NRDCA 250 – "FIELD QUALITY CONTROL PROCEDURES FOR APPLICATION OF INSULATING CONCRETE ROOF DECK SYSTEMS"

I. Scope

The application of a lightweight insulating concrete roof system requires the contractor to monitor the quality of concrete placed. This document defines the type of quality control procedures that should be followed by the contractor during the system application. This document also states the frequency of each quality control procedure.

The quality control procedures included in this document are:

Cast Density of Insulating Concrete
Cellular Concrete Foam Density
Cellular Concrete Foam Volume Output

II. Reference Documents

A. Following are documents referenced in this document or that reference this document.

1. **NRDCA 100 – "Guide for Field Application of Aggregate Insulating Concrete Roof Deck Systems".**

2. **NRDCA 175 – "Guide for Field Application of Cellular Insulating Concrete Roof Deck Systems".**

3. **NRDCA 300 – "Procedures to Determine the Accuracy of Material Measuring Equipment for Lightweight Insulating Concrete".**

4. **NRDCA 400 - "Guide for Field Application of Lightweight Insulating Concrete Reroofing / Recover Systems".**

III. Cast Density of Insulating Concrete

A. General: The cast density is the best control for a material to met the required specification.

B. Frequency of Determining Cast Density: Cast density measurements should be made once every 30 minutes during placement and more often if raw material measuring devices are not functioning accurately or the cast density fluctuates widely.

Should the cast density measurement vary by more than +/- 3 pcf from the specification, the frequency of measurements should be increased to once every 15 minutes. The increased frequency must continue until the cause of the cast density variance is corrected. Adjustments are made by varying the quantity of water, cement, and/or foam volume.

C. Cast Density Measurement Procedure: This procedure requires using a weigh scale and a container that has its accuracy determined in accordance with document NRDCA 300. Listed are the quality control measuring steps to be followed:

1. **Weigh an empty calibrated cast density container (minimum 10 quart) and record the weight.**

2. **Using a calibrated cast density container, fill the container with insulating concrete directly from the hose until it over flows the container.**

3. **Scrape the container top using a straight edge to remove excess concrete from the filling operation.**

4. **Wipe the outside of the container clean.**

5. **Weigh the full container using a scale calibrated by Procedure V of document NRDCA 300**

6. **Subtract the empty container weight from the full container weight.**

7. **Multiply the net weight of concrete by the container calibration factor determined by Procedure VI of document NRDCA 300. The resulting calculation is the insulating concrete cast density in pounds per cubic feet.**

D. Example of Cast Density Determination

A 10 quart container has empty weight of 2.0 pounds and a calibration factor of 2.90. What is the cast density of the insulating concrete?

1. **Fill the calibrated container with insulating concrete**
2. **The filled container weighs =19.5 pounds**
3. **The net weight of concrete is (19.5-2.0) =17.5 pounds**
4. **Multiply the net weight by the calibration factor to obtain an estimate of the concrete cast density in pounds per cubic feet**
5. **(17.5 pounds x 2.9 pails / cubic feet) = 50.75 pcf**

IV. Cellular Concrete Foam Density

A. General: Correct foam density is the starting point for producing foam with the proper quality.

B. Frequency of Determining Foam Density: Foam density must be checked at the beginning of each job.

Should the foam density measurements vary by more than - 10% or + 20% from the foam manufacturers approved density, adjustments need to be made to the foam generator until the foam density conforms to specifications.

C. Foam Density Measurement Procedure: This procedure requires a calibrated container (minimum 5 gallon) and weigh scale. Refer to document NRDCA 300 for equipment accuracy procedures. Listed are the quality control measuring steps for this procedure:

1. **Weigh an empty calibrated container and record the weight.**

2. **Fill the pail directly from the foam generating equipment. Ensure that the foam fills the whole volume of the container.**

3. **Scrape the container using a straight edge to remove excess foam from the filling operation.**

4. **Weigh the foam filled container using a calibrated scale.**

5. **Subtract the empty container weight from the filled container weight.**

6. **Multiply the net weight of foam by the container calibration factor determined by Procedure VI of document NRDCA 300. The resulting calculation is the foam density in pounds per cubic feet.**

V. Cellular Concrete Foam Volume Output

A. General: The volume of cellular foam inserted into the cement and water slurry is the integral control of the resulting cellular concrete cast density. Following is the procedure used to establish the starting point for determining foam volume.

B. Frequency of Determining Foam Volume and Accuracy Limits: Foam volume per second must be measured at the beginning of each job.

C. Foam Volume Measurement Procedure: This procedure uses a 55-gallon drum calibrated using the procedure in Section VI of document NRDCA 300.

1. **Place the foam generator into operation.**

2. **Place the foam hose into the drum and time the amount of time required to fill the drum with foam in seconds.**

3. **Divide the volume of the drum in cubic feet by the time in seconds. This calculation results in the cubic feet of foam per second produced by the foam generator.**

4. **Example of Foam Volume Measurement: A 55-gallon drum has a calibrated volume of 7.8 cubic feet. The time required to fill the drum was measured to be 12 seconds.**

Foam Volume Output = 7.8 cubic feet / 12 seconds
= .65 cubic feet per second

If the mix design requires 19 cubic feet of foam, the time required for the foam generator to run is determined as follows:

Foam Generator Run Time = 19 cubic feet / .65 cubic feet per second
= 29.2 seconds