



**NRDCA 100 – “GUIDELINE FOR FIELD APPLICATION of
AGGREGATE INSULATING CONCRETE ROOF DECK SYSTEMS”**

The National Roof Deck Contractors Association (NRDCA) has prepared this document to provide customers and installers information that the industry believes is important to proper application of aggregate insulating concrete roof deck systems. Procedural differences do exist between various aggregate concrete suppliers to accommodate their product and testing agency approvals. If questions arise on specific points, contact the contractor, material manufacturer or Approval Agency for clarification.

I. Approved Materials and Reference Documents

- A. **Approved Materials:** In addition to product application parameters contained in Agency Approval Guides, Approved Products must conform to ASTM Standards.

| <u>Product</u> | <u>ASTM Standard</u> |
|--------------------------------------|---|
| Insulating Concrete Aggregate | ASTM C 332- Standard Specification for Lightweight Aggregates for Insulating Concrete |
| | ASTM C-495 – Standard Test Method for Compressive Strength of Lightweight Insulating Concrete |
| | ASTM C-513 – Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength |

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| Expanded Polystyrene Insulation | ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation Type-1 minimum density 0.90 pcf |
| Portland Cement | ASTM C 150 – Standard Specification for Portland Cement Types I, II, III. |
| Metal Decking | ASTM A 653 - Specification For Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated by the Hot Dip Process ASTM 924 – Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process. Minimum G-60 Galvanized Coating. |

B. Reference Documents: Listed below are documents referenced in this guideline.

NRDCA 250 – “Field Quality Control Procedures for Application of Insulating Concrete Roof Deck Systems”

NRDCA 300 – “Procedures to Determine the Accuracy of Material Measuring Equipment for Lightweight Insulating Concrete”

“Steel Deck Institute – SDI Manual of Construction with Steel Deck”

II. Application Equipment

A. Pump – Progressive cavity pumps are used to transfer aggregate concrete from the mixer to its point of placement. Progressive cavity pumps are constant volume delivery pumps consisting of a rotor and stator. These pumps are sized to deliver adequate material volume through hoses attached to the pumps.

Since these pumps are not pressure sensitive, kinks and obstructions in the hose are to be avoided. The possibility exists that the hose will burst if the hose is not free flowing.

B. Delivery Hose – The preferred hose is 2” or larger inside diameter rubber lined, with full flow fittings, rated at minimum 800 PSI. The last section of hose should be non-collapsing.

III. Raw Material Measuring Equipment and Accuracy Verification

- A. **Equipment Requiring Accuracy Verification:** Listed below are the measuring equipment requiring accuracy verification.

Load Cell
Water Meter
Cast Density Scale
Cast Density Calibrated Container

- B. **Accuracy Verification Procedures:** The procedures to determine the accuracy of the above listed equipment and the accuracy limits are contained in document NRDCA 300.

IV. Quality Control Test Procedures

- A. **Quality Control Procedures:** The cast density of insulating concrete must be measured to maintain control of the application. The cast density measurement procedure and the limits on values measured are contained in Section III of document NRDCA 250.

- B. **Expanded Polystyrene Insulation Board:**

The EPS manufacturer shall provide a signed certificate stating that the EPS meets the minimum physical properties of Type 1 per ASTM C 578. The bundle or package of EPS boards must contain a label indicating that the EPS is Agency Approved on projects where the Agency Approved system has been specified.

V. Application Procedures

- A. **General:** Refer to the Agency Approval Guide for specific manufacturer's approved products and application procedures.
- B. **Steel Decking Application:** Steel Decking must be installed in accordance with Agency Approved applications, the procedures shown in the Steel Deck Institute Manual of Construction with Steel Deck and applicable building code requirements. The installer of the steel deck is responsible for meeting all these requirements.

C. Insulating Concrete Application:

1. Mixing Procedure

Aggregate concrete contains four major components – water, Portland cement, aggregate and air entrainment. Portland cement and water must be accurately measured with previously discussed load cell and water meter devices. Aggregate is provided in bags of known volume. Air entrainment may be included in the aggregate bag or be added to the mix water. Order of addition to the mixer is water followed by Portland cement and aggregate. Time of mixing will be approximately one minute after all material is added to the mixer.

2. Placing Procedures:

- a. **Substrate Preparation** – Before placing concrete, the substrate should be clean. All curbs, roof drains, wood blocking, etc. should be in place. Concrete decks may be dampened to avoid premature drying of slurry coat. All surfaces should be free of standing water, ice, and snow.
- b. **Slurry Coat** – If polystyrene insulation board is used, place a minimum 1/8-inch thickness of slurry above the top surface of the structural substrate. Steel deck applications require filling of all deck flutes and then placing a 1/8 inch thickness above the top flute. Insulation boards should be walked-in too firmly and completely seat them in the slurry coat.
- c. **Top Coat** – Place the topcoat to the minimum thickness allowed for the insulating concrete and at the design grade to provide slope. The topcoat for steel deck applications not using EPS board must fill the steel deck flutes and to the minimum insulating concrete thickness above the top flute. The topcoat should be placed within 4 hours of EPS application or the following day for a specific manufacturers approved application.
- d. **Cold Joints** - Cold joints should be full-depth of the insulating concrete and square-edged. Leaving screed bars in place overnight at the edge of the day's last pour is a good method of accomplishing this. Cold joints must not be placed where rainwater is prevented from reaching a roof drain.
- e. **Cast Density** –Check the cast density every 30 minutes, and record the data. Refer to NRDCA 250 for the method of checking cast density.

VI. Finishing Procedure:

A. Setting Finish Grade or Slope: The top placement of insulating concrete provides the finish surface to which roofing materials are attached. The following procedures are used to establish the grade for the top placement.

- 1. Round Pipe or Square Tube Screeds** of the insulating concrete minimum thickness are placed and shimmed to provide the design grade. The pipes or tubes support a straight edge pulled to create a finished surface and to give the hose man a target thickness when placing the top coat.
- 2. Strings** may be pulled from low points to high points to set the top placement grade on irregular surfaces or intricate sloped areas.

B. Finishing Equipment: Listed below are examples of commonly used finishing equipment:

- 1. Place a straight edge** on pipe or tube screeds. Pull the straight edge over the screeds to obtain proper thickness and a degree of smoothness to the cast concrete.
- 2. A darby or bull float** is a finishing tool with a blade approximately 4' long. The entire surface or only footprints and screed bar marks may be finished with these tools.
- 3. A trowel** approximately 2' long can be used in tight spots and to finish out footprints and screed bar tracks.

C. Finishing: Aggregate concrete shall be placed to the required thickness and grade with an adequate finish to receive the specified roofing membrane. Cold joints between completed sections should be finished smooth

VII. Roofing

Install the roofing membrane in accordance with the roofing product approvals listed in the Agency Approval Guide for the specific insulating concrete system. Under normal conditions, the roof deck may be ready for the roof membrane application in 24-72 hours. The roofing membrane should be installed within 3-7 days after the roof deck has been cast. The general contractor should protect an exposed roof deck from other trades and traffic.