FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
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Florida Method of Test for Material Properties Identification of Adhesive Bonding Material Systems

Designation: FM 5-569

1. SCOPE

1.1 This document describes the product identification methods for adhesive bonding material systems in structural applications for bonding anchors and dowels to uncracked concrete. This method is applicable to products specified under FDOT Standard Specification Section 937 and installed under Section 416. This method shall be used in conjunction with FM 5-568.

2. OUTLINE OF METHOD

2.1 Material properties of proposed adhesive products are determined by testing to establish a unique reference (fingerprint) for comparison with untested production samples. Components of adhesive products shall be tested both individually and as properly proportioned and mixed, as applicable. Testing shall be performed by an independent facility. All tests shall be performed at 25°C ± 3°C except as otherwise stated.

2.2 Referenced Documents

2.2.1 American Society of Testing and Materials.

ASTM D1875 -- “Standard Test Method for Density of Adhesives in Fluid Form”

ASTM E1252 -- “Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis”

ASTM C881 -- “Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete”

2.2.2 Standard Specifications for Road & Bridge Construction, Florida Department of Transportation.

Section 416 -- "Installation of Post-Installed Anchor Systems and Dowels for Structural Applications in Concrete Elements"

Section 937 -- "Post-Installed Anchor Systems for Structural Applications in Concrete Elements"

2.2.3 Florida Test Methods, Florida Department of Transportation.

FM 5-568 -- Anchor System Tests for Adhesive-Bonded Anchors and Dowels

3. APPARATUS

3.1 The test apparatus shall be as required by the applicable sections of the referenced documents and as described herein.

4. SAMPLING

4.1 Adhesive products shall be randomly selected by the testing agency from commercial distribution sources.

5. PROCEDURE

5.1 Handling, preparation, installation, and curing of proposed adhesive products shall be in accordance with the manufacturer's published instructions. Only tools and dispensing equipment recommended by the manufacturer shall be used. Samples shall be prepared such that they are representative of field installations of commercially available products.

5.2 Perform each of the following tests, as applicable:

5.2.1 Infrared Absorption Spectroscopy -- For injection systems, the individual resin and hardener components shall be scanned. For encapsulated systems, where the hardener is impregnated into the aggregate, the combination of these components shall be scanned. The testing and reporting should be in accordance with ASTM E1252.

Each individual scan curve indicating wavelength (or wavenumber) and relative magnitude of absorption peaks shall be the reference used for comparison.

5.2.2 Bond Strength -- A minimum of 5 replicate specimens for either injection or encapsulated systems shall be tested in accordance with the Confined Tension test as described in FM 5-568.

The resulting average uniform bond stress, calculated in accordance with FM 5-568, shall be the reference used for comparison.

5.2.3 Density (injection systems only) -- Samples shall be tested separately for the resin and hardener components of injection systems. The test method shall be in accordance with ASTM D 1875.

The average density shall be the reference used for comparison.

5.2.4 Average Weight (encapsulated systems only) -- A minimum of 5 replicate specimens shall be tested for each available size. Condition the sample capsules to 25°C ± 3°C. Measure and record the weight of each size of the assembled capsule using a laboratory balance, 200-g or greater capacity, accurate to ± 0.1g. Calculate the average weight for each size of available capsule. Report all measured and calculated values.

The average weight of the completely assembled capsule (for each size) shall be the reference used for comparison.

5.2.5 Gel Time (injection systems only) – Dispense the material in accordance with manufacturer instructions and test per ASTM C881.

The elapsed time between initial mixing of the reactants and solidification shall be reported as the gel time and be the reference for comparison.

5.2.6 Setting Time (encapsulated systems only) -- A minimum of 5 replicate specimens shall be tested in accordance with the Confined Tension test as described in FM 5-568 except the test load shall be applied within ± 5 minutes, after installation, of the minimum setting time recommended by the manufacturer.

The resulting average uniform bond stress (at the minimum setting time), calculated in accordance with FM 5-568, shall be the reference used for comparison.

6. REPORT

6.1 Report test results as required for each test method.