WEAVER CONSTRUCTION MANAGEMENT, INC.
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Englewood, CO 80110
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SUBMITTAL TRANSMITAL

October 3, 2011
WGC Submittal No: 04150-001.A

PROJECT: Harold Thompson Regional WRF
Birdsall Rd.
Fountain, CO 80817
Job No. 2908

ENGINEER: GMS, Inc.
611 No. Weber St., #300
Colorado Springs, CO 80903
719-475-2935 Roger Sams

OWNER: Lower Fountain Metropolitan
Sewage Disposal District
901 S. Santa Fe Ave.
Fountain, CO 80817
719-382-5303 James Heckman

CONTRACTOR: Ammex Masonry, Inc.
P.O. Box 1272
Commerce City, CO 80022
303-853-9008 Amy Wheeler

SUBJECT: Response to review comments 2 - 4.

- Comment #2 - Vertical Reinforcing was submitted on 8/2/11 in submittal 03200-008.A
- Comment #3 Control Joints - please see attached correspondence
- Perlite Loose Masonry Insulation - attached data sheets

SPEC SECTION: 04150 - Masonry Accessories

PREVIOUS SUBMISSION DATES: 8/17/11

DEVIATIONS FROM SPEC: ___ YES _X_ NO

CONTRACTOR'S STAMP: This submittal has been reviewed by Weaver General Construction and approved with respect to the means, methods, techniques, & safety precautions & programs incidental thereto. Weaver General Construction also warrants that this submittal complies with contracted documents and comprises on deviations thereto:

Contractor's Stamp:	Engineer's Stamp:
Date: 10/3/11 Reviewed by: H.C. Myers (X) Reviewed Without Comments ( ) Reviewed With Comments ENGINEER'S COMMENTS:	

John Jacob

From: Josh Cronholm <jcronholm@ammexm.com>
Sent: Monday, October 03, 2011 1:29 PM
To: John Jacob
Subject: 04150-001 #3 Control Joints

John, I just got off the telephone with the masonry institute to discuss the control joint material. Diane Travis, technical director of RMMI, said that the non-asphaltic fiberboard is a good product for brick veneer, but not for CMU. The issue being that CMU shrinks. The "x" shaped material that I submitted allows for shrinkage while still providing some water repellency if the flexible sealant were to fail. The flat fiberboard would work in brick because brick grows over time and the control joint will never grow in size only shrink. I have always used the product submitted in CMU similar to this project.

Diane has offered to speak directly to the design team if they would like. She can be reached at 303-893-3838.

Thanks,

Josh Cronholm
Ammex Masonry, Inc.
DBE Certified Contractor
PO Box 1272
Commerce City, CO 80022
Phone 303-853-9008
Fax 303-853-9007

