

SECTION 07220 - LIGHTWEIGHT INSULATING CONCRETE ROOF INSULATION

rev. 8/7/2010

PART 1: GENERAL

1.01 SECTION INCLUDES:

- A. Lightweight Insulating Concrete Application to Prepared Substrate

1.02 RELATED SECTIONS

- A. Section [----] - Testing Laboratory Services
- B. Section [----] - Rough Carpentry
- C. Section [----] - Roof Deck
- D. Sections [7526 / 7541] - Roofing**
- E. Section [----] - Sheet Metal Flashing and Trim
- F. Section [-----] - Sprayed Fire Protection

1.03 REFERENCE STANDARDS

References in these specifications to standards, test methods and codes, are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

ASTM	American Society for Testing and Materials Philadelphia, PA
FM	Factory Mutual Engineering and Research Norwood, MA
UL	Underwriters Laboratories Northbrook, IL

1.04 SUBMITTALS

All submittals which do not conform to the following requirements will be rejected.

- A. Submittal of Equals:** Submit lightweight insulating concrete systems to be considered as equals to the specified roof system no less than 10 days prior to bid date. Primary lightweight insulating concrete systems which have been reviewed and accepted as equals to the specified system will be listed in an addendum prior to bid date; only then will equals be accepted at bidding. Submittals shall include the following:

1. Submit manufacturer's instructions for proper placement of the proposed lightweight insulating concrete roof insulation system.
2. Submit documentation confirming compliance with FM 1-195 PSF Windstorm Resistance Classification utilizing the specific roof membrane system proposed for use on this project.
 - a) Submit documentation confirming that the specific expanded polystyrene proposed for use on this project is approved by Factory Mutual for use in conjunction with the proposed lightweight insulating concrete system.
3. Submit a letter from the supplier of the proposed lightweight insulating concrete system confirming that the expanded polystyrene used as a component in the lightweight insulating concrete system is to be furnished by the supplier of the proposed lightweight insulating concrete system.
4. Submit shop drawings including a roof plan, roof slopes, and thickness of insulation.
5. Submit a sample copy of the warranty covering the proposed lightweight insulating concrete system.
6. Submit a sample copy of the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system.
7. Submit a letter from the roof membrane manufacturer confirming the intention to issue the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system at project completion.
8. Submit a letter from the proposed lightweight insulating concrete system supplier confirming that the Contractor is approved to install the proposed lightweight insulating concrete system.

1.05 QUALITY ASSURANCE

- A. **Acceptable Contractor:** The contractor must be certified in writing prior to bid by the supplier to install the proposed lightweight insulating concrete system and specified roof membrane system for single source warranty.
- B. **Agency Approvals:** The proposed lightweight insulating concrete system shall conform to the following requirements. No other testing agency approvals will be accepted.
 1. **Underwriters Laboratories:** Tested by Underwriters Laboratories in accordance with the procedures of ASTM E 119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory. Lightweight insulating concrete roof insulation components are defined by Underwriters Laboratories under sections CCVW for foamed plastic and CCOX for floor or roof - topping mixture in the latest edition of the Underwriters Laboratories Fire Resistance Directory.
 2. **Factory Mutual:** Tested by Factory Mutual Research and listed in the most recent Factory Mutual Approval Guide as non-combustible or Class 1, and for 1-540 windstorm

classification utilizing the specific roof membrane system proposed for use on this project.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. **Delivery:** Deliver materials in the supplier's original unopened packages, fully identified as to manufacturer, brand or other identifying data and bearing the proper Underwriters Laboratories label.
- B. **Storage:** Store Insulcel concentrate at temperatures between 52°F and 80°F (11° - 27° C). Expanded polystyrene board should not be stored in areas of standing water prior to application but can be exposed to rainwater before application. Boards must be clean and free from foreign substances.

1.07 PROJECT/SITE CONDITIONS

A. Requirements Prior to Job Start

1. **Notification:** Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
2. **Permits:** Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
3. **Safety:** Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

B. Environmental Requirements

1. **Precipitation:** Do not apply materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials and building interiors are protected from possible moisture damage or contamination.
2. **Temperature Restrictions:** When air temperatures of 40°F (4.4°C) or above are predicted to occur within the first 24 hours after placement, normal mixing and application procedures may be used.

1.08 WARRANTY/GUARANTEE

- A. **Insulation System Warranty:** Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the insulation system manufacturer's 10 year labor and materials warranty. The insulation system warranty shall include the composite roof deck system consisting of pregenerated foam and polystyrene insulation panels. All repair or replacement costs covered under the guarantee shall be borne by the insulation system manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner. Specific items covered during the term of the insulation system warranty include:

1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks.
2. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)
3. The Insulating Concrete Warranty will not limit, by geographic location, the owners rights for claims, actions, and/or proceedings.
4. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

> Lightweight Ten Year Roof Insulation Performance Warranty

B. Roof System Guarantee: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with a labor and materials endorsement to the roof membrane manufacturer's guarantee confirming that a single guarantee covers both the lightweight insulating concrete system and the roof membrane/flashing system. The roof system guarantee shall include both the roofing and flashing membrane, and the specified new lightweight insulating concrete system consisting of pregenerated foam, patented-pre-formed polystyrene panels, base sheet, and base sheet fasteners. All repair or replacement costs covered under the guarantee shall be borne by the roof membrane/flashing manufacturer. The guarantee shall be for a 10 year term, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner. Specific items covered under the roof system guarantee include:

