

SECTION 03953

CONCRETE REPAIR AND PROTECTION MODIFIED LO MODULUS HMWM

NOT FOR USE AS A CONSTRUCTION DOCUMENT. The following specification is a guide and contains performance and descriptive language. Edit carefully to coordinate with specific project requirements. User must determine suitability of this specification in whole or part for a particular project. This guide specification is for 3M™ Concrete Protector and Restorer (CP&R) 5742LO.

PART 1 GENERAL

1.01 SUMMARY

- A. Repairing and protecting portland cement concrete (PCC) with a modified low modulus HMWM.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 1. ASTM 2879 - Vapor Pressure
 2. ASTM C 78 – Flexural Strength
 3. ASTM C 881 - Modified Slant Shear Bond
 4. ASTM D 93 - Pensky Martins Closed Cup
 5. ASTM D 638 - Tensile Properties and Young's Modulus
 6. ASTM D 1298 - Specific Gravity

1.03 SUBMITTALS

- A. Submit liquid sample and small quantity sand sample.
- B. Submit two copies of manufacturer's literature for products furnished, mixing instructions, brochures, data sheets, technical data (including cure time/temperature information), application guides, appropriate Material Safety Data Sheets (MSDS) and other safety requirements.
- C. Submit list of similar projects which have been installed, identified with project name, location and date.

1.04 QUALITY ASSURANCE

- A. Materials may be accepted by a manufacturer's Certificate of Compliance.
- B. Field Sample: Install sample 10 feet by 10 feet [___ feet by ___ feet] (3 meters by 3 meters [___ meters by ___ meters]) of system. Sample must be representative of installed system. Sample must be approved by [Architect/Engineer] [Owner's representative]. Use sample to determine coverage rate for application. Leave sample in-place for reference during the project.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in sealed, undamaged containers, with clear and legible labels meeting requirements of local regulations identifying manufacturer's name, product, quantity, date of manufacture and lot number.
- B. Storage: Store materials inside at temperatures below 90 degrees Fahrenheit (32 degrees Celsius) in shaded, well ventilated areas. Store orange labeled part B in a sprinkler protected storage area away from combustible materials.
- C. Store sand so that moisture content is kept within specified requirements.

1.06 PROJECT CONDITIONS

- A. Install materials in accordance with health, safety, environmental and weather conditions required by manufacturer, or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction.

- B. Wet surfaces must dry for three days and no standing water in cracks.
- C. Curing and Application Conditions:
1. Do not apply if rain is anticipated within 8 hours of application.
 2. Do not apply if air and surface temperatures are lower than 50 degrees Fahrenheit (10 degrees Celsius), if temperature is expected to drop below this limit or rise higher than 120 degrees Fahrenheit (48 degrees Celsius) within 24 hours of application.
 3. Cure system at 72 degrees Fahrenheit (22 degrees Celsius) and 50% relative humidity. Lower temperatures require extended cure. Higher temperatures may cause faster cure.
- D. Seal doors, windows, air intakes, elevators and other openings that will allow vapors to migrate into occupied spaces.
- E. Ventilate interior and exterior application areas and occupied spaces adjacent to application areas during application and for an appropriate period after application or until vapor and odor concentrations are below Permissible Exposure Limits (PEL) listed in manufacturer's MSDS. Inspection of job site by a qualified industrial hygienist before work begins and periodic air monitoring during and after application may be necessary to determine ventilation requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Polymer System: Stable two part, low modulus, low viscosity, low VOC, chemical resistant, modified high molecular weight methacrylate resin having a penetration time (gel time) of 3 to 5 hours minimum and meeting or exceeding the following physical and performance requirements.

Table 1 – Typical Physical Properties

Property	Standards and Conditions	Part A Results
Viscosity	Brookfield RVT w/UL adapter at 100 rpm @ 72°F (22°C)	5 to 10 cps
Specific Gravity	ASTM D 1298 at 60°F (15°C)	0.95
Weight	+/- 0.4 lbs./gal. (0,05 kg/litre)	7.92 lbs./gal. (0,95 kg/litre)
Flash Point	ASTM D 93 Pensky-Martins Closed Cup	Greater than 200°F (93°C)
Vapor Pressure	ASTM 2879 at 68°F (20°C)	1 mm Hg
VOC Rating ¹	Calculated weight loss	Less than 50 grams/liter as mixed combined
Solution Stability/ Shelf Life	6 weeks exposure at 130°F (54°C) without gelling	Product can be stored up to 6 months below 90°F (32°C) in original unopened container

