Bureau of Materials and Physical Research
Illinois Laboratory Test Procedure
Effective Date: August 16, 1996
Revised: March 30, 2012

Chemical Adhesives

This test procedure applies to Article 1027.01 of the Standard Specifications for Road and Bridge Construction (current year issued).

1.0 SCOPE

1.1 The purpose of this procedure is to evaluate chemical adhesives for dowel and tie bars.

1.2 Article 420.05(b) and 442.06(a)(2) of the IDOT *Standard Specifications for Road and Bridge Construction* allows the use of chemical adhesive for dowel and tie bars.

2.0 REFERENCED DOCUMENTS

2.1 ASTM E 488

2.2 ASTM D 695

3.0 PROCEDURE

3.1 The Bureau of Materials and Physical Research will evaluate the effectiveness of chemical adhesives for dowel and tie bars.

3.2 The Manufacturer shall provide a sample of the two part chemical adhesive resin system to be considered for approval. If special equipment is required to disperse the adhesive it shall also be provided.

4.0 DRY CONDITIONING

Gun Grade Adhesive:
Install #5 (15 mm) epoxy coated 60,000 psi (413,700 kPa) deformed rebar into 4000 psi (27,600 kPa) **dry** concrete. Hole diameter shall be 0.75 in. (19 mm) and depth of embedment shall be 5 in. (125 mm). The chemical adhesive shall be mixed and dispensed per manufacturer's label/technical literature with packaging and equipment provided by the manufacturer.

Glass Capsule:
Install the appropriate size threaded rod into 4000 psi (27,600 kPa) **dry** concrete. Hole diameter shall be 0.75 in. (19 mm) and depth of embedment shall be 5 in. (125 mm). The glass capsule shall be installed and the threaded rod inserted per manufacturer's label/technical literature.

Note: Concrete shall be of a suitable mass and dimensions to prevent edge cracking when bars are fully loaded.

The chemical adhesive, rebar/threaded rod, concrete and air temperature at time of installation shall be 73 ± 4 °F (23 ± 2 °C).

Perform static tension test one hour after installation per ASTM E 488. Stop test and record load at 0.1 in. (2.5 mm) slippage or 16,000 lbs (71,200 N), whichever occurs first.

Acceptance Criteria: a minimum 13,550 lbs (60,300 N) force with less than 0.1 in. (2.5 mm) slippage.

5.0 DAMP CONDITIONING

Install and test in same manner as "Dry Conditioning" except hole shall be filled with water for a minimum of twelve hours and water removed just prior to installation.

Acceptance Criteria: a minimum 13,550 lbs (60,300 N) force with less than 0.1 in. (2.5 mm) slippage.

6.0 COLD TEMPERATURE CONDITIONING

Install and test in same manner as "Dry Conditioning" except that the gun grade adhesive/glass capsule, rebar/threaded rod, and concrete shall be conditioned to 32 ± 4 °F (0 ± 2 °C). Remove the materials from the conditioning chamber, perform mixing, install bar and return completed test specimen to the conditioning chamber in no more than ten minutes. The test specimen shall be held at the above conditioning temperature for twenty-four hours. Static tension testing shall be performed immediately after the 24 hour cure.

Note: Concrete for installation shall be 6 × 12 in. (150 × 300 mm) cylinders with a minimum 4,000 psi (27,600 kPa) compressive strength.

Acceptance Criteria: < 0.1 in. (2.5 mm) slippage at time of concrete failure. Record load.

7.0 COMPRESSIVE STRENGTH

Make and test two 1 in. (25 mm) diameter by 2in. (50 mm) cylinder specimens at 73 ± 4 °F (23 ± 2 °C). Test one specimen at one hour after casting and the other at 24 hours after casting according to ASTM D 695.

Acceptance Criteria: A minimum one hour compressive strength of 3,000 psi (20,700 kPa); a minimum twenty-four hour compressive strength of 4,000 psi (27,600 kPa).

Note: Compressive Strength testing not applicable for glass capsules.

8.0 HORIZONTAL INSTALLATION SUITABILITY

Install a 1.25 in. (32 mm) diameter, 14 in. (350 mm) long smooth steel dowel bar into a horizontal clear plastic tube 9 in. (230 mm) long and 1.375 in. (35 mm) diameter. Prior to installation, sufficient chemical adhesive shall be placed inside the clear plastic tube at one end suitably plugged to prevent any material from flowing out of the plugged end. Immediately install the steel dowel bar with sufficient force and a reciprocating twisting motion until the bar reaches the back of the plastic tube. The materials, mixing, installation and curing shall be at 73 ± 4 °F (23 ± 2 °C).

Acceptance Criteria: The chemical adhesive shall allow a steel dowel bar to be installed by hand without appreciable drain down from the top of the bar (as determined by the Bureau of Materials and Physical Research).

Note: Horizontal Installation Suitability testing not applicable for glass capsules.

9.0 INFRARED SPECTROPHOTOMETER "FINGER PRINT"

Document the "finger print" for each component and the properly mixed and cured adhesive for each product meeting all of the above criteria. (To be performed by IDOT Bureau of Materials and Physical Research)

Acceptance Criteria: These items will be part of the historical data base along with the physical tests that form the basis of a particular product being placed on the approved products list.