

**MATERIALS FOR CONCRETE REPAIR – METHYL METHACRYLATE (MMA)
POLYMER MATERIALS.
(REV 5-4-18)**

SECTION 930 is expanded by the following new Subarticle:

930-8 Methyl Methacrylate (MMA) Polymer Concrete.

930-8.1 General: Use methyl methacrylate (MMA) polymer concrete to repair concrete including defects or purposely placed openings in concrete elements. Any depth larger than the manufacturer's recommendation for the specific material shall be repaired with portland cement concrete meeting the requirements of Section 346.

930-8.2 Material Supply, Storage, and Marking: The material shall be pre-proportioned including aggregate. Deliver products in original, unopened containers with manufacturer's name, date of manufacture, and clearly marked with all information described below. Store the material in an elevated dry and weather protected enclosure in full compliance with the manufacturer's recommendations. Material must be used within manufacturer's recommended shelf life.

The material from which the containers are made shall have water vapor transmission not greater than 100 g/m² in 24 hours as determined in accordance with Procedure B of ASTM E96.

All containers shall be marked with the following information:

1. LOT identification number and material expiration date
2. Directions for use shall include but are not limited to the following:
 - a. The type and kind of primer recommended (if any) to bond fresh repair material to the concrete or mortar being repaired.
 - b. The recommended amount of liquid component, to be mixed with the package contents.
 - c. The recommended length of mixing time or sequence of mixing in minutes.
3. Date the material was packaged and product expiration date.
4. The yield in cubic feet or yield in ft²/in thickness when mixed with the recommended amount of liquid.
5. The net weight in each container. The contents of any container shall not vary by more than 2% from the weight stated in the declarations. The average weight of filled containers in a LOT shall be not less than the individual weight stated in the declarations.
6. State the approximate working time.
7. State any ambient condition limitations.

930-8.3 Sampling, Mixing, and Additional Testing: A LOT is the packaged repair material normally placed on a pallet. A unit sample is a single container or package of material randomly selected from the LOT. Mix and install the materials in accordance with the manufacturer's recommendations. Perform all mixing in a manner that will not introduce air or pre-polymerized material into the mix. Manufacturers will be required to provide field representation upon request by the Engineer. The Department reserves the right to conduct further field testing on any approved material.

930-8.3.1 Rejection: All materials in broken containers shall be rejected. Material that fails to meet any of the requirements of this Specification shall be rejected. Report all materials failing to meet this specification and state the reasons for rejection in writing to the Engineer and the producer or supplier. Reject materials that have exceeded the product's shelf life.

930-8.3.2 Mixing and Fabrication: Mechanically mix the dry packaged materials with liquid components in accordance with the manufacturer's recommendations.

930-8.3.3 Length Change: Make and cure the test specimens in accordance with ASTM C157, except omit the curing period in Section 10.3; however 11.1.2 shall apply for 28 day curing period.

930-8.3.4 Manifestly Faulty Specimens: Visually examine each group of specimens representing a given test or a given age of test, including tests of freshly mixed concrete, before or during the test, or both, whichever is appropriate. Discard any specimen found to be manifestly faulty by such examination without testing. Visually examine all specimens representing a given test at a given age after testing, and should any specimen be found to be manifestly faulty the test results thereof shall be disregarded. Should more than one specimen representing a given test at a given age be found manifestly faulty either before or after testing, the entire test shall be disregarded and repeated. The test result reported shall be the average of the individual test results of the specimens tested or, in the event that one specimen or one result has been discarded, it shall be the average of the test results of the remaining specimens.

930-8.4 Methyl Methacrylate (MMA) Polymer Materials for Repair of Predominately Horizontal Surfaces.

930-8.4.1 General: This material is intended to be used to repair concrete where the area to be treated will be on a horizontal surface, and shall be self-consolidating. Examples of the type of locations for these materials are bridge decks, portland cement concrete pavements and other locations required by the Contract Documents. Follow the manufacturer's recommendations for preparing the surfaces, mixing, placing, and curing the repair material unless otherwise directed in the Contract Documents.

930-8.4.2 Physical Properties: The repair material shall meet or exceed the physical properties stated in Table 1 as determined by the specified test methods.

| Table 1 – Physical Properties of MMA Polymer Repair Materials for Horizontal Surfaces | | |
|---|-------------|---|
| Requirement | Test Method | Test Value |
| Minimum Compressive Strength, psi | | |
| 3 hours | ASTM C109 | 6,000 |
| 24 hours | | 8,000 |
| 7 days | | Greater than or equal to strength at 24 hours |
| Maximum Length Change, % | | |
| Allowable shrinkage at 28 days when air cured compared to length at one day | ASTM C157** | -0.08 |
| Maximum Absorption (@ 7 days), % | ASTM C413 | 1 |
| Minimum Flexural Strength (at 7 days), psi | ASTM C348 | 2000 |
| Time of Setting (Initial), minutes | ASTM C191 | 15 to 45 |
| Minimum Bond Strength by Slant Shear, psi | | |
| 24 hours | FM 5-587 | 2,000 |
| 7 days | | Greater than or equal to strength at 24 hours |
| Thermal Compatibility, Minimum Bond Strength by Slant Shear, psi | | |
| 24 hours | FM 5-609 | 90% of control specimen |
| 7 days | | |

* Air cure all specimens at normal laboratory temperature ($73^{\circ} \pm 3^{\circ}$ F; not greater than 55% relative humidity)
** Make and cure the test specimens in accordance with ASTM C-157, except omit the curing period in Section 10.3; however 11.1.2 shall apply for 28 day curing period.

930-8.5 Constructability: Furnish to the Engineer for approval shop drawing as may be required to complete repairs in compliance with the design shown in the Plans and the manufacturer's recommended repair system.

Do Not Use Without
CO Specs Authorization