

SPECIFICATION FOR RECOVER PLACEMENT OF CELCORE CELLULAR INSULATING CONCRETE OVER AN EXISTING ASPHALTIC ROOF

SECTION: 03 52 16 - CELLULAR LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including all General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. This section includes cast-in-place cellular lightweight insulating concrete for roof decks placed upon a properly prepared existing asphaltic roof.
- B. Related Sections include:
 - 1. Rough Carpentry, Wood blocking and curbs, Division 06000
 - 2. Roof Membrane, Division 07000

1.3 DEFINITIONS

- A. Cellular Lightweight Insulating Concrete: Low-density concrete produced using preformed foam.
- B. Recover: New components installed over an existing asphaltic roof. If more than one roof is present, the existing components should be removed.

1.4 REFERENCES

- A. ASTM C 150, Standard Specification for Portland Cement
- B. ASTM C 138, Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- C. ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete
- D. ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection
- E. ASTM C 495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete
- F. ASTM C 796, Standard Test Method for Foaming Agents for use in Producing Cellular Concrete Using Preformed Foam

- G. ASTM C 869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete
- H. ASTM C 578, Standard Specification for Rigid Cellular Polystyrene Thermal Insulation
- I. ASTM C 513, Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength
- J. ASTM C 1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

1.5 SUBMITTALS

- A. Product data for the cellular lightweight insulating concrete and the polystyrene insulating board indicating compliance with all applicable Approvals, Standards and required physical property values.
- B. Florida Product Approval Number, 2010 Code Version, including HVHZ Approval
- C. Miami Dade County, Notice of Product Acceptance - NOA
- D. Shop drawings indicating polystyrene insulation layout , thicknesses, slope, drain locations, and high / low point thickness measured from atop the of the existing roof.
- E. Applicator shall be a firm Approved in writing by the foam concentrate Manufacturer. The written Approval letter shall identify the project by name and the Approved contractors firm.
- F. Statements from manufacturers certifying that each of the following materials comply with referenced standards:
 - 1. Portland Cement
 - 2. Foaming Agent
 - 3. Admixtures
 - 4. Polystyrene Insulation Board

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualification: An independent testing agency shall be qualified in accordance with ASTM C 1077 and ASTM E 329 for testing indicated.
- B. FM Global Approval: provide cellular lightweight insulating concrete that has been evaluated by FM Approvals as part of a roof assembly and is listed in the FM RoofNav data base for Class 1 and Non-combustible construction.
- C. UL Fire Resistance: The Cellular Lightweight Insulating Concrete shall be UL Classified and listed in the current UL Fire Resistant Design Directory under Category COXX, Floor and Roof Topping Mixtures.

1.7 DELIVERY AND STORAGE

- A. Deliver materials unopened in the manufacturers original packaging or by acceptable bulk delivery.
- B. Materials shall be identifiable by manufacturers labeling.
- C. Where applicable materials shall bear the following Approval Marks:
 - 1. Underwriters Laboratories - UL
 - 2. Factory Mutual - FM
 - 3. Miami-Dade County - NOA

1.8 PROJECT CONDITIONS

- A. When air temperatures 40°F or above are predicted to occur within the first 24 hours after placement, normal application shall apply.
- B. When air temperatures are 40°F and are predicted to fall to freezing within 24 hours of placing the cellular insulating concrete, placement shall be postponed.
- C. Do not place when placement surfaces or air temperatures are 32°F or below.
- D. Do not place during precipitation, or when there is a likely expectation that precipitation will occur during placement. Do not place cellular insulating concrete upon surfaces covered with water, dew, frost, ice or snow.

1.9 WARRANTY / GUARANTEE

- A. Upon successful completion of the project, after all post installations have been completed, furnish the Owner a roof deck system manufacturer's warranty. The warranty shall be a term type and shall be issued to the Owner at no additional cost. Specific items covered under the warranty shall include:
 - 1. The actual resistance to heat flow through the roof insulation will be at least 80% of the designed thermal resistance, provided the insulation is dry and the roof membrane is free of leaks.
 - 2. The roof insulation will remain in a re-roof-able condition should the roof membrane require replacement during the original term of the warranty (excluding damage caused by fastener withdrawal during the removal of the roof cover).
 - 3. The roof insulation will not cause structural damage to the building as a result of expansion from thermal or chemical reaction.
 - 4. The roof insulation will not cause the roof membrane to leak as a result of vapor pressure build-up from batching (mixing) water used to produce the insulating concrete.
 - 5. The roof insulation warranty period shall be for a term of [value] years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers whose products are listed and meet or exceed the requirements of this specification are approved for use.
- B. Basis of Design: Celcore Incorporated, www.celcoreinc.com.
- C. Manufacturer's listed below may be considered, subject to compliance with the specification:
 - 1. [manufacturer], [website]

2.2 MATERIALS

- A. Cement: portland type I, I/II meeting ASTM C150
- B. Water: shall be clean, potable, free from injurious quantities of acid, alkali, salt, oil, organic matter and other impurities. The maximum permissible chloride level is 250 ppm.
- C. Foaming Agent: meeting ASTM C 869 when tested in accordance with ASTM C 796. Foam concentrate shall be manufacturer labeled bearing FM, UL and Miami-Dade County Approval Marks.
- D. Admixtures: admixtures shall not be used unless approved in writing by the Foam Manufacturer.
- E. Insulating Board: shall be a product of expanded polystyrene (EPS holey board) meeting ASTM C 578, Type I, 1 lb/ft³ nominal density with keying holes comprising approximately 3% of the gross surface area. Approved manufacturers include:
 - 1. Carpenter Company www.carpenter.com
 - 2. Cellofoam North America www.cellofoam.com
 - 3. Dyplast Products, LLC www.dyplastproducts.com
 - 4. Insulfoam www.insulfoam.com
 - 5. ThermaFoam, LLC www.thermafoam.com
- F. Curing Compound: as required by the foam manufacturer and applied in accordance with the manufacturer's instructions.

