



INDIANA DEPARTMENT OF TRANSPORTATION

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Eric Holcomb, Governor
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CONSTRUCTION MEMORANDUM

21-05

(REVISED)

TO: District Deputy Commissioners
Technical Service Directors
District Construction Engineers
District Testing Engineers
District Area Engineers
Project Engineers/Supervisors
Office of Materials Management


FROM: Greg Pankow, Chief Engineer of Construction
Division of Construction Management and District Support

SUBJECT: Alternate Curing Method for Structural Concrete Using E5 Internal Cure

E5 Internal Cure is a new type of concrete admixture that has been shown to provide significant benefits during the placement of concrete and in the overall quality of the in-place concrete. Some of the benefits include improved water retention, workability, pumpability and higher pozzolanic activity, which can create higher strength and reduced permeability.

To evaluate the performance of E5 Internal Cure, an alternate curing method was developed in lieu of the water curing requirements in 702.22. This alternate curing method is to be considered for bridge decks, slab bridges and reinforced concrete bridge approaches on existing and future construction contracts.

In lieu of the water curing requirements in 702.22, concrete may be placed and cured as follows.

Mix Design and Batching:

1. The concrete mix design shall include the admixture "E5 Internal Cure" by Specification Products with a dosage rate of 4 oz/cwt of cementitious.
2. The concrete mix design shall include either 3% silica fume addition or 30% slag cement replacement per 709.05(c). Class C concrete mix designs shall be based on 658 lb/cu yd of portland cement and the cement content shall not be increased.
3. The water-cementitious ratio shall be 0.420 to 0.490.

4. A water-reducing admixture is not required.
5. Ensure that the concrete mixture is fully wetted before adding the E5 Internal Cure admixture to the load.

During placement:

1. A representative from Specification Products shall be on site during placement. This requirement may be waived by the Department's Division of Materials and Tests if both the Contractor and ready mixed concrete supplier have sufficient experience with batching and placement of the admixture on previous Department contracts.
2. Water shall not be applied to the plastic concrete surface for any reason.
3. Products marketed as "evaporative retardants" or "evaporation reducers" shall not be used for any reason. Some common trade names for these products include Sika Film, MasterKure ER50 and Eucobar.
4. The following products may be used as finishing aids as directed by the manufacturer:
 - a. E5 Miracle Aid by Specification Products
 - b. EZ Finish by Specified Surfaces
 - c. The Juice by M2 Solutions.

After placement:

1. Curing compound shall be applied in accordance with 702.22(a)2 and modified as follows:
 - a. A motorized sprayer shall be used.
 - b. Two coats shall be applied to achieve a final appearance of a white sheet of paper. The first coat shall be applied to the plastic surface from a walk bridge immediately after texturing and after any bleed water or sheen has dissipated from the surface. After the first coat has set, but not to exceed 40 minutes later, the second coat shall be applied. The second coat shall not be applied immediately after the first coat.
 - c. The sprayer shall be operated in a manner that does not apply enough downward pressure to distort the plastic surface.
 - d. Exposed railing reinforcing bars shall be protected from overspray by covering.
 - e. The narrow coping area on the backside of the railing shall be sprayed with curing compound with a hand pumped sprayer.
2. Acceptance beams shall be field cured by wrapping the beams in wet burlap and then wrapping in plastic. The beams will be placed near the structure and shaded from direct sunlight. It is imperative that the burlap around the beams remain moist during the curing period.

3. The requirements of 702.24(a) are modified as follows. Equipment or traffic will not be allowed on structures for a minimum of 120 hours and until flexural test beams representing all concrete required to carry live loads indicate a modulus of rupture of 600 psi.
4. The requirements of 702.14(b)1 and 702.14(b)2 are modified as follows. Falsework and/or falsework jacks shall remain in place at least 120 hours after concrete placement and until flexural test beams indicate a modulus of rupture of 600 psi or greater has been achieved.
5. For the purpose of determining cold weather concrete conditions in accordance with section 702.11 the minimum curing period shall be continuous for 168 hours after placement.
6. Prior to the placement of pavement markings, the deck shall be cleaned with light blasting to remove the curing compound only at the locations of the new pavement markings.
7. The Department's project personnel will provide feedback to the Concrete Engineer at Department's Division of Materials and Tests, including strength data and visual observations both during the pour and curing periods.

The Contractor shall submit a request to use the E5 Internal Cure admixture and alternate curing method to the Department's project personnel for approval. The request shall be submitted a minimum of seven days prior to placement. Project personnel will then forward the request to the Area Engineer and the Concrete Engineer at the Division of Materials and Tests. Upon approval, a zero-cost change order will be processed to add the appropriate contract item(s) with a supplemental description as follows:

609-06259	Reinforced Concrete Bridge Approach, E5 Internal Cure
704-51002	Concrete, C, Superstructure, E5 Internal Cure

GGP/jjn