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**SECTION 03 01 00**

**MAINTENANCE OF CONCRETE**

**(Pavemend SLQ)**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

A. Documents affecting work include, but are not limited to, drawings and general provisions including General and Supplementary Conditions and Division 01 Specifications.

B. Related Sections include the following:

1. 03 01 30 Maintenance of Cast-in-Place Concrete

2. 03 01 50 Maintenance of Cast Decks and Underlayments

3. 03 11 00 Concrete Forming

4. 03 20 00 Concrete Reinforcing

5. 03 30 00 Cast-In Place Concrete

6. 03 31 00 Structural Concrete

7. 03 31 23 High Performance Structural Concrete

8. 32 01 29 Rigid Paving Repair

9. 34 01 13 Operation and Maintenance of Roadways

10. 34 01 23 Operation and Maintenance of Railways

11. 34 01 33 Operation and Maintenance of Airfields

12. 34 01 43 Operation and Maintenance of Bridges

13. 35 01 50 Operation and Maintenance of Marine Construction

C. Referenced Standards include the following:

1. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

2. ASTM C78 – Standard Test Method for Flexural Strength of Concrete

3. ASTM C157 – Standard Test Method for Length Change of Hardened Cement Mortar and Concrete

4. ASTM C469 – Standard Test Method for Static Modulus of Elasticity and Poisson’s Ratio of Concrete in Compression

5. ASTM C496 – Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

6. ASTM C666A – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing (Procedure A)

7. ASTM C672 – Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals

8. ASTM C882 – Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear

9. ICRI Guideline 210.4R-2021 Guide for Nondestructive Evaluation (NDE) Methods for Condition Assessment, Repair, and Performance Monitoring of Concrete Structures

10. ICRI Guideline 310.1R-2008 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion

11. ICRI Guideline 310.2R-2013 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

12. ICRI Guideline 320-1R-2019 Guide for Selecting Application Methods for the Repair of Concrete Surfaces

13. ICRI Guideline 320.2R-2018 Guide for Selecting and Specifying Materials for Repair of Concrete Structures

14. ACI SPEC-301-16 Specifications for Structural Concrete

15. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction

16. ACI 305R-20 Guide to Hot Weather Concreting

17. ACI 306R-16 Guide to Cold Weather Concreting

18. ACI 318-19(22) Building Code Requirements for Structural Concrete

19. ACI 318-89 Building Code Requirements for Reinforced Concrete

20. ACI 347R-14 Guide to Formwork for Concrete

21. ACI 546R-14 Guide to Concrete Repair

**1.02 SUMMARY**

A. This section specifies furnishing and applying a cement based, very rapid setting, semi self-leveling, structural repair mortar that is water-activated, and can be applied in below freezing temperatures as low as 0°F (-18°C).

B. Section includes Pavemend SLQ (Semi Self-Leveling, Extended, Very Rapid Repair Mortar for Warm or Cold Weather).

**1.03 SUBMITTALS**

A. Product Data: Submit manufacturer's Technical Data Sheets and SDSs (Safety Data Sheets) for the very rapid setting, semi self-leveling, structural repair mortar and any accessory products used.

B. Applicator Qualifications: Submit proof of status as a Qualified Applicator via a letter or certificate from manufacturer of very rapid setting, semi self-leveling, structural repair mortar.

**1.04 QUALITY ASSURANCE**

A. Applicator Qualifications: All applicators must be trained and possess adequate experience in the application of very rapid setting, semi self-leveling, structural repair mortar, and have successfully completed at least five projects of similar size, scope, and complexity.

B. Manufacturer Qualifications: Manufacturer must have at least ten years of experience manufacturing very rapid setting, semi self-leveling, structural repair mortar.

**1.05 WARRANTY**

A. Product must have a standard warranty of at least one year.

1. If an extended warranty is desired for Pavemend SLQ, a warranty request form may be obtained by contacting Aquafin Technical Department.

**1.06 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 the specified product according to manufacturer’s written instructions.

1. For Pavemend SLQ, store the product in original, unopened, undamaged, sealed pail out of direct sunlight in a cool, dry, indoor location.

**1.07 ENVIRONMENTAL REQUIREMENTS and JOBSITE CONDITIONS**

A. Comply with required substrate temperature range, and ambient temperature range for the length of time stated on the manufacturer’s written instructions for the very rapid setting, semi self-leveling, structural repair mortar.

1. For Pavemend SLQ, substrate and ambient temperatures must be at least 0°F (-18°C). during application and for at least 24 hours after application. Substrate and ambient temperatures must not be higher than 110°F (43°C).

B. For warm and hot weather applications [76°F to 110°F (25°C to 43°C)], protect mixing and application area from wind and direct sunlight. Keep product containers cool and out of direct sunlight.

1. For Pavemend SLQ in warm or hot weather applications, condition Pavemend SLQ and any aggregate for extension to approximately 70°F (21°C) prior to mixing, provide artificial shade, and use cold water for mixing. Refer to Section 3.03.

C. For cool weather applications [50°F to 59ºF (10°C to 15°C)], condition product and any aggregate to be used for extension to manufacturer’s recommendations.