Perlite Institute, Inc. 7d INSULATION 1981

Perlite

water repellent

easily installed

non-combustible

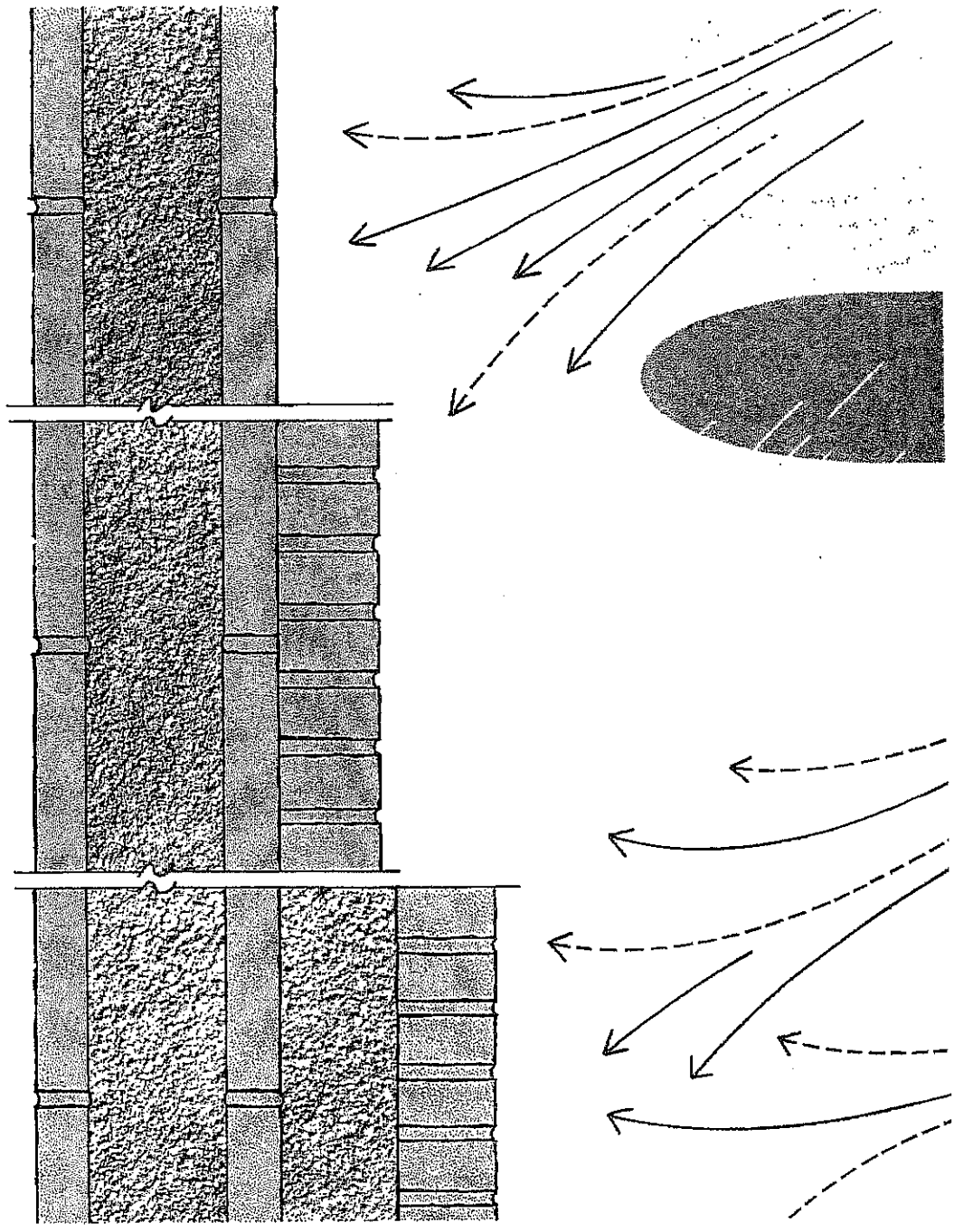
inorganic

non-toxic

energy saving

permanent

readily available



Perlite

PP-PRODUCT PRESENTATION

Description

Perlite loose fill insulation is an inert volcanic glass expanded by a special heat process and treated with a non-flammable silicone. The resultant light weight product is a white granular material which handles and pours easily. It provides a quick, inexpensive and permanent method for efficiently insulating masonry walls. Depending upon design conditions, reductions in heat transmission of 50 percent or more may be obtained when perlite loose fill is used in the hollow cores of concrete block or cavity type masonry walls.

Properties

Thermal Insulation—Perlite contains countless tiny air cells which account for its excellent thermal insulation and light weight. Thermal conductivity factors at the recommended density range of 5 to 8 pcf (80-128 kg/m³) are shown in Table 3.

The efficiency and economy of perlite loose fill insulation has been proven many years in the insulation of storage tanks for liquid gases, such as oxygen, liquid natural gas and nitrogen at temperatures as low as −400°F (−240°C).

Water Repellency — The non-flammable silicone treatment significantly improves low water retention properties of perlite.

Permanency — Perlite is inorganic and therefore, rot, vermin and termite resistant and non-combustible with a fusion point of approximately 2300°F (1260°C). It is as permanent as the walls which contain it.

Non-settling — Perlite loose fill supports its own weight in the wall without settling as verified by actual field measurements.

Benefits

Total Functional Performance — Silicone Treated Perlite functions as a permanent, non-toxic, non-combustible, rotproof insulation which minimizes winter heat loss and summer heat gain to provide greater comfort at lower cost. The silicone treatment protects against water transmission and severe wind driven moisture penetration and thus assures constant insulating efficiency.