Table 2 – Typical Performance Properties

Property	Standards and Conditions	Mixed Polymer System Results
Crack Healing (filling)	50°F (10°C) to 100°F (37°C)	+90% 8 mil (0,2 mm) crack minimum
Slant Shear Bond Strength with Deflection Values	ASTM C 881 modified 7 days aging at 70°F (21°C), conditioned and tested at: •70°F (21°C) psi (MPa) Deflection, inches (mm) •0°F (-17°C) psi (MPa) Deflection, inches (mm)	Crack Size 10 mil (0,25 mm) 45 mil (1,1 mm) •320 (2,2) •290 (1,9) •0.59 (14) •0.43 (10) •565 (3,8) •470 (3,2) •0.45 (11) •0.58 (14)
Flexural Strength (Beam Test) with Deflection Values	ASTM C 78 - 7 days aging at 70°F (21°C), conditioned and tested at: •70°F (21°C) psi (MPa) Deflection, inches (mm) •0°F (-17°C) psi (MPa) Deflection, inches (mm)	Crack Size 10 mil (0,25 mm) 45 mil (1,1 mm) •500 (3,4) •420 (2,8) •0.131 (3,3) •0.202 (0,5) •605 (4,1) •590 (4) •0.15 (3,8) •0.291 (7,3)
Tensile Strength/Elongation	ASTM D 638 14 day accelerated aging	300 psi (2 MPa) Greater than 100% minimum
Modulus of Elasticity (Young's Modulus) neat	ASTM D 638 •7 day aging tested at 72°F (22°C) •14 day accelerated aging at 131°F (55°C) tested at 72°F (22°C)	•900 psi (6,2 MPa) maximum •1450 psi (9,9 MPa) maximum

2.02 ACCESSORIES

- A. Sand: Commercial, uniform grade 20-30, clean, washed and dried silica sand free from dirt, dust and other contaminants. Free moisture content must be 0.5% by weight maximum at the time of application.
- B. Sealant: Silicone or siliconized acrylic.
- C. Cleaning Agents: Appropriate solvents.

PART 3 EXECUTION

Concrete design and structural requirements should be analyzed by a qualified licensed Structural Engineer to Determine the suitability of these materials for the intended use for specific project requirements.

3.01 EXAMINATION

- A. Inspect top surface and cracks before polymer system is applied. Surface and cracks must be free of laitance, loose surface debris, grease, oil, rust, contaminants and other defects which will adversely affect polymer system application and performance.
- B. Dry concrete 3 days prior to polymer system application to obtain optimum adhesion.
- C. Verify curing methods, admixtures and other chemical compounds used with concrete are compatible with polymer system.
- D. Polymer system application implies surface is accepted and suitable for application.

3.02 PREPARATION

- A. Prepare areas to be treated with polymer system in accordance with manufacturer's instructions.
- B. Prepare only areas that can be treated during the same work day.
- C. Clean surfaces using shot blast, 3M Roto Peen or high pressure water blast (5000 psi maximum) and clean cracks using high pressure water blast, air blast or wire brush as required in accordance with manufacturer's instructions and recommendations to remove dirt, dust, sand, gravel, laitance, loose debris, grease, oil, rust, and other contaminants.

- D. Remove existing sealant and clean surface to remove sealant residue.
- E. Plug drain holes immediately prior to polymer system application, so that polymer system will not leak from drains or be discharged from surface. Use adequate size plugs. Sand dyking at drain perimeter is not permitted.
- F. Seal accessible cracks from underside with sealant 24 hours before material application to prevent leaking through cracks. If crack sealing from underside is not possible, suspend plastic sheets below crack to protect adjacent property and surfaces.

3.03 APPLICATION

- A. Treat cracks, repair spalls and perform other repairs with polymer system in accordance with manufacturer's instructions.
- B. Apply polymer system uniformly to surface in accordance with manufacturer's instructions at coverage rate determined during Field Sample application. Do not apply polymer system to a greater surface area than can be covered with sand within cure times required by polymer system manufacturer. Do not allow polymer system to flow into expansion joints.
- C. After initial application, ensure polymer system has been uniformly distributed. Uniformly broom or squeegee pooled polymer system from low areas. Apply polymer system over areas appearing undertreated immediately.
- D. Uniformly broadcast sand into polymer system at 1 - 2 lbs./sq. yard (0,54 - 1,08 kg/ sq. m) within cure times required by polymer system manufacturer. Prevent sand drift while broadcasting sand.
- E. Allow to final tack free surface cure according to conditions described in Article 1.06.C
- F. Vacuum or sweep excess sand from cured treated surface.

Paragraph G below is an alternative to broadcasting sand described in Paragraph D above. Edit accordingly if Paragraph G is chosen instead of D. Delete Paragraph F above if G is chosen.

- G. Remove excess polymer system by sandblasting
- H. Once polymer system has reached tack free surface cure, apply sealant coves at the base of turn-ups and at construction and control joints and areas where sealant was removed prior to application of polymer system.

3.04 PROTECTION

- A. Once polymer system is applied, only minimal pedestrian or vehicular traffic may be allowed on treated surfaces to reapply polymer system, broom out puddles or broadcast sand. Once polymer system is completely applied and sand is broadcast, do not allow pedestrian or vehicular traffic on treated surfaces until final cure.

END OF SECTION