# SECTION 07501 (00 00 00)

## RA LIGHTWEIGHT INSULATING CONCRETE (LWIC)

GENERAL

SECTION INCLUDES

Insulating concrete fill on corrugated metal deck.

Insulation board for embedment in lightweight insulating concrete.

RELATED SECTIONS

Section 01572-Construction Waste Management.

Section 05310-Steel Decking.

Section 07540-Thermosplastic Membrane Roofing.

Section 07551- RA Modified Bitumen Roofing.

Section 07600- RA Flashing and Sheet Metal.

* 1. REFERENCES

ASCE-7 American Society of Civil Engineering.

American Society for Testing and Materials (ASTM).

* + - 1. C150-Portland Cement
			2. C177-Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
			3. C332-Lightweight Aggregates for Insulating Concrete.
			4. C495-Compressive Strength of Lightweight Insulating Concrete.
			5. C578-Rigid, Cellular Polystyrene Thermal Insulation.
			6. C796-Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.
			7. C869-Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
		1. Florida Building Code (FBC).
		2. Florida Building Code Test Protocol for High Velocity Hurricane Zones, Test Application Standard (TAS) No. 105-Test Procedure for Field Withdrawal Resistance Testing.

SUBMITTALS

* + 1. Product data
			1. Recycled Content:
				1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
				2. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
				3. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
				4. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
			2. Regional Materials:
				1. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
				2. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
				3. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
				4. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
			3. Rapidly Renewable Content:
				1. Indicate manufacturer and product name for each tracked material; total product cost for each tracked material; and percentage of product, by weight, for each material that meets the rapidly renewable criteria.
		2. Mix Designs: Submit mix designs to Engineer for review a minimum of 20 days before first placement. Do not proceed without Engineer’s written approval.

Submit certified test reports stating that concrete physical properties meet specification requirements.

Submit Roof Plan showing pitch/taper, sumps, details cut locations. Submit details.

* + 1. Complete current Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).

QUALITY ASSURANCE

Applicator: Company specializing in placing lightweight concrete fill material and approved by manufacturer.

Complete insulating concrete roof deck system: Certified in writing, jointly, by the manufacturer and the licensed applicator, verifying that work conforms to requirements of the contract documents and manufacturer's requirements for honoring the manufacturer's warranty as specified in the appropriate Roofing Section.

Tests:

* + - 1. Compressive test for insulating concrete: ASTM C495.

Thermal transmission: ASTM C177.

* + 1. Code Compliance.
			1. Building Code: The complete roofing system shall comply with all applicable requirements of the Florida Building Code.
			2. Product Approvals: Roofing system shall have current FBC HVHZ Protocols and required product Notice of Acceptance (NOA) for each roofing system applied to each type of substrate.
			3. Wind Resistance: Execute the installation of the LWIC system to comply with wind resistance requirements of applicable building codes for specific negative wind pressures at various building elevations (heights) as indicated on the Drawings.
				1. Calculations: Wind load calculations shall be prepared by a licensed structural engineer registered in the State of Florida in accordance with ASCE 7.

PRE-INSTALLATION MEETING

* + 1. Shall not occur without Shop Drawings approved by the Contractor and accepted by the A/E. Shall convene a minimum of two weeks before starting work of this section.
		2. Required Attendees:
			1. Owner’s Project Manager.
			2. Building Department Representative.
			3. Owner’s Maintenance Foreman.
			4. Architect.
			5. Contractor.
			6. LWIC manufacturer.
			7. LWIC installer.
			8. Roofing subcontractor.
			9. Roof System Manufacturer.
			10. Installers of deck or substrate construction to receive LWIC work.
			11. Installers of roof-top units and other work in and around roofing that must precede or follow LWIC work (including mechanical work if any).
			12. Any other subcontractors associated with roof assembly work.
		3. The Contractor shall make arrangements for the meeting and notify the parties required to attend.
		4. Agenda shall include:
			1. Review preparation and installation procedures and coordinating and scheduling required with related work.
			2. Review LWIC system requirements (drawings, specifications, and other contract documents).
			3. Review Shop Drawings and associated submittals.
			4. Review manufacturer's technical materials.
			5. Review and finalize construction schedule related to roofing work and verify availability of materials, personnel, equipment and facilities needed to make progress and avoid delays.
			6. Review required inspection, testing, certifying and material usage accounting procedures.
			7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including temporary roofing.
			8. Tour representative areas of LWIC substrates (decks), inspect and discuss condition of the substrate, roofing system, roof drains, curbs, penetrations and other preparatory work performed by other trades.

PROJECT CONDITIONS

Environmental Requirements: When air temperature of 40 degrees F. or above are predicted for the first 72 hours after placement, normal placement procedures may be used.

Inspection: The applicator shall be responsible for inspection and approval of the substrate as being suitable for the roof insulation system.

* 1. SPECIAL WARRANTIES

By Membrane Producer: Provide a 20 year Special Warranty from the roof membrane producer covering correction of defects in the roof insulation component of the Roof Assembly.

By Lightweight Insulation Concrete (LWIC) Producer and Installer: Provide a 10 year Special Warranty in which the lightweight concrete roof insulation producer/installer agrees to correct defective roof insulation work.