Tests conducted by independent laboratories confirm the superior qualities of silicone treated perlite loose fill insulation:

Test	Results
ASTM E-84	
Flame Spread	0
Fuel Contribution	0
Smoke Density	0
FED. SPEC. HH-1-515D	
Critical Radiant Flux	Greater than 1.07 Watts/cm²
Smoldering Combustion	Flaming Combustion: None Weight Loss: Nil
Corrosion	Pass
Moisture Absorption	Nil

Cost Savings—Insulation is essential in all construction for energy conservation. The original cost of installing Silicone Treated Perlite Loose Fill Insulation can be recovered quickly due to substantial reductions in heating and air conditioning energy consumption. In addition, Perlite Loose Fill Insulation cuts installation costs since it is lightweight and pours easily and quickly in place without need for special installation equipment or skills. The insulation may be poured directly into walls or emptied into a simple wood or metal hopper which can be slid along the wall to direct the perlite into cores or cavities. Perlite loose fill is free flowing and fills all voids without bridging.

Silicone treated perlite minimizes water transmission—Water transmission tests by Structural Clay Products Research Foundation show a cavity wall filled with Silicone Treated Perlite will not transmit water to the interior wythe even under the most severe conditions. Performance of over-all wall was rated "excellent" in accordance with procedures established by the National Bureau of Standards in BMS 82. However, it should be noted that silicone treated perlite insulation will not waterproof a poorly constructed masonry wall.

CC-CODES, CERTIFICATION

Applicable Standards, Specifications and References

ASTM Specification C549 Perlite Loose Fill Insulation

ASTM Specification C520 Density of Granular Loose Fill Insulations (Proposed)

ASTM Specification E-84 Test for Surface Burning Characteristics of Building Materials

Federal Specification HH-I-574b Thermal Insulation (Perlite)

FHA Use of Materials Bulletin UM-37

Brick Institute of America Technical Notes No. 21A

National Concrete Masonry Assoc. Tek 101

Federal Specification HH-I-515D for: Corrosion / Smoldering Combustion / Critical Radiant Flux / Moisture Absorption

Coverage

Number of Bags required
(4 cu. ft = approx. 110 litres)

wall area sq. ft. (sq. metres)	core fill: block size 6.0 in. (15.2 cm)	core fill: block size 8.0 in. (20.3 cm)	core fill: block size 12.0 in. (30.5 cm)	cavity fill: cavity width 1.0 in. (2.5 cm)	cavity fill: cavity width 2.0 in. (5.1 cm)	cavity fill: cavity width 3.0 in (7.6 cm)
100 (9.3)	5	7	12	2	4	6
500 (46.5)	23	33	58	10	21	31
1,000 (93)	46	65	118	21	42	62

4 hour fire rating

(UL) Underwriters' Laboratories Design No. U905 shows that a 2-hour rated 8 in. (20.32 cm) concrete block wall is improved to 4 hours when cores are filled with Silicone Treated Perlite.

Thermal Transmittance Calculations

In order to calculate the thermal transmittance, U value, of a wall system, the thermal resistances of the individual components in series can be added together to obtain the total resistance. The reciprocal is the U value. The thermal resistances for the individual components can be obtained from the literature or if the thermal conductivity of a homogenous component is known, the thermal resistance of that component can be calculated by dividing the thickness of the component by the thermal conductivity.

For example: the resistance of 3 in. (76 mm) of 5 pcf (80 kg/m³) perlite is 3/0.32 = 9.38 °F • ft² • h/Btu (1.65 K • m²/W). Using published data on the thermal conductivity of concrete blocks from the National Concrete Masonry Association (NCMA) and calculation procedures verified by actual tests at Dynatech Research & Development Co., R and U values for uninsulated and insulated concrete block walls (including face shell mortar bonding) are shown in Table 1. It should be noted that the values in Table 1 were determined using the series-parallel method of heat flow calculation as described in the ASHRAE Handbook of Fundamentals. While the series-parallel method yields more conservative values than other heat flow calculation techniques, it provides more representative data on actual performance of the wall construction.

