



**NRDCA 175 – “GUIDELINE FOR FIELD APPLICATION of  
CELLULAR 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 cellular insulating concrete roof deck systems. Procedural differences do exist between various cellular 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 the Agency Approval Guides, Approved Products must conform to ASTM Standards.

<b><u>Product</u></b>	<b><u>ASTM Standard</u></b>
<b>Cellular Concrete</b>	<b>ASTM C 869- Standard Specification for Foaming Agents used in Making Preformed Foam for Cellular Concrete.</b>
	<b>ASTM C 796 – Test Method of Testing Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.</b>
	<b>ASTM C-495 – Standard Test Method for Compressive Strength of Lightweight Insulating Concrete</b>
	<b>ASTM C-513 – Standard Test Method for Obtaining and Testing Specimens of</b>

**Hardened Lightweight Insulating  
Concrete for Compressive Strength**

**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 standard.**

**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 – A progressive cavity pump transfers cellular concrete from the mixer to the point of placement. These pumps are constant delivery pumps consisting of a rotor and stator of adequate size to deliver material through hoses to the point of placement.**

**Avoid kinks and obstructions in the hose, since progressive cavity pumps are not pressure sensitive. The hose may burst if the hose is not free flowing. Other pumps should demonstrate acceptable performance.**

- B. Delivery Hose – The preferred hose or pipe is 2” diameter rubber lined, with full flow fittings, rated at 800 PSI. The last 50 feet of hose should be a non-kink type.**

### **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 measurement procedure and the limits on values measured are contained in Section III of the 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 for 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. Foam Generation Procedures:**

The premix solution is water and foam concentrate in a specific proportion. Preformed foam is generated by combining air and the premix solution at a predetermined pressure. The premix solution and air pass through a nozzle producing pre-formed foam which is added to the cement water slurry.

Water for dilution of the foam concentrate should be potable, clean and free from deleterious amounts of acid, alkali, and organic materials. Accurately dilute the foam concentrate, in accordance with the manufacturer's recommendation. For foam generators requiring an air compressor, the air compressor should be of sufficient size and capacity to provide air at uniform pressure throughout the foam generation process. The foam nozzles should be those recommended by the foam concentrate manufacturer.

2. **Mixing Procedure:**

Cellular concrete contains three components; water, Portland cement, and pre-generated foam. They should be added to the mixer in that order. Each component should be accurately measured. Material may also be weighed in the mixer with a load cell.

After about half of the water has been added to the mixer, cement is added. Foam should not be introduced until all of the cement and water are mixing.

3. **Placing Procedures:**

Refer to the Agency Approval Guide for the foam concentrate manufacturer's approved cast density, slurry coat thickness and top pour thickness.

- A. **Substrate Preparation** – Prior to 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 to be 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 to firmly and completely seat them in the slurry coat.
- C. **Top Coat** – The topcoat must be placed 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 may be placed later the same day 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** – The cast density should be checked every 30minutes, 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:** Cellular 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**

The roofing membrane shall be installed 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.