1. For Pavemend SLQ in cool weather applications, condition Pavemend SLQ and any aggregate to be used for extension to approximately 70°F (21°C) prior to mixing and use warm water for mixing. Refer to Section 3.03.

D. Protect areas from rain during and after application. Follow manufacturers instructions for protection of the very rapid setting, semi self-leveling, structural repair mortar after application.

1. For Pavemend SLQ, application must be protected from rain until product has reached its final set (approx. 10 min.).

F. Prepare application area, mixing stations, equipment, tools and crew so that everything is ready to go prior to mixing Pavemend SLQ.

1. Provide suitable area(s) for mixing materials and staging located as close as possible to each area that will receive repairs.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

A.AQUAFIN, Inc. 505 Blue Ball Road, #160. Elkton, MD, 21921. Phone: 1-866-AQUAFIN or 410-392-2300, website: [www.aquafin.net](http://www.aquafin.net) e-mail: [technical@aquafin.net](mailto:technical@aquafin.net)

B. Requests for substitutions will be considered only if submitted to the architect/engineer in writing and must include substantiation of product performance, 10 days prior to the original bid date.

**2.02 MATERIALS**

A. Very Rapid Setting, Semi Self-Leveling, Structural Repair Mortar

B. Acceptable Products:

1. Pavemend SLQ (Semi Self-Leveling, Extended, Very Rapid Repair Mortar for Warm or Cold Weather).

C. Performance and Physical Properties: Meet or exceed the following values for material:

1. Material: cement based, structural repair mortar that is very rapid setting, semi self-leveling, and extended.

2. Initial Set: 2 to 4 min.

3. Final Set: 4 to 10 min.

4. Open to Foot Traffic: after 20 minutes

5. Open to Wheeled Traffic: after 1 hour

6. Compressive Strength: 3,000 psi @ 1 hour, > 4,000 psi @ 3 hours, > 4,500 psi @ 24 hours, > 5,000 psi @ 7 days, > 6,000 psi @ 28 days

7. Flexural Strength: > 500 psi @ 7 days, > 600 psi @ 28 days

8. Splitting Tensile Strength: > 150 @ 28 days, > 250 @ 28 days

9. Bond Strength: > 1,200 psi @ 24 hours, > 1,375 psi @ 7 days

10. Rapid Freeze Thaw Resistance (durability factor): 99.6% @ 300 cycles

11. Scaling Resistance: loss of 0 lbs/ft2 @ 50 cycles

12. Modulus of Elasticity: 1.93 EE6 @ 28 days

13. Coefficient of Thermal Expansion: 2.95 @ 28 days

14. Length Change:

a. Dry: -0.03% @ 28 days

**2.03 ACCESSORIES**

A. (Optional) Steel Reinforcement Anti-corrosion Coating. (Pavemend SLQ does not require the use of a bonding agent.)

1. REBAR PRIMER/BOND-CI (Cementitious corrosion protection and bonding agent)

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

A. Verify that jobsite conditions are appropriate for the very rapid setting, semi self-leveling, structural repair mortar application.

B. Inspect concrete substrate in application area and verify that it is suitable to receive the very rapid setting, semi self-leveling, structural repair mortar application.

C. Provide a written report with photos documenting and describing the conditions of the jobsite and the substrate. Include any areas of concern or uncertainty.

1. Concrete that shows signs of insufficient strength or poor quality should be reported to the Engineer.

2. Concrete that is discolored from oil or grease contamination should be reported to the Engineer.

3. Concrete cracks that are not noted on details, drawings, or specifications should be reported to the Engineer.

4. Exposed Steel Reinforcement with obvious signs of corrosion that is not noted for replacement on details, drawings, or specifications should be reported to the Engineer.

D. Do not proceed with the very rapid setting, semi self-leveling, structural repair mortar until all areas of uncertainty have been clarified, all concerns have been addressed, and jobsite and substrate conditions have been corrected and made ready for the application.

**3.02 PREPARATION**

A. Concrete Surface Preparation:

1. Follow manufacturer’s written instructions for concrete surface preparation.

2. Perform mechanical surface preparation to meet the manufacturer’s CSP (concrete surface profile) requirements. Reference ICRC (International Concrete Repair Institute) Guideline No. 310-2R-2013.

a. For Pavemend SLQ, mechanically prepare concrete to a CSP of 5 – 7. Use a chipping hammer, chisel, steel shotblast, high pressure water blast (hydroblast) greater than 5000 psi, or similar methods.

3. After mechanical preparation, clean the concrete substrate. All surfaces must be clean and free of previous coatings, loose or deteriorated concrete, cement laitance, sand, dirt, dust, oil, grease, sealers, water repellants, curing compounds, and other bond-inhibiting materials.

a. For Pavemend SLQ, high pressure water blasting (hydroblasting) is the preferred method of cleaning. Pressure washing is also acceptable when hydro blasting methods are not possible.

b. For Pavemend SLQ, all surfaces must be saturated surface dry (SSD) with no standing water immediately prior to application.