* + - 1. See 07500 for full requirements of this Special Warranty that shall be included in this LWIC Special Warranty (that will accompany the Roof Assembly Special Warranty).
			2. At time of project closeout, submit this signed Special Warranty to the roof membrane producer, for transmittal to Contractor, A/E and board.

PRODUCTS

ACCEPTABLE PRODUCTS

Subject to compliance with the specified requirements, provide products for roofing and re-roofing as appropriate, by one the following:

* + - 1. Celcore Inc.
			2. Concrecel USA.
			3. Elastizell Corporation of America.

MATERIALS

* + 1. All lightweight concrete materials are to contain recycled content such as reclaimed Portland cement. All expanded polystyrene board to contain recycled content.

Cellular Insulating Concrete: Slurry of cellular Portland cement, water, and manufacturer’s product. No admixtures shall be used without approval by LWIC manufacturer.

Portland Cement: ASTM C150, Type I, II, or III.

Cellular Foaming Agent: ASTM C869 and C796.

* + - * 1. All cellular foaming agents to be manufactured from 100 per cent bio-based materials.

Water: Potable, clean and free of deleterious amounts of acid, alkali and organic materials.

Vented Insulation Board: Comply with ASTM C578, expanded polystyrene as approved by LWIC manufacturer.

* + - * 1. Board thickness: Per shop drawings.
			1. Curing Compound: For use when allowed by the LWIC manufacturer and when used in accordance with LWIC manufacturer’s written recommendations.

Aggregate Insulating Concrete: Slurry of cellular Portland cement, water, and manufacturer’s product. No admixtures shall be used without approval by LWIC manufacturer.

Portland Cement: ASTM C150, Type I, II, or III.

Aggregate: ASTM C332, Expanded vermiculite.

* + - * 1. ASBESTOS: Must be asbestos free, no asbestos shall be allowed, not even trace levels shall accepted. If vermiculite aggregate is used, LWIC manufacturer must supply the Owner a notarized statement by an officer of the LWIC manufacturer that mined aggregates are asbestos free.

Water: Potable, clean and free of deleterious amounts of acid, alkali and organic materials.

Vented Insulation Board: ASTM C578, Expanded polystyrene as approved by LWIC manufacturer.

* + - * 1. Board thickness: Per shop drawings.
			1. Curing Compound: For use when allowed by the LWIC manufacturer and when used in accordance with LWIC manufacturer’s written recommendations.

When required, mesh reinforcement shall be equal to keydeck type 21602-1619.

Venting Accessories:

* + - 1. Stack Vents and Perimeter Vents: Provide in compliance with manufacturer’s requirements and Florida Building Code (FBC) High Velocity Hazard Zone (HVHZ) Protocols and required product Notice of Acceptance (NOA).

PHYSICAL PROPERTIES OF MIX

Cellular:

Density at time of placement: 38-48 pcf min.

Oven dry density: 30 pcf min.

Minimum compressive strength: 200 psi min. (ASTM C495).

* + 1. Aggregate:

Density at time of placement: 60-68 pcf min.

Oven dry density: 35 pcf min.

Minimum compressive strength: 300 psi min. (ASTM C495).

EXECUTION

REMOVALS

* + 1. Lightweight Insulating Concrete Decks: Remove completely all existing roof membranes and insulation materials to structural deck. Install new lightweight insulating concrete system or remove and replace existing wet/deteriorated lightweight insulating concrete with new lightweight concrete when fastener field withdrawal resistance per FBC can not be achieved or when moisture exceeds:
			1. Cellular: 20 percent moisture.
			2. Aggregate: 30 percent moisture.

PREPARATION

Cover drains. Set screeds to assure correct thickness of insulating concrete.

Install all roof penetration assemblies (such as scuttles, curbs, joint assemblies, vents, piping, and electrical risers and conduit, etc.).

Close or seal all joints and openings in metal deck prior to concrete placement.

INSTALLATION

Mix and pump into place under provisions of manufacturer's instructions using equipment designed specifically for this type of work.

Insulation Installation:

Fill steel form corrugations with slurry coat of insulating concrete to a minimum of 1/8 inch over the top of form.

Place insulation board on concrete within 30 minutes of placing of concrete slurry.

Lay insulation board per Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).

Boards and slurry shall be left undisturbed a minimum of 24 hours before application of top coat.

Install layer of insulating concrete within 24 hours of installing the initial leveling coat. All areas of 1/8-inch thick leveling layer of insulating concrete and insulation board not covered by the lightweight concrete within four hours shall be removed from the deck.

Install insulating concrete and develop the new sloping sections to drains on roof after as shown on roof plan.

The average 'R' value shall be 20 min. as tested in accordance with ASTM C177 which includes the outside air film roofing materials, insulating concrete, insulating board, and inside air.

Concrete Placing:

Pump concrete into place. Do not vibrate or tamp.

Screed to an even surface, and to drain. Broom finish.

Thickness of concrete over top of insulation: Per Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).

FIELD QUALITY CONTROL

Conduct wet density test daily. At least 4 test specimens shall be sampled at the point of placement for each day's pour or each 8 cubic yards of material placed. Test in accordance with ASTM C495.

Prior to commencement of roofing, insulating concrete applicator shall flood test the deck to insure positive slope and drainage. If there is any ponding water, it shall be corrected before placement of the roofing materials.

Furnish Certificate of Compliance to the Owner upon completion of job.

END OF SECTION