBLE - The fusion point of perlite is 1,260°C ASTM E84, Flame Spread 0, Fuel Contribution 0, Smoke Density 0. FED. SPEC. HH-I-515D - Critical Radiant Flux greater than 1.07 Watts/cm^2, Smoldering Combustion, Flaming Combustion -None, Weight Loss - nil.

4 HOUR FIRE RATINGS - Laboratory tests show that a 2-hour rated 20, 25 or 30 cm concrete block wall is improved to 4 hours when cores are filled with Perlite.

PERMANENT - Perlite is an inorganic, naturally occurring mineral and it is as permanent as the walls which contain Perlite. It supports its own weight and will not settle or bridge.

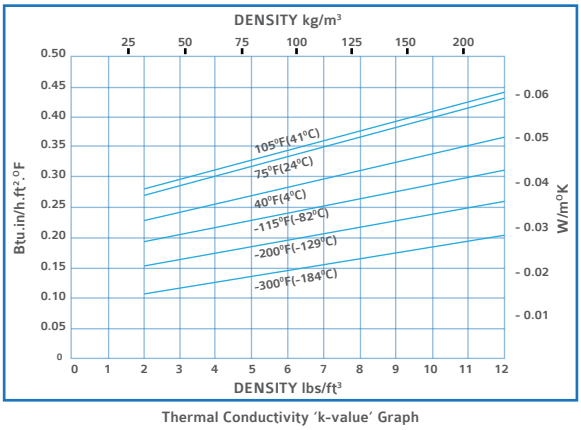
SOUND REDUCTION - Perlite loose-fill insulation has the ability to fill all voids, mortar lines, and ear holes thus enabling it to reduce airborne sound transmission through walls. Lightweight 20 cm masonry block filled with perlite achieves an STC of 51.

ECONOMICAL - Perlite loose-fill masonry insulation offers excellent thermal and fire resistant properties at an economical cost. It is lightweight and pours easily and quickly without requiring special equipment or skills.

Perlite is 22% more effective than EPS inserts

Perlite is 12% more effective than EPS beads

Perlite is 6% more effective than vermiculite



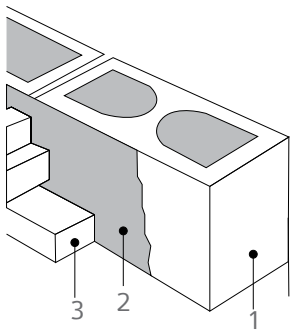
Thermal Conductivity 'k-value' Graph

GULF PERLITE CONSTRUCT LOOSE– FILL MASONRY THERMAL INSULATION SPECIFICATIONS

TABLE 1: THERMAL DESIGN[1,5], CONCRETE MASONRY WALL

Block Size	Type6	Perlite Filled	R-Value (Km^2/w)	U-Value (W/m^2k)
6 inch (15 cm)	Perlite lightweight Block	No	0.46	2.16
		Yes	1.18	0.85
8 inch (20 cm)		No	0.50	1.99
		Yes	1.61	0.62
10 inch (25 cm)		No	0.53	1.88
		Yes	1.96	0.51
12 inch (30 cm)		No	0.55	1.82
		Yes	2.56	0.39
6 inch (15 cm)	Normal Hollow Block	No	0.34	2.90
		Yes	0.61	1.65
8 inch (20 cm)		No	0.37	2.73
		Yes	0.77	1.30
10 inch (25 cm)		No	0.38	2.62
		Yes	0.93	1.08
12 inch (30 cm)		No	0.40	2.50
		Yes	1.11	0.90

Sample U-factor calculations for veneer and cavity walls



1. 8 inch (20 cm) lightweight concrete block filled with perlite (from Table 1)..... 1.61
2. 4 inch cavity filled with perlite (from Table 2)..... 2.20
3. 4 inch (10 cm) face brick (from Table 2)..... 0.08

R= 3.89

U=0.25

L - Estidama, U- Value, RE - Target=0.29w/m^2k

1.The values in this table represent typical U-values of concrete block. The actual U-value of a concrete block is influenced by concrete constituents and moisture content. Contact Gulf Perlite LLC for more information for Perlite blocks.

2. U-factors expressed w/m^2 °k. Different densities of perlite in the core spaces of concrete block have only slight effect on the overall U-factor. For estimates of this effect, please refer to Perlite Institute Technical Data Sheet No.2-6 which provides the calculation techniques.

3. Metric: To determine R-value and U-factors in SI (metric) units use the following conversion factor.
Thermal Resistance, R: °F.ft^2.h/Btu x 1.761 102E-01=K.m^2/W
Thermal Transmittance, U: Btu/h.ft^2.°F x 5.687 263E + 00 = W/m^2.k

4. R-values and U-values from NCMA ten Sheet 101A.

5. Lightweight masonry units (1280 kg/m^3). Heavyweight masonry units 2160 kg/m^3

TABLE 2: THERMAL RESISTANCE VALUES FOR VENEER AND CAVITY WALL CALCULATIONS

	R-Value (°F.ft^2.h/Btu)	R-Value (KM^2/w)
Outside Air Film	0.17	0.03
Common Brick (with holes)	0.20	0.04
Face Brick (no holes)	0.44	0.08
Air Space in Cavity 3/4 to 4 inch (19-102mm)	0.97	0.17
1 inch (2.5cm) cavity filled with perlite	3.12	0.55
2 inch (5.1cm) cavity filled with perlite	6.25	1.10

