

## Part 1, General (H P Underwater Repair Mortar)

- 1.01 Work Included
  - A. Furnish all materials, labor, tools, and equipment to patch interior and/or exterior vertical or overhead surfaces as designated by the owner.
- 1.02 Related Work
  - A. Joint fillers
  - B. Crack repair
- 1.03 Quality Assurance
  - A. Provide a notarized certificate stating that the portland cement mortar meets the specified requirements and have the manufacturer's current printed literature on the specified product.
  - B. Portland Cement mortar shall be tested, on a batch basis, to assure the product has been manufactured as specified on manufacturer's printed literature.
  - C. Laboratory test reports, from an independently qualified testing laboratory, shall be made available for the specified product if requested.
- 1.04 Delivery, Storage, and Handling
  - A. Deliver the specified product in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.
  - B. Store and condition the specified product as recommended by the manufacturer.
- 1.05 Job Conditions
  - A. Environmental Conditions: Do not apply material if it is raining or the ambient temperature will fall below 40 degrees within 24 hours of product application.
  - B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the portland cement mortar.

## Part 2, Products

- 2.01 Acceptable Manufacturers
  - A. HP Underwater Repair Mortar by U. S. Concrete Products, LLC. – Baltimore, Md.
  - B. Substitutions: The use of other than the specified product will be considered providing the contractor requests its use in writing to the Engineer. This request shall be accompanied by a certificate of compliance from an approved independent testing laboratory that the proposed substitute product meets or exceeds the specified performance criteria, tested in accordance with the specified test standards.

2.02 Performance Criteria

- A. Properties of the mixed Portland cement mortar:
  - 1. Working Time: 7-10 minutes
  - 2. Finishing Time: up to 15 minutes
  - 3. Color: concrete gray
  
- B. Properties of the cured portland cement mortar:
  - 1. Compressive Strength (ASTM C-109 Modified)
    - a. 2 hours 3000 psi
    - b. 1 day 4000 psi
    - c. 28 days 7000 psi
  - 2. Splitting Tensile Strength (ASTM C-496) at 28 days: 1000 psi min.
  - 3. Flexural Strength (Modulus of Rupture)(ASTM C-78) at 28 days: 1200 psi min.
  - 4. Bond Strength (ASTM C-1042 Modified) at 28 days: 2000 psi min.
  - 5. Unit Weight 120 lbs./cubic feet
  - 6. Dry cure shrinkage: No greater than .05%, when tested according to ASTM C157.
  - 7. Modulus Of Elasticity (ASTM C 469)  $4.4 \times 10^6$
  - 8. Coefficient of Thermal Expansion (CRD C 39)  $7.0 \times 10^{-6}$  in./in./F<sup>o</sup>

2.03 Materials

- A. Fast Setting Portland cement mortar:
  - 1. The fast setting Portland cement mortar mix shall be a blend of Portland cement, well-graded, clean, aggregates and admixtures to produce a workable mix.
  - 2. The fast setting Portland cement mortar shall be a blend of selected Portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability and a corrosion inhibitor.
  - 3. The material shall not contain asbestos, chlorides, nitrates, added gypsum, added lime, or high aluminum cements.
  - 4. The material shall be non-combustible, either before or after cure.
  - 5. The portland cement mortar shall be supplied in a factory proportioned single unit requiring only the addition of water.
  - 6. The portland cement mortar must be placeable from 1/8 in. to 2 in. in depth per lift.

Part 3, Execution

3.01 Surface Preparation

- A. The surface must be mechanically prepared. Areas to be patched must be clean and sound. All loose and deteriorated concrete shall be removed by mechanical means approved by the Engineer. Chip concrete substrate to obtain a surface profile of + 1/8 in. with a new aggregate fractured surface. Be sure the area to be patched is not less than 1/4 in. in depth. Sandblast reinforcing steel to remove all contaminants and rust. Where reinforcing steel is encountered, the following procedures will be used. If half of the diameter of the rebar is exposed, chip out behind the reinforcing steel. The distance chipped behind the rebar will be equal to or exceed the minimum placement depth of the approved material.

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- B. Cracks in the substrate in the area of the patching or overlay work must be treated as directed by the Engineer.
- C. Extend all existing control and expansion joints through any patch or overlay. Install new joints as directed by the Engineer. Fill all joints as directed by the Engineer.

### 3.02 Application

- A. Mixing the portland cement mortar: Mix manually or mechanically. Mechanically mix with a paddle and low-speed (400-600 rpm) drill. Pour approximately 4 qts. water into the mixing container. Add HP Underwater Repair Mortar while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining water (up to 5 qts.) if a loose consistency is desired. If manual mixing takes more than three minutes, mix small quantities. Should smaller quantities be needed, be sure the components are dosed in the correct ratio and that the HP Underwater Repair Mortar is uniformly pre-mixed before batching.
- B. Placement Procedure: Fill the properly prepared area with HP Underwater Repair Mortar. Consolidate, screed and apply the appropriate finish. Use a steel trowel for a smooth finish. Use a wood float for rough surface. For Vertical overhead areas where the depth of the repair to sound concrete is greater than 2 in., repair will be made in maximum lifts of 2 in. For horizontal applications the material can be extended with a clean well graded aggregate. The top surface of each lift shall be scored so as to produce a roughened surface for the next lift. The preceding lift should be allowed to reach final set before applying fresh material. The fresh mortar must be scrubbed into the preceding lift. For horizontal applications over 1in. in depth, the mortar can be extended with a clean, well graded aggregate.
- C. Curing is not required under most conditions. However, if ambient condition might cause premature surface drying-high winds, high temperatures, direct sunlight, low humidity, etc. - use a fine mist of water or wet burlap or an ASTM C309 curing compound to prevent moisture loss.
- D. Adhere to all limitations and cautions for the portland cement mortar in the manufacturers current printed literature.

### 3.03 Cleaning

- A. The uncured portland cement mortar can be cleaned from tools with water. The cured portland cement mortar can only be removed mechanically.