TABLE 1. THERMAL RESISTANCE (R) VALUES[1] AND THERMAL TRANSMITTANCE (U) VALUES[3] OF CONCRETE BLOCK WALLS UNINSULATED AND INSULATED WITH PERLITE LOOSE FILL[4]

Block	6 in. Block				8 in. Block				12 in. Block			
Density (PCF)	Uninsulated R[2]	Uninsulated U[4]	Insulated with Perlite R[2]	Insulated with Perlite U[4]	Uninsulated R[2]	Uninsulated U[4]	Insulated with Perlite R[2]	Insulated with Perlite U[4]	Uninsulated R[2]	Uninsulated U[4]	Insulated with Perlite R[2]	Insulated with Perlite U[4]
80	1.76	0.38	5.19	0.16	1.81	0.38	8.00	0.11	2.07	0.34	11.64	0.08
95	1.56	0.41	4.27	0.20	1.62	0.40	6.60	0.13	1.86	0.37	9.46	0.10
105	1.44	0.44	3.74	0.22	1.52	0.42	5.78	0.15	1.73	0.39	8.22	0.11
115	1.33	0.46	3.25	0.24	1.41	0.44	5.03	0.17	1.61	0.41	7.09	0.12
125	1.19	0.49	2.68	0.28	1.28	0.47	4.15	0.20	1.47	0.43	5.79	0.15
135	1.04	0.53	2.13	0.34	1.15	0.50	3.30	0.24	1.32	0.46	4.58	0.18

1. The values in this table represent typical R values of concrete block. The actual R of a concrete block is influenced by the concrete constituents and by moisture content. More accurate estimates of thermal performance can be made if the actual thermal conductivity k or thermal resistance R of the specific block has been determined by tests. Procedures to make calculations for blocks of known conductivity are described in Perlite Institute Technical Data Sheet No. 2-6.

2. R values expressed in °F • ft² • h/Btu do **not** include inside and outside air film resistances. To determine total resistance (Rt) of single wythe block walls add .85 to R values shown above.

3. U values expressed in Btu/h • ft² • °F were calculated using thermal conductivity k factor of 0.32 Btu • in/h • ft² • °F. Different densities of perlite in the core spaces of concrete block has only a slight effect on the overall U value. For estimates of this effect see Perlite Institute Technical Data Sheet No. 2-6 which provides the calculation techniques.

4. U values shown **include** the effect of inside and outside air film resistances (15 mph wind).

5. These U values are based on steady state heat flow and must be considered conservative. Some designers may choose to use a mass correction factor which will result in lower U values.

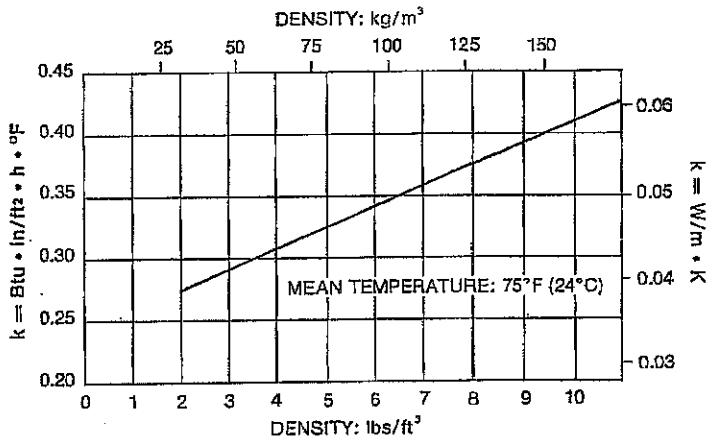
▲**Metric:** To determine R and U values in SI (metric) units use the following conversion factors:

Thermal resistance, R: °F • ft² • h/Btu x 1.761 102 E−01 = K • m²/W
Thermal transmittance, U: Btu/h • ft² • °F x 5.687 263 E + 00 = W/m² • K

