



**NRDCA – 400 “GUIDELINE FOR FIELD APPLICATION of
LIGHTWEIGHT INSULATING CONCRETE REROOFING/RECOVER 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 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.

Preface

These specifications are intended for use when lightweight insulating concrete is poured over existing roofing (recovery application) or over new temporary roofing (reroofing application). Both of these applications have used lightweight insulating concrete successfully for many years. This guide is prepared to acquaint potential users of the knowledge gained by the industry over the years.

The designer must review local building codes to determine if the code specifies minimum slope, additional R value or overflow drains or other requirements that may affect this application of a lightweight insulating concrete system.

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.

Product

ASTM Standard

Cellular Concrete Foaming Agents

ASTM C869 – Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

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12/27/01

Revision Date: 04/11/03

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Insulating Concrete Aggregate	ASTM C332 – Standard Specification for Lightweight Aggregates for Insulating Concrete
Expanded Polystyrene Insulation	ASTM C578 – Standard Specification for Rigid Cellular Polystyrene Thermal Insulation Type 1, minimum density 0.90 pcf
Portland Cement	ASTM C150 – Standard Specification for Portland Cements Types I, II, and III

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

NRDCA 100 – “Guideline for Field Application of Aggregate Insulating Concrete Roof Deck Systems”

NRDCA 175 – “Guideline for Field Application of Cellular Insulating Concrete Roof Deck Systems”

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”

NRDCA 500 - “Gypsum Roof Deck Replacement Procedures”

II. Acceptance

- A. Structural Integrity** – A registered structural engineer (one who is registered in the state where the job is located) should determine the capability of the existing structure to carry the loads imposed by the reroofing or recover application. The lightweight insulating concrete contractor must provide the structural engineer the cast weight (pounds per square foot) and the dry weight (pounds per square foot) of the new system. The roofing contractor shall provide the designer the proposed weight of the new roofing membrane system.
- B. Structural Deck Inspection** – A roof top inspection must be conducted before the addition of an LWIC system. It is suggested as part of the roof top inspection that building tenants be questioned as to whether they know of existing roof leaks. The following should be considered during the inspection of existing roofing substrates:

1. **Wood/Plywood Structural Decks** – Contact the LWIC manufacturer to determine whether they recommend application of their LWIC over wood or plywood structural decks. If the manufacturer recommends application over wood or plywood structural decks, follow the procedures contained in this Guide for Application of the LWIC system.
2. **Steel Decks** –Inspect steel decks from the bottom side for signs of deterioration. The LWIC contractor should reject rusted decking or point out the condition for further owner inspection.
3. **Cementitious Wood Fiber Decks** – Cementitious wood fiber decks should be inspected from the bottom side for signs of deterioration. Replace roof deck panels with excessive deflection or obvious loss of structural integrity. Areas of the roof deck that are questionable should be evaluated for structural integrity. Install a temporary roof meeting Agency Approval requirements over the replaced deck areas. Contact the LWIC system manufacturer for policies regarding application over cementitious wood fiber decks.
4. **Lightweight Insulating Concrete over Metal Decking** – Inspect LWIC decks from the bottom for signs of rust deterioration, and leaks.

If the metal decking appears sound, the roof area should be walked, feeling for soft spots (blisters, deteriorated lightweight, areas of non-bonded lightweight to metal decking). Correct unsatisfactory conditions and leave open to dry if possible.

5. **Lightweight Insulating Concrete over Structural Concrete** – Walk the existing roof looking for soft areas in the LWIC. Inspect soft areas further by removing the roof and inspecting the LWIC. Repair the soft areas before applying a new roof membrane.
6. **Structural Concrete Decks** – Poured-in-place structural concrete decks with leaking roofs usually contain large areas of wet insulation. If the existing insulation is board type, the entire roof and insulation systems may have to be removed. If this is the case, the structural concrete should have a temporary roof meeting Agency Approval guidelines installed.
7. **Precast Concrete Decks** – Precast concrete desks will usually have smaller areas of wet insulation than poured-in-place structural concrete decks. Remove wet areas of board-type insulation and replace with new rigid insulation. Install a temporary roof meeting Agency Approval guidelines to cover the newly installed insulation board.
8. **Poured Gypsum Deck** – Inspect the underside of poured gypsum decks for roof leaks or bowed form board. Excessively wet areas may require replacement with a new gypsum application following NRDCA 500. Air dry areas of low

moisture after removal of the existing roof membrane and before the reroofing system application. Nail the base ply of a two ply temporary roof with a FM Agency approved fastener. Complete installation of the temporary roof membrane before applying a new LWIC system.

Note: Do not drop a precast panel or steel panel into a gypsum panel area. Not tying in the metal reinforcing mesh across the repair area will compromise the structural integrity of the surrounding gypsum deck and diaphragm capacity of the deck.

III. Existing Roof Inspection and Repair

Investigate the existing roof deck application using the as-build drawings and/or field inspection to determine the wind up-lift capacity.

- A. Recover Application – If the structural deck appears sound, the roof area should be walked in parallel lines approximately 4 feet apart to feel for soft spots (suspected wet insulation). Core soft spots and areas of identified leaks to verify insulation condition. Remove areas of wet insulation. Replace the insulation and cover with a temporary roof. Cut blisters and make watertight. Remove non-bonded insulation, replace and install a temporary roof membrane.

