

**SECTION 03 52 00**  
**LIGHTWEIGHT CONCRETE ROOF INSULATION**

09-11

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

Section specifies insulating concrete placed on a prepared structural deck.

**1.2 RELATED WORK**

A. Roof decks: Section 03 51 16, GYPSUM CONCRETE ROOF DECKS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of material.
  - 2. Specifications for mixing, placing, curing and protection of insulating concrete.
  - 3. Interstitial deck: Test specimens reports.
- C. Certificates: Aggregate or foam manufacturer's written certification that applicator has equipment and training to provide a satisfactory installation.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact.
- B. Store in dry and watertight facilities. Do not store materials on ground.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
  - 305R-10.....Hot Weather Concreting
  - 306R-10.....Cold Weather Concreting
  - 308R-01(R2008).....Curing Concrete
  - 523.1R-06.....Guide for Cast-in-Place Low-Density Concrete
- C. American Society for Testing and Materials (ASTM):
  - A82-07.....Steel Wire, Plain, for Concrete Reinforcement
  - A185-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  - C150-09.....Portland Cement

C260-10.....	Air-Entraining Admixtures for Concrete
C309-07.....	Liquid Membrane Forming Compounds for Curing Concrete
C332-09.....	Lightweight Aggregates for Insulating Concrete
C495-07.....	Compressive Strength of Lightweight Insulating Concrete
C578-10.....	Rigid Cellular Polystyrene Thermal Insulation
C665-06.....	Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
C796-04.....	Foaming Agents For Use in Producing Cellular Concrete Using Preformed Foam
C869-91(R2006).....	Foaming Agents Used in Making Preformed Foam for Cellular Concrete

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Portland cement: ASTM C150, Type I or Type III.
- B. Lightweight Aggregate: Vermiculite or Perlite conforming to ASTM C332, Group I.
- C. Foaming Agent: ASTM C869.
- D. Air-Entrainment Agent:
  - 1. ASTM C260 type recommended by the aggregate manufacturer.
  - 2. Admixtures with chloride salts or regenerated foam types not acceptable.
- E. Water: Clean and potable, free from impurities detrimental to the concrete.
- F. Insulation and Control Joint Filler:
  - 1. Control Joint Filler: Glass fiber or similar vapor permeable highly compressible material which will compress to one-half its thickness under a load of 172 kPa (25 psi) or less.
  - 2. Insulation: ASTM C665, unfaced for relief vents.
  - 3. Insulation Board:
    - a. Polystyrene: ASTM C578, Type I.
    - b. Board with evenly distributed holes or slots for bonding; approximately 3 percent open area.
- G. Admixtures:
  - 1. Air Entraining: ASTM C260, Type recommended by the aggregate manufacturer. Admixtures with chloride salts or pregenerated foam types are not acceptable for vermiculite or perlite concrete.

2. Accelerating, Retarding, and Water Reducing: ASTM C494, Type as recommended by insulating concrete manufacturer.
- H. Concrete Sealer: ASTM C309, Type 2, white, pigmented, curing, sealing, hardening and dustproofing concrete, and compatible with latex paint or acrylic paint, not acting as a bond breaker for the paint.

## **2.2 MIXES AND MIXING**

### Roof Deck

- A. Mix insulating concrete in accordance with ACI 523.1R or manufacturer's printed specifications where more demanding.
- B. Place in accordance with chapter 5 of ACI 523.1R, or manufacturer's specifications where more demanding.
  1. Cold Weather Concreting: ACI 306R and ACI 523.1R. Remove and replace frozen concrete.
  2. Hot Weather Concreting ACI 305R.
  3. Place insulating concrete to not less than 90 mm (3-1/2 inches) over the top of the steel deck crests.
  4. Smooth the placed material to a uniform finish following the screeding operation.
  5. Free surface of loose material, finish smooth to receive sealer.
- C. Design Mix:
  1. Compressive strength: Minimum 862 kPa (125 psi) when tested in accordance with ASTM C495 except do not oven dry cellular concrete samples.
  2. Dry density: Maximum 450 Kg/cubic meter (28 pcf).
- D. Vermiculite or Perlite aggregate mix.
  1. Mix proportions as recommended by aggregate manufacturer for specified strength and density.
  2. Approximate proportions:
    - a. Ratio of 0.17 cubic meter (6 cubic feet) of aggregate to 42 Kg (94 pounds) of Portland cement.
    - b. Air entraining agent approximately 8 Kg (0.11 pound) per 95 L (25 gallons) of water.
    - c. Slump approximately 70 mm (2.7 inches).
    - d. Water to assure uniform and consistent mix.
- E. Cellular concrete mix:
  1. Mix proportions as recommended by foam manufacture for specified strength and cast density.
  2. Preformed foam concentrate diluted at approximately 40 parts water to one part concentrate.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Clean deck of debris, oil, and other contaminants that will prevent bond.
- B. Do not start until curbs, sleeves, edge venting, or other penetration forms are completed.

### **3.2 PLACING INSULATING CONCRETE**

- A. Place in accordance with ACI 523.1R or manufacturer's specifications where more demanding.
- B. Cold Weather Concreting: ACI 306R.  
Remove and replace frozen concrete.
- C. Hot Weather Concreting: ACI 305R.
- D. Place reinforcement as required for fire rating and for seismic areas.
  - 1. Lap the edges of the reinforcement 150 mm (6-inches) and the ends 150 mm (6-inches).
  - 2. Locate at midheight of insulating concrete.
  - 3. Place reinforcement without attachment approximately 13mm (1/2 inch) above steel deck crests in insulating concrete.
- E. Place for thickness and profiles shown.
- F. Place concrete not less than 50 mm (2-inches), or more than 200 mm (8-inches) in thickness.
- G. Slope insulating concrete uniformly, 1 in 50 (1/4-inch per foot) minimum, to drains or scuppers.
- H. Depressions that create ponding are not acceptable.
- I. Leave surface free of loose material and finish to receive roofing material specified.
- J. Roof relief Vents for Vermiculite or Perlite Concrete:
  - 1. Under roof relief vents, remove insulating concrete to structural deck and fill with ASTM C665 insulating material.
  - 2. Coordinate with roofing and sheet metal work to space vents minimum 152 mm (6-inches) in diameter, a maximum distance of 9 m (30 feet) from adjacent vent and from vented edge.
- K. Control Joints For Perlite Concrete:
  - 1. Install minimum 25 mm (1-inch) wide control joint through thickness of perlite concrete around perimeter of roof deck and at junction of roof penetrations.
  - 2. Fill control joints with control joint filler specified.

### **3.3 PLACING INSULATION BOARD FOR COMPOSITE CONSTRUCTION**

- A. Coat concrete roof deck with a slurry of the insulating concrete, minimum 3 mm (1/8-inch) thick.
- B. Fill the corrugations of metal decking with insulating concrete to a minimum depth of 3 mm (1/8-inch) over top of flutes.
- C. Set insulation boards to key into slurry. Install insulation in a stair stepped configuration to form base for slope-to-drain capability.
- D. Place for thickness and profiles shown. Thickness of concrete over insulation board not less than 2 inches.

### **3.4 CURING, PROTECTION AND TESTING**

- A. Roof Deck: Cure in accordance with ACI 308R, or manufacturer's specification where more demanding.
- B. Do not permit traffic on insulating concrete for 72 hours after placing.

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*Replace Boilers - FCA D, Energy*  
*Malcom Randall VA Medical Center, Gainesville, FL*

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