1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks;
2. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)
3. The roof insulation will remain in place even if the roof membrane sustains wind damage covered by the guarantee.
4. The base sheet, base sheet fasteners and polystyrene panels will be covered by the guarantee.
5. The roof system guarantee will not limit, by geographic location, the Owner's rights for claims, actions, and/or proceedings.
6. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

> Ten year Roof System Guarantee

PART 2: PRODUCTS

2.01 MATERIALS

- A. Acceptable Manufacturer:** Provide a lightweight insulating concrete roof insulation system incorporating pregenerated foam and expanded polystyrene board supplied by a single manufacturer.
- RT Insucel or Insucel Roof Insulation System by Siplast Engineered Lightweight Roofing Insulation.

2.02 SYSTEM DESCRIPTION

- A. Lightweight Concrete System Description:** Provide materials used in the lightweight concrete roof insulation system conforming to the following.
1. Galvanized Metal Deck: Corrugated steel decking incorporating a pre-applied galvanized coating conforming to a minimum Class G-60 as specified in ASTM A 525 and having slots in the flutes equal to a minimum of 0.5% of the deck area. Metal deck shall be Ga. 22 Type B deck at 80 ksi.
 2. Concrete roof decks shall be clean and free of any surface contaminants, minimum 3,000 PSI strength. New concrete decks will be allowed to cure for a minimum of 28 days prior to any roofing.
 2. Portland Cement: Portland cement conforming to Type I, II, or III as defined by ASTM C 150.
 3. Foam Concentrate: Protein based foam concentrate conforming to ASTM C 869 and ASTM C 796.
 4. Expanded Polystyrene Insulation Board: Expanded polystyrene (EPS) insulation board having a nominal density of 1 pcf (16 kg/m³) defined as Type I by ASTM C 578 and containing approximately 3% open area. Each bundle of board shall be delivered to the job site with clear identification as to manufacturer and shall carry the Factory Mutual approval label and the Underwriter's Laboratories Classified label on each bundle.
 5. Water: Potable water that is clean and free of deleterious amounts of acid, alkali and organic materials.

2.03 MIX DESIGN

- A. Density:** Mix Portland cement and pregenerated foam with water to achieve a wet density ranging from 38 to 48 pcf (609 to 769 kg/m³), resulting in a minimum dry density of 30 pcf (481 kg/m³) and minimum compressive strength of 200-300 psi (1469-2070 kPa).

PART 3: EXECUTION

3.01 EXAMINATION

- A. **General:** Ensure that all surfaces to receive lightweight insulating concrete are free of oil, grease, paints/primers, loose mill scale, dirt, or other foreign substances. Where necessary, cleaning or other corrections of surfaces to receive lightweight insulating concrete is the responsibility of the party causing the unacceptable condition of the substrate.
- B. **Substrate Acceptance:** With the general contractor present, examine surfaces to receive the roof insulation system and determine that the surfaces are acceptable prior to placement of the lightweight insulating concrete system.

3.02 PREPARATION

- A. **General:** Remove water or any other substance that would interfere with bonding of the lightweight concrete system.

3.03 APPLICATION

- A. **General:** Provide equipment and application procedures conforming to the material supplier's application instructions.
- B. **Application:** Place a 1/8-1/2 inch (3-12.5 mm) minimum thickness of lightweight insulating concrete slurry over substrate deck before embedding the specified expanded polystyrene insulation panels. Place a minimum 1 inch (25 mm) thickness of expanded polystyrene insulation panels as shown in the approved shop drawings and in a brick-like pattern within 30 minutes of applying the insulating concrete slurry coat to the substrate. The maximum allowable expanded polystyrene insulation panel step in a stair-step design is 1 inch (25 mm). The following day place a 2 inch (51 mm) minimum thickness of the lightweight insulating concrete over the top of the expanded polystyrene insulation panels.
- C. **Thermal Resistance:** Install the specified lightweight insulating concrete system to provide for an **[average]** thermal value of **R-15** or as shown on the architectural details/drawings.
- D. **Slope:** Install the specified lightweight insulating concrete system to provide for a minimum positive roof slope of **[1/4]** inch per foot (**[2]** %). See the structural drawings for slope provided by the roof framing system.

3.04 FIELD QUALITY CONTROL

- A. **Protection:** Avoid roof-top traffic over the roof insulation system until one can walk over the surface without creating surface damage.
- B. **Compressive Strength Testing:** The Architect has the option to select an independent testing laboratory to randomly sample the top placement of insulating concrete to verify the thickness and density, and to secure and test compressive strength cylinders in accordance with ASTM C 495. The Owner will be responsible for the cost and engagement of the independent testing laboratory services.

- C. Application Monitoring:** Monitor the thickness and wet density of the lightweight insulating concrete at the time of placement to determine conformance to the manufacturer's requirements. Monitor the placement of proper thickness of polystyrene insulation board in accordance with the contract documents.
- D. Fastener Withdrawal Testing:** Conduct a base ply fastener pull test 3 or more days following the application of the lightweight insulating concrete to ensure a minimum withdrawal resistance of 40 pounds (18 kg) per fastener.

3.05 PATCHING

- A. Patching:** Perform all patching and repairing of insulating concrete using Zono-Patch or other materials approved by the lightweight insulating concrete supplier.