

SECTION 03 07 60
FIBER REINFORCED POLYMER CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDES

Externally bonded fiber reinforced polymer systems for strengthening concrete.

1.2 QUALITY ASSURANCE

- A. Applicator: Company specializing in the installation of Carbon Fiber Systems with minimum five years of experience, member of the International Concrete Repair Institute (ICRI) and the American Concrete Institute (ACI).
- B. Reference Standards:
 - 1. ACI 440.2R - Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.
 - 2. ASTM E 84 - Test for Surface burning Characteristics of Building Materials.
 - 3. ASTM E 119 - Fire Tests of Building Construction and Materials.
 - 4. ASTM D 3039 - Test Methods for Tensile Properties of Fiber Resin Composites.
- C. Regulator Requirements: Conform to the following Code for flame/fuel/smoke ratings requirements and fire resistance ratings.
 - 1. International Building Code (IBC), latest edition.

1.3 SUBMITTAL

- A. Product Data: Provide manufacturer's specifications showing compliance with specifications. Include data for fire retardant chemicals used to comply with fire rating:
- B. Test Reports: Two certified copies of field test reports indicating tensile strength, strain and elastic modulus as per ISIS, ASTM D 3039, shell to concrete-adhesive shear, and shell to concrete-adhesive tension as per ISIS.
- C. Shop Drawings: Submit documentation showing FRP system to be used, locations of FRP system relative to existing structure, dimensions and orientation of each ply, number of plies, sequence of installation and calculations prepared by a Professional Engineer registered in the State of Wisconsin.

1.4 JOB CONDITIONS

- A. Provide staging as required to install FRP system.
- B. Protect finished surfaces from resin droppings.

1.5 PERFORMANCE

- A. The selected FRP system shall be designed in accordance with ACI 440.2R by the FRP Contractor for the equivalent area of steel indicated on the

construction documents, comply with specification requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products of the following manufacturers are acceptable. Submit products of other manufacturers for approval.
 - 1. Master Builders.
 - 2. Sika Chemical Corporation.
 - 3. Stellar-Mark Inc.

2.2 MATERIALS

- A. Epoxy Resin: Provide resin that has the following characteristics: compatible with adhesion to concrete substrate, adhesion to FRP composite system, filling ability, workability, pot life and develop appropriate mechanical properties for the FRP composite.
- B. Carbon Fiber Reinforced Polymer: Continuous, bi-directional fibers selected and tested for the composite system.
- C. Fire Retardant Chemicals: Chemicals that are used to retard the tendency of resin to burn. Retardant may be added to the resin or coated on the surface of the FRP.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Confirm compatibility of surfaces to receive FRP materials.
- C. Verify that epoxy injection repairs are complete prior to FRP application.
- D. Verify ducts, piping, equipment, or other items which would interfere with application of the FRP system are suitably located.
- E. Beginning of installation means acceptance of existing conditions and substrate.

3.2 PREPARATION

- A. Clean surfaces as necessary for proper bonding of FRP system.
- B. Fill voids and cracks in substrate; remove projections and level where FRP system is applied.
- C. Protect adjacent surfaces and equipment from droppings.
- D. Grind concrete surface to insure adequate bond between concrete and FRP system. Prepare test surfaces for not less than three bond tests.

3.3 APPLICATION

- A. Mix and apply FRP system in accordance with manufacturer's instructions and to comply with ACI 440.2R.

3.4 FIELD QUALITY CONTROL

- A. Contractor Tests: Contractor shall prepare and test not less than

three samples to confirm that bond between concrete and FRP system is adequate to develop design loads used for the system. Notify Engineer not less than three working days prior to testing of materials.

- B. Preparation of concrete surfaces shall be conducted in accordance with approved test results.
- C. Acceptance: Inspection, evaluation and acceptance of the work shall be performed by the Engineer in accordance with ACI 440.2R.

3.5 CLEANING

- A. Remove excess material, droppings, and debris.
- B. Remove FRP materials from surfaces not specifically required to be covered.

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