Walk or electronically scan the roof for wet areas when LWIC is the insulation. Air dry identified areas of wet LWIC before installing a temporary roof. Replace any areas of LWIC that do not meet the nail pull test of 40 pounds after air drying.

When the LWIC cannot be opened to drying, venting either with perimeter vents or vent stacks should be provided. The vents should be tall enough to extend above the new pour and should not vent into the new system. Omit vents if existing structural substrate is slotted galvanized decking.

- B. Reroofing Application – If significant areas of the roof insulation are wet or the roof is extensively blistered, the roof and roof insulation should be completely removed. A minimum thickness of rigid board, sufficient to span the deck flutes, should be installed if a steel deck is involved. Cover the rigid board with a temporary roof meeting Agency Approval guidelines. If the deck is concrete, cover the concrete with a temporary roof that is Agency Approved.

IV. Moisture Detection Devices

Many electronic moisture detection devices are used to map moisture contents of existing roofing. Calibrate these devices by taking a core sample of all components in the existing roof to determine the actual moisture content of the materials. Without calibration, the electronic readings will not indicate the moisture level present. The actual moisture content or location in the existing roof cannot be determined without calibration.

V. Preparation

- A. Before reroofing, it is required that one has a pre-job meeting of all trades involved in the reroofing, the owner's representative, and any inspectors involved. Verify or determine who is responsible for completing various repairs and be sure the work is accomplished before the LWIC pour starts.

Examples of repair work to be completed can include gravel removal, blister repair, acceptance of surfaces to be poured, carpentry work, mechanical work, electrical work, masonry work, and maintaining the existing roof in a watertight condition.

- B. Remove dirt, algae, loose gravel, and any other loose material from an existing roof surface. Any large deposits of oil, grease, acid, or unknown contaminants should be removed.
- C. Before performing any work on the roof, document any existing water damage and any staining or efflorescence on walls.
- D. If additional slope is added, determine the height of the new roof deck relative to curbs, parapet walls, equipment supports, pipes, and all roof top equipment. In some cases, curb heights may need to be increased to allow a minimum of 8" high base flashing. Be sure to take into account any crickets at the high side of curbs. This will sometime entail lengthening electrical connections. Verify that the increased height at vertical walls will allow the use of existing base flashing. If the new height prevents use of existing flashing, adding roof drains near the wall to reduce height may be an option. It may require raising the through-wall flashing. Carefully examine flashing heights at clearstory window curbs.

VI. Application Procedures

Specific LWIC application, finishing, and quality control procedures are contained in the NRDCA documents listed in Section I.B. The additional procedures shown below relate to reroofing or recover applications.

- A. Working with Roofers – Regardless of whether the job is a recover or re-roof, the roofing contractor is responsible for maintaining the watertight integrity of the roof. Maintain open communications with this contractor. Notify the roofing contractor of any damaged or obvious defects to the existing or temporary roof before the LWIC application.
- B. Protection of Property – Reroofing, unlike new construction, is usually conducted on an occupied, completed structure. Walls are not scheduled for cleaning. Landscapers will not follow your operations. Parking lots will be full. More care and planning are required to insure the protection of property of others.

- C. **Roof Membrane Adhesion** – Lightweight insulating concrete adheres well to both smooth surfaced and gravel surfaced (loose gravel removed) built-up roofs. If the existing surface is an attached single-ply, a sprayed in place urethane roof, or aluminum coated roof, the membrane should be bond tested to determine adequate adhesion of the LWIC. Loose-laid roofs are not acceptable substrates for lightweight insulating concrete.
- D. **Slope** – Roof slope should be formed by stair-stepping the insulation boards in increments of approximately 1” or less, rather than thickening the lightweight insulating concrete pour. The EPS board shall be of single thickness for each increment and not layered.
- E. **Rain or Placement Water Removal** – LWIC placement or rainwater may collect at low points in the existing roof. Excess water may be removed via a sump pump or water vacuum before roofing.
- F. **Roof Drains** – It is important during reroofing or recover applications that the roof drain be flush or below the existing roof or new temporary roof. This will allow any rainwater to escape to the drain. In a reroofing situation the drains may have to be lowered. When pouring the insulating concrete, a temporary bulkhead will be placed a few feet from the drain. After the insulating concrete has set, the bulkhead can be removed to allow installation of taper material from the bulkhead into the drain.
- Water test roof drains before starting construction. Maintain integrity of the roof drainage system during construction. Install a tightly fit circular 1-inch thickness of fiberglass roof insulation or other similar filter media in the roof drain. The fiberglass will allow water drainage but not insulating concrete. Taped drains or drains plugged with impervious materials to prevent the entry of lightweight concrete, must be removed in case of rain and before leaving the job each day.
- G. **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 rain water is prevented from reaching a roof drain.
- H. **Cleaning** – In addition to cleaning up all excess materials from nailers, pipes, drains, and parapets, one should have the pump area and grounds surrounding the building free of all debris.
- I. **Dew-Point Consideration** – The project designer should add sufficient expanded polystyrene insulation into the LWIC system to keep the dew point above the temporary roof installed in a reroofing application or above the existing roof membrane in a recover application.

VII. Roofing

Place roofing in accordance with the roofing product approvals listed in the Agency Approval Guide for the specific insulating concrete system.