Guide Specifications For
Internally Cured Concrete

Note to Specifier:
Prewetted lightweight aggregate is incorporated into a conventional concrete mixture to provide reservoirs of water within the concrete that slowly release the water after the concrete sets to provide "internal curing" to the mixture. Internal curing has been shown to improve the mechanical and durability properties of concrete by enabling more complete hydration of the portland cement and continued reaction of supplementary cementitious materials.

PART 1-GENERAL

This guide specification shall be used for modifying a conventional normal weight concrete mixture to provide internal curing of the concrete by replacing a portion of the normal weight fine aggregate with prewetted expanded slate (STALITE) fine lightweight aggregate.

The conventional concrete mixture being modified shall satisfy all project requirements and specifications for constituent materials and for both fresh and hardened concrete properties.

The modified, or internally cured, concrete mixture shall meet all project requirements and specifications for constituent materials and for both fresh and hardened concrete properties, including the additional requirements in this guide specification.

PART 2-LIGHTWEIGHT AGGREGATE (LWA)

Expanded slate (STALITE) fine lightweight aggregate for internal curing shall conform to the requirements of ASTM C 330 [AASHTO M 195] *Standard Specification for Lightweight Aggregate for Structural Concrete*.

PART 3-PREWETTING & TESTING OF LWA

Expanded slate (STALITE) fine lightweight aggregate shall be prewetted prior to mixing into the concrete mixture. The recommendations of the lightweight aggregate supplier shall be followed to ensure that the lightweight aggregate has a minimum absorbed moisture content of 10% at the time of batching.

The New York State DOT test method NY 703-19E *Moisture Content of Lightweight Fine Aggregate (Aug 2008)* shall be used to determine the free and absorbed moisture content of the lightweight aggregate at the time of batching.

Batch quantities shall not be adjusted for the water absorbed in the lightweight aggregate.

Notes to Specifier:
The NYS DOT test method gives the most consistent and accurate results with lightweight aggregates, due to their unique physical properties. A copy of the test method is attached as an appendix.

The water absorbed in the lightweight aggregate remains in the aggregate during mixing and placement and does not contribute to the mixing water.

PART 4-QUANTITY OF PREWETTED LWA REQUIRED FOR INTERNAL CURING

The concrete supplier shall compute the weight of prewetted expanded slate (STALITE) fine lightweight aggregate (W_{LWA}) required to supply the internal curing water in the internally cured concrete mixture using the following relationship:

W_{LWA} = 61 lbs per cwt of total cementitious materials

Note to Specifier:
This quantity of prewetted lightweight aggregate supplies enough internal moisture to compensate for the typical chemical shrinkage of portland cement. The relationship can be adjusted for different values of chemical shrinkage or to provide additional compensation for other sources of moisture loss, such as loss of moisture by evaporation.

PART 5-INTERNALLY CURED CONCRETE MIXTURE

The proportions of the internally cured concrete mixture shall be determined by modifying the proportions of the conventional normal weight concrete mixture in the following manner: the volume of prewetted expanded slate (STALITE) fine lightweight aggregate that corresponds to W_{LWA} computed above shall replace an equal volume of normal weight fine aggregate. Other minor adjustments to the mixture may be made to achieve mixture performance requirements.

Submit the internally cured concrete mixture and any test results as required by the contract documents.

PART 6-CONSTRUCTION REQUIREMENT

The expanded slate (STALITE) fine lightweight aggregate shall be stockpiled and handled in accordance with the contract requirements for normal weight aggregates. The lightweight aggregate shall be prewetted, according to the recommendations of the lightweight aggregate supplier, to ensure that the absorbed moisture content is at least 11% at the time of batching.

The internally cured concrete mixture shall be batched, transported, placed and finished to meet all requirements specified in the contract documents for the conventional normal weight concrete mixture.

The free moisture content of the prewetted lightweight fine aggregate shall be determined immediately prior to batching, as specified above. Batching weights shall be adjusted accordingly.

Water absorbed in the lightweight aggregate is retained within the aggregate during mixing and does not affect the mix water. Therefore, batching weights shall not be adjusted for the absorbed moisture in the prewetted lightweight aggregate.

PART 7-DENSITY OF INTERNALLY CURED CONCRETE

Density of internally cured concrete shall not be used as a basis for field acceptance.

Note to Specifier:
For internally cured concrete, the lightweight aggregate is being used as an agent to deliver internal curing moisture and not as a means to reduce the concrete density. However, since a significant quantity of normal weight fine aggregate is replaced with prewetted lightweight aggregate in internally cured concrete, the density of the concrete will be reduced. This reduction in density is not significant for some concrete applications while for other applications it may need to be considered in the design. If the internally cured concrete has a density of 135 pcf or greater, it is classified as a normal weight concrete by current design specifications.

PART 8-"LEED" PROJECTS

As directed by the architect, the concrete supplier shall use raw materials harvested within a 500 mile job site radius.

STALITE
ROTARY KILN EXPANDED LIGHTWEIGHT AGGREGATE

REVISED1-9-13