B. Exposed Steel Reinforcement:

1. Follow the manufacturer’s written instructions for the very rapid setting, semi self-leveling, structural repair mortar regarding preparation of exposed steel reinforcement. Reference ICRI Guideline 310.1R-2008 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.

2. Refer to drawings and project specifications for reinforcement details and reinforcing replacements.

**3.03 MIXING**

A. Follow manufacturer’s written instructions for mixing.

1. For Pavemend SLQ, carefully read all instructions prior to mixing and precisely follow all mixing directions. Do not mix in a grout mixer or rotating drum concrete mixer. Do not hand mix Pavemend SLQ.

2. For Pavemend SLQ, mix in bucket with a heavy duty drill & paddle.

3. For Pavemend SLQ mix entire contents of one unit at a time.

4. For Pavemend SLQ, in normal temperature conditions [60°F to 75°F (16°C to 24°C)],

the water temperature for mixing Pavemend SLQ should be between 65°F to 75°F (18°C to 24°C).

a. Slightly adjust the temperature of the water so that the temperature of the conditioned dry

product and the water temperature average out to approximately 70°F (21°C). Example: if the temperature of dry Pavemend SLQ is 65°F (18°C), the ideal mixing water temperature is 75°F (24°C).

5. For Pavemend SLQ, mix until the 82°F to 85°F (28°C to 29°C) CMT (critical mix temperature) is reached. Use an infrared thermometer to measure the temperature of mixed Pavemend SLQ.

B. Product should be mixed right next to the area of application and then placed immediately after mixing.

1. For Pavemend SLQ, place material immediately after the CMT has been reached.

C. Do not re-temper mixed product.

**3.04 APPLICATION**

A. Apply very rapid setting, semi self-leveling, structural repair mortar in strict compliance with manufacturer’s written instructions.

1. For Pavemend SLQ, place material in horizontal applications, or use traditional form & pour methods.

B. Apply very rapid setting, semi self-leveling, structural repair mortar within the minimum and maximum thickness profiles recommended by the manufacturer.

1. For Pavemend SLQ, apply at minimum profile thickness of 1/4 inch (6 mm).

2. For Pavemend SLQ, there are no restrictions to the maximum depth of the repair profile.

C. For best results, place very rapid setting, semi self-leveling, structural repair mortar in a single monolithic application instead of a multi-layered application.

D. When applying the very rapid setting, semi self-leveling, structural repair mortar in layers, material must be placed before final set has been reached in previous layer.

1. For Pavemend SLQ, maintain a minimum thickness of 1” if repair material must be

layered.

E. Screed or trowel the very rapid setting, semi self-leveling, structural repair mortar to create a level surface.

**3.05 FINISHING**

A. Follow manufacturer’s written instructions for finishing the very rapid setting, semi self-leveling, structural repair mortar.

1. For Pavemend SLQ, finish material to desired texture upon initial set.

2. For Pavemend SLQ, it can be saw-cut, drilled, sanded and/or polished upon final set.

3. For Pavemend SLQ, do not add water to the surface of Pavemend SLQ when finishing.

B. Refer to drawings and project specifications for finishing work and final texture(s).

**3.06 JOINTS**

A. Previously Existing Joints:

1. Follow manufacturer’s written instructions for re-establishing joints in the very rapid setting, semi self-leveling, structural repair mortar.

a. For Pavemend SLQ, all previously existing joints must be re-established within 1 hour of final set.

B. Placement of Additional Joints:

1. Refer to details, drawings, and project specifications for additional (new) joint locations and joint details.

**3.07 FIELD QUALITY CONTROL**

A. Inspect concrete surfaces prior to repairs ensuring that they have been mechanically prepared to meet the manufacturer’s CSP (concrete surface profile) requirements and are clean. Refer to Section 3.02.

B. Inspect completed application and verify that the very rapid setting, semi self-leveling, structural repair mortar has been finished according to project specifications.

**3.08 CURING**

A. Follow manufacturer’s written instructions for curing.

1. For Pavemend SLQ, do not water cure, damp cure or use curing agents.

2. For Pavemend SLQ, allow for extended curing times in cool/cold temperatures.

**3.09 PROTECTION**

A. Protect very rapid setting, semi self-leveling, structural repair mortar application area(s) from foot traffic and damage by other trades until cured.

1. For Pavemend SLQ, protect from foot traffic for at least 20 minutes. Add 30 minutes for every 10°F (6°C) drop in temperature below 72°F (22°C).

2. For Pavemend SLQ, protect from wheeled traffic for at least 1 hour. Add 30 minutes for every 10°F (6°C) drop in temperature 72°F (22°C).

3. For Pavemend SLQ in cool weather applications [50°F to 59ºF (10°C to 15°C)], in thicknesses of 1/2” (1.3 cm) or greater, add (+) 30 minutes for every 10°F (6°C) drop in temperature below 50°F (10°C).

4. For Pavemend SLQ in cold weather applications [below 40°F (4°C)], in thicknesses of 1” or greater, add (+) 30 min. for every 10°F (6°C) below 40°F (4°C).

**End of Section**