2.3 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Mix materials in strict accordance with recommendations of the foam manufacturer to yield the proper physical properties. Use the minimum amount of mix water required to produce concrete having good work-ability.
- B. Mix and pump the cellular lightweight insulating concrete into place using a batch plant approved by the foam manufacturer. Thoroughly blend all materials before discharging the mixer.

- C. Wet cast density: [38 - 42] lbs/ft³ (+/- 3 lbs/ft³) at the point of placement when sampled in accordance ASTM C 172 except as modified by the applicable sections of ASTM C 495. End of hose wet density shall be determined in accordance ASTM C 138. Do not rod or vibrate sample.
- D. The cellular insulating concrete shall have a minimum 28 day compressive strength of [200 - 350] psi when tested in accordance with ASTM C 495.
- E. The insulating concrete deck shall be designed to provide an [minimum or average] R-value of: R = [value]

PART 3 - EXECUTION

3.1 EXAMINATION OF EXISTING CONSTRUCTION

- A. Professional analysis as follows shall be conducted by others prior to placement of the cellular insulating concrete roof deck:
 - 1. Determine the adequacy of the structural deck to support the loads to be imposed by the new cellular insulating concrete deck and roofing system.
 - 2. Determine the condition of the existing structural deck system and/or an analysis of the state of deterioration of the original construction.
 - 3. Determine the adequacy of the existing roof system to meet the design pressure requirement for the specified wind uplift resistance.

3.2 PREPARATION

- A. The surfaces on which the cellular insulating concrete is to be placed shall be clean of foreign debris, loose gravel, free of standing water and blisters in the roof membrane.
- B. Should the existing roof have thermal insulation, any areas determined as being wet or deteriorated shall be removed and the removal areas shall be made watertight prior to placing the cellular insulating concrete.
- C. Blisters in the existing roof shall be cut or shaved and then repaired to a watertight condition. This work shall be accomplished by the roofing contractor and performed prior to the beginning of the cellular insulating concrete placement. It shall be the responsibility of the Prime and/or roofing contractor to maintain the building in a watertight condition during the period of construction.
- D. The placement contractor shall visually inspect the surface condition of the existing roof prior to beginning placement of the cellular insulating concrete. Any areas of unsoundness or requiring additional preparation shall be brought to the attention of the Prime and/or roofing contractor for correction prior to placement.
- E. Cover and protect all equipment, stands, curbs, drains, etc., prior to beginning placement of the cellular insulating concrete.

- F. Protect all elements that interface with the insulating concrete placement from application damage or disfigurement.

3.3 INSTALLATION

- A. Place a slurry layer of cellular concrete on the prepared roof surface having sufficient thickness to receive the EPS holey boards plus a minimum 1/8" thickness, with out voids.
- B. Immediately place the EPS holey board insulation into the fresh cellular concrete layer in an manner which causes the boards underside to make full contact with the concrete. Cellular concrete shall be caused to partially enter into the keying holes of the board. The insulation board shall be placed in a brick like pattern of staggered joints butted together.
- C. When required for slope, install the EPS holey board in a stepped configuration with maximum step increments of 1 inch.
- D. The installed EPS holey board layer shall be allowed to set overnight, undisturbed, prior to receiving topping. Prior to placement of topping, the holey board layer shall be inspected for firm bond attachment to the existing roof surface.
- F. Place a minimum 2 inch thick topping layer of cellular insulating concrete above the insulation board and/or the existing roof surface. Screed and hand finished the placement to a smooth surface.
- G. Apply curing compound to the surface of the deck after topping placement once the layer has hardened sufficiently to receive foot traffic without causing damage. Curing shall be applied at a rate and in a manner as recommended by the foam manufacturer.

3.4 FIELD QUALITY CONTROL

- A. End-of-hose wet density checks shall be taken at a minimum of one every thirty minutes during placement. Density information shall be recorded by the placement foreman and kept as a written project record. Sampling shall be done in accordance ASTM C 172 except as modified by the applicable sections of ASTM C 495.
- B. Cylindrical test specimen shall be cast during each days work or for every 5000 sq/ft of placement. Specimens shall be cast in accordance with the applicable sections of ASTM C 495. Do not rod. A set of test specimens shall be consider (6) 3 x 6 cylinders from the same sampling. (4) specimens of each set shall be tested for compressive strength and (2) shall be for oven-dry density determination. Testing shall be conducted at age 28 days in accordance with ASTM C 495.
- C. Retesting for compressive strength and oven dry density, if required, shall be done in accordance with ASTM C 513.

3.5 PROTECTION

- A. The installed cellular insulating concrete roof deck shall be protected from work traffic for a minimum of 48 hours after topping placement. The roof deck shall be protected from concentrated loads of construction materials. Load distribution materials, such as ply wood,

shall be used by other trades when stocking materials.

- B. Coordinate installation of the roof cover such that the installed insulating concrete deck is not exposed for unnecessary extended periods of time. The insulating concrete deck shall be considered sufficiently cured to receive roof cover at age 3 - 5 days following placement.

3.6 REPAIRS

- A. Where required to provide a surface condition acceptable to receive the roof cover, repairs made to smooth the surface, correct depressions or fill divots shall be done in accordance with written guidance provided by the foam concentrate manufacturer.

3.7 DEFECTIVE WORK

- A. Remove and replace any area of the roof deck placement that fails to comply with the requirements of the foam manufacturer and/or the project specifications.

END OF SECTION 03 52 16

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