3 inch (7.7cm) cavity filled with perlite	9.38	1.65
4 inch (10.3cm) cavity filled with perlite	12.5	2.20
Reflexive Air Space	3.08	0.54
Furring (Nonreflective Air Space)	1.01	0.18
Gypsum or Plaster Board 1/2 inch (13mm)	0.45	0.08
Gypsum or Plaster Board 5/8 inch (16mm)	0.56	0.10
Inside Air Film	0.68	0.12

GULF PERLITE CONSTRUCT COVERAGE

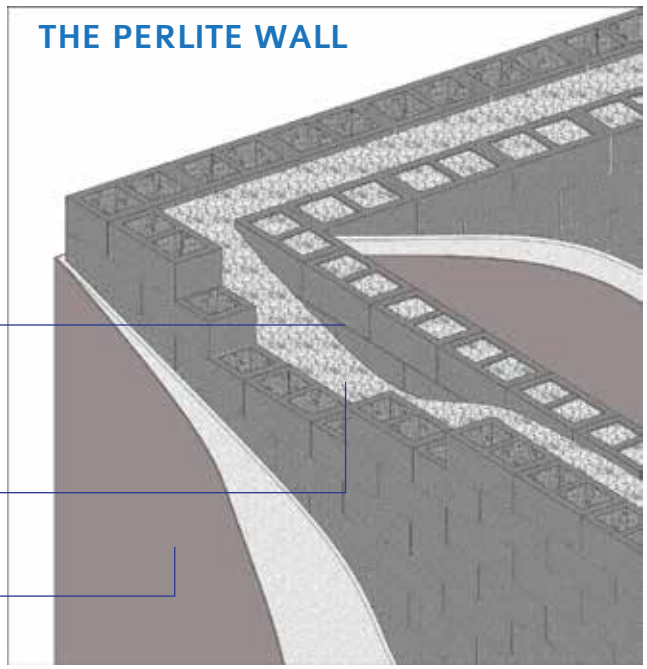
APPROXIMATE PERLITE MASONRY BLOCK LOOSE-FILL COVERAGE*
(Coverage per 100 litre bag)

	12 inch (30cm) Block	10 inch (25cm) Block	8 inch (20cm) Block	6 inch (15cm) Block
Number of Blocks Filled	8.5	12	15.5	21
	1 in. (2.5 cm) Cavity	1.5 in. (3.9 cm) Cavity	2 in. (5.1 cm) Cavity	2.5 in. (6.4 cm) Cavity
Square Meter of Wall Filled	4.10	2.75	2.05	1.60

* Data based on actual field conditions

APPROXIMATE PERLITE MASONRY BLOCK LOOSE-FILL COVERAGE
(Number of 100 litre Bags)

Wall Area	Core Fill			Cavity Fill		
	Block Size			Cavity Width		
	15 cm	20 cm	25 cm	2.5 cm	5.0 cm	7.5 cm
100m²	54	77	139	25	49	73



EXECUTION / INSTALLATION

1. The insulation shall be installed in the following locations:
    a. In the cores of all exterior (and interior) hollow masonry walls.
    b. In the cavity between all exterior (and interior) masonry walls.
    c. Between exterior masonry walls and interior furring.

2. The insulation shall be poured directly (or via a hopper) on the top of the wall at any convenient interval (not exceed more than 6m). Wall sections under doors and windows shall be filled before sills are placed. Rodding or tamping is not necessary.

3. All holes and openings in the wall, through which insulation can escape, shall be permanently sealed or caulked prior to installation of the insulation. Copper, galvanized steel or fiber glass screening shall be used in all weep holes. The inclusion of weep holes is considered good construction design practice to allow passage of any water which might penetrate the cavities or core spaces of wall construction.

4. Insulation must remain dry. Cavity caps or other suitable means should be used as the work progresses to ensure the insulation is protected from inclement weather.

STANDARDS, SPECIFICATIONS AND REFERENCES

- ASTM Specification C549 Perlite Loose Fill Insulation
- ASTM Specification C520 Density of Granular Loose Fill insulation
- ASTM Test Method C236 Test Method for Steady State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
- ASTM Test Method E84 Test for Surface Burning Characteristics of Building Materials
- FHA Use of Materials Bulletin UM-37
- GSA Commercial Item Description A-903 - Insulation, Thermal (Expanded Perlite)
- Brick Institute of America Technical Notes No. 21A
- National Concrete Masonry Association Tek 101A
- Federal Specification I-IH- 1-51 SD for: Smoldering Combustion/Critical Radiant Flux

ADVANTAGES:

- **Avoiding thermal bridges that appear when EPS boards or thermal blocks are used.**
- **Heat Transmission Coefficience 0.032-. 0.045 W/mK, 22% more effective than EPS inserts, 12% than EPS beads, 7% than foam and 6% than vermiculite.**
- **Sound reduction Coefficience Rw = 51dB.**
- **4 hours fire-resistance rating.**
- **Asbestos-free, pH neutral & odourless.**
- **100% natural & eco-friendly insulation.**
- **Fast workability and easy installation without special training.**
- **1/3 of Polystyrene cost!**

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