FLORIDA DEPARTMENT OF TRANSPORTATION
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Florida Test Method
For
WET BOND STRENGTH OF EPOXY MORTARS TO CONCRETE AND FIBERGLASS JACKET SURFACES

Designation: FM 5-518

1. SCOPE

1.1 This method describes a physical test for measuring the tensile bond of epoxy mortars to concrete and fiberglass jacket surfaces after the mortar has been poured against the totally salt water-wetted faces. The test is applicable to epoxy compounds intended for use in integral pile jacket repair systems or repairs where wet or damp surfaces do or can exist.

Note: The values stated in SI units are to be regarded as standard. The values in parenthesis are for information only.

2. OUTLINE OF METHOD

2.1 The epoxy compound and fillers (when specified) are mixed and poured onto horizontal surfaces previously wetted with salt water. The epoxy mix displaces the water and bonds to the flat faces of the test specimens which are either portland cement concrete or sandblasted fiberglass panels. After the mix is hardened for seven days, an increasing bending stress is applied to the bonded section until there is a failure in the bond. The tensile strength in the outer fibers at break is calculated and reported as the wet bond strength.

3. APPARATUS

3.1 Concrete test cylinders, 100 mm (4 in.) in diameter by 300 mm (12 in.) in length prepared using Class III concrete with type III cement and cured a minimum of 28 days.

3.2 Fiberglass panels, 200 x 200 mm (40 000 mm^2) (8 $in.^2$), 3 mm (1/8 in.) minimum thickness, meeting requirements of Section 457 and sand blasted on both sides.

3.3 Assemblies for measuring wet bond strength to fiberglass and concrete.

3.4 Plastic beakers, 100-mL graduated for measuring.

3.5 Tinius - Olsen Universal Testing Machine or equal.

4. PROCEDURE

4.1 Allow the epoxy sample components, sand, and test apparatus to stand at laboratory temperature for at least 4 h. Sand shall be as specified for the type of epoxy.

4.2 Using the mix ratio specified by the manufacturer of the epoxy, calculate a formula on a volumetric basis to give 100 mL of the mixed epoxy product.

4.3 Stand 100-mm cylinders on end, in 3.5% sodium chloride or salt water for 15 - 30 min.

4.4 Mix epoxy thoroughly based on manufacturers recommended procedures using formula from Section 4.2.

4.5 Using cylinders from water, place mixed epoxy evenly over ends which have been soaked. (Note: Epoxy should be evenly placed and cover all exposed surfaces.) For fluid epoxies, which can run out of the joint, prepare a taped sleeve on the bottom cylinder to insure that the joint between cylinders is full of epoxy.

4.6 Place cylinders together and place on end. Epoxy should be forced out around the perimeter at the joint.

4.7 Allow cylinder to stand for 7 days.

4.8 Break at the end of the seven day period. Utilize the wood frames for bottom supports placed at 300 mm (12 in.) from inside edges of frames. Joint of cylinders should be centered on the head of the machine and 150 mm (6 in.) from the inside edges of frames. The head travel rate should be 1.3 mm/min. (0.05 in./min.).

4.9 Record the force at fracture in newtons (N) pound-force (lbf)).

4.10 To calculate Wet Bond Strength (WBS), use the following formula: WBS = Mc/I. The minimum WBS is 1.7 MPa (250 psi) and the minimum breaking force is 2329 N (523.6 lbf) when using the 100-mm (4-in.) cylinder and 300 mm (12 in.) distance from inside edges of supports.

$$WBS, (Pa) = Mc/I$$

Where: M = Moment = 1/2 Total 300 mm (12 in.) distance x 1/2 force at

Break (N)

C = Distance to neutral plane (radius), mm

$I = d^4/64$ = Moment of inertia, mm^4

4.11 To measure the bond strength to fiberglass pile jackets, install a 100-mm (4-in.) diameter fiberglass circle (which has been prepared by sandblasting and soaking in seawater as in Section 4.3 above) in the joint between the cylinders in Section 4.6 above.