TABLE 2. RESISTANCE VALUES FOR VENEER AND CAVITY WALLS CALCULATIONS

	R Values (°F • ft² • h/Btu)	R Values (K • m²/W)
Outside Air Film	0.17	0.03
Common Brick	0.20	0.04
Face Brick	0.11	0.02
Air Space in Cavity ¾-4 in. (19-102 mm)	0.97	0.17
1 in. Cavity Filled with 5 pcf Perlite (80 kg/m³)	3.12	0.55
2 in. Cavity Filled with 5 pcf Perlite (80 kg/m³)	6.25	1.10
3 in. Cavity Filled with 5 pcf Perlite (80 kg/m³)	9.38	1.65
4 in. Cavity Filled with 5 pcf Perlite (80 kg/m³)	12.50	2.20
Reflective Air Space	3.08	0.54
Furring (Nonreflective Air Space)	1.01	0.18
Gypsum or Plaster Board 0.5 in. (13 mm)	0.45	0.08
Gypsum or Plaster Board 0.625 in. (16 mm)	0.56	0.10
Inside Air Film	0.68	0.12

TABLE 3. THERMAL CONDUCTIVITY OF EXPANDED PERLITE (AT VARIOUS DENSITIES)



Sample U value calculations for Veneer and Cavity Walls

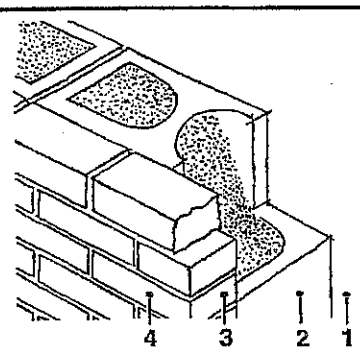
VENEER WALLS

Given: Veneer Wall of 4 in. face brick, 8 in. 105 pcf block filled with 5 pcf perlite, determine the U value:

	R values
1. inside air film (from Table 2)	.68
2. 8 in. 105 pcf block filled with 5 pcf perlite (from Table 1)	5.78
3. face brick (from Table 2)	.11
4. outside air film (from Table 2)	.17
R Total =	**6.74**

U = 1/Rt = 0.148

To find the total R of a Veneer Wall, add the R values for the veneer material (from Table 2), inside and outside air films (from Table 2) and the insulated block (from Table 1). Take the reciprocal of the total R to find the U value.



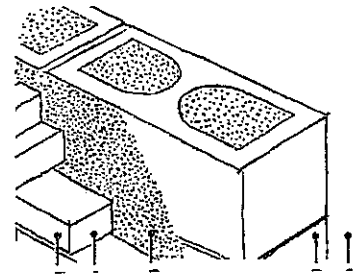
CAVITY WALLS

Given: Cavity Wall of 4 in. face brick, 3 in. cavity filled with 5 pcf perlite, 8 in. 105 pcf block filled with 5 pcf perlite, determine the U value:

	R values
1. inside air film (from Table 2)	.68
2. 8 in. 105 pcf block filled with 5 pcf perlite (from Table 1)	5.78
3. 3 in. cavity filled with 5 pcf perlite (from Table 2)	9.38
4. 4 in. face brick (from Table 2)	.11
5. outside air film (from Table 2)	.17
R Total =	**16.12**

U = 1/Rt = 0.062

To find the total R of a cavity wall, follow the same procedure as for veneer walls adding in the R of the perlite filled cavity



GUIDE SPECIFICATION SECTION 07—SILICONE TREATED PERLITE LOOSE FILL INSULATION

PART 1.—GENERAL

1.01 SCOPE

The work covered by this section of the specification includes supplying and installing loose fill material for the thermal insulation of all masonry walls in accordance with these specifications and applicable drawings.

PART 2.—PRODUCTS

2.01 MATERIALS

Silicone Treated Perlite loose fill insulation. Each package shall be clearly marked as such. The insulation material shall conform to the requirements of ASTM Designation C549 and Federal Specification HH-I-574b and shall be a product of a member of Perlite Institute, Inc. or approved equal. Prior to installation of the insulation, the manufacturer shall furnish a certificate to the architect or owner stating the product conforms to the Standard Specifications for Silicone Treated Perlite Loose Fill Insulation as adopted and published by Perlite Institute, Inc.

PART 3.—EXECUTION

3.01 INSTALLATION

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

(b) The insulation shall be poured directly into the wall at any convenient interval. Wall sections under doors and windows shall be filled before sills are placed.

(c) 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.)