



Methacrylate Deck Crack Treatment

Methacrylate deck crack treatment uses methacrylate resin to seal cracks in concrete bridge decks and is designed to be a crack sealer only. It is not a surface overlay. Methacrylate resin is used to repair newly placed decks that exceed the crack intensity limits and to rehabilitate existing bridge decks that have deteriorated over time.

Typically, the resin is applied to the deck surface by hand or mechanically sprayed and spread with a broom or squeegee. In general, the application of methacrylate on a bridge deck is a simple process. However, careful inspection is needed to assure the treatment is effective and that the treated surface maintains a desirable roadway surface condition.

Attachment No. 1 contains inspection guidelines to assist Structure Construction personnel when inspecting a methacrylate application.

Additional information regarding methacrylate is available in the *Concrete Technology Manual*.

Methacrylate Deck Treatment Inspection Guidelines

Prior to Starting Work

- Review Standard Specification¹.
- Review and authorize the Contractor's program for public safety associated with the use of methacrylate resin as required in the Special Provisions.
- Forward Form CEM 3101, *Notice of Materials to be Used*, to Materials Engineering and Testing Services (METS).
- Verify the methacrylate was tested and released by METS (Form TL-0101, *Sample Identification Card*).
- Verify the sand and absorbent material meets the specification² requirements.
- Refer to BCM 112-4.0, *Friction Testing of Bridge Decks*, for instructions on obtaining verification of the coefficient of friction for the test area.
- Hold a meeting with the Contractor to discuss the required test area, skid testing, application equipment, safety, abrasive cleaning methods, and a contingency plan if the resin does not cure in time.

During Construction Operations

- Prior to treating the required deck areas, ensure that the methacrylate deck treatment has been performed on a test area and the results are accepted. The main purpose of conducting a test area is to obtain the necessary information (i.e., application rate, initiator/promoter amount, set time, coefficient of friction, etc.) to assure that the work within the traveled way can be completed without disruption to the traveling public.
- The concrete deck surface must be cleaned prior to methacrylate application. Steel shot blasting is specified to prepare the deck surface. If the deck surface becomes contaminated before the methacrylate is applied the deck surface must be cleaned again³. Check the contract Special Provisions for other specified deck cleaning methods, if any.
- Prior to applying the methacrylate, weather conditions and deck surface temperature should be checked. Current specifications limit the relative humidity to 85 percent or lower at the time of treatment. The deck surface needs to be dry and between 50 to 100 degrees F.
- Methacrylate resin can be applied by hand or with mechanical equipment. If mechanical sprayers are used they must be the *airless* type. Compressed air spray application creates

¹ 2010 Standard Specifications (SS), Section 15-5, *Bridge Rehabilitation* and Section 51-1.01D(4)(d), *Crack Intensity*.

² 2010 SS, Section 15-5.05B, *Materials*.

³ 2010 Standard Specifications (SS), 15-5.01C(2), *Prepare Concrete Deck Surfaces*, or 2006 Special Provisions (SP), *Clean Bridge Deck*.

mist and cannot be used. Typical application involves hand placing with buckets and spreading with a squeegee or broom.

- The resin must be placed within 5 minutes of the initiator being mixed. Excess material needs to be distributed (by a squeegee or broom) within 10 minutes of resin placement. The redistribution of the excess material is important to ensure cracks are completely filled and to avoid thick glassy spots that may reduce the coefficient of friction. Spread rates are specified in the contract specifications⁴; the exact spread rate is determined by the Engineer and will vary depending on the surface condition, aggregate type, and roughness of the deck surface. The specifications⁵ suggest an application rate of 90 ft²/gal. As a *rule of thumb*, 100 ft²/gal (2.45 m²/liter) is a good starting point for normal concrete. Lightweight concrete will require more resin and may reduce the spread rate to about 65 ft²/gal (1.6 m²/liter). For very dense concrete, less resin is required and the spread rate can increase to about 175 ft²/gal (4.29 m²/liter). As a *rule of thumb* the surface above cracks should be slightly wet with resin, 20 minutes after application. This is an indicator that the cracks are completely filled. If dry after 20 minutes, increase the amount of resin being applied. If ponding is evident, reduce the amount of resin. It is essential that the resin remains fluid long enough (40 to 90 minutes) for the cracks to be filled. If rapid gelling occurs the material should be rejected.
- Methacrylate resin must only be applied to the deck area. The Contractor is required to protect or avoid placing resin on other parts of the structure (e.g., barrier rails, joints, drainage facilities, etc). It is important to ensure resin does not leak or drip into waterways, roadways, or parking areas below the bridge. Sealing of joints and scupper drains is one method to prevent this.
- Sand is applied to increase skid resistance. Careful inspection of the deck surface after the sand application is needed to assure that the sand adheres to the deck. Any areas found absent of sand adhesion must be abrasively blasted. Vacuum attachments must be used during abrasive blasting operations.
- Apply absorbent material. The absorbent material removes oily residue that can form and prevents tracking of residue onto the adjacent pavement.

Prior to Opening the Treated Area to Traffic, the Following Requirements Must be Met

1. The treated surface is tack free and not oily.
2. The applied sand cover adheres and resists brushing by hand.
3. Excess sand and absorbent material has been removed.
4. No material will be tracked beyond the limits of treatment by traffic.
5. The treated deck should be comparable to the test area.

Typical Problems Associated with Bridge Deck Methacrylate Resin Treatment Operations

⁴ 2010 SS, Section 15-5.05C, *Construction*, or 2006 SP, *Bridge Deck Methacrylate Resin Treatment*

⁵ 2010 SS, Section 15-5.05C, *Construction*, or 2006 SP, *Bridge Deck Methacrylate Resin Treatment*

- Oiliness—The tack, or the oiliness, of methacrylate resin can create serious problems, especially in cold night closures. Opening traffic lanes prior to the complete cure of the resin can cause the tracking of residue, oiling of cars, and/or reduced skid resistance. This issue is due to *oxygen inhibition* of the top surface. Methacrylate resin cures from the lack of oxygen, thus the exposed surface tends to cure last. Even if the bulk of the resin sets up and can resist penetration with a screwdriver, the surface can still be covered with an oily sheen. Modern methacrylate resins contain additives to prevent this phenomenon.
- Inability to spread material - Heat and sunlight can cause methacrylate to set faster. Occasionally, the resin will set before the material is spread. This causes the worst case for crack sealing as it prevents the resin from properly flowing into the cracks.
- Sand does not adhere—Resin that sets prior to applying sand will result in the creation of glassy spots. The glassy areas may have reduced skid resistance and remedial work to repair these areas would be required. Methods that have been proven effective are to abrasively blast the glassy areas. For larger areas where the sand was not promptly applied and didn't adhere, resin and sand can be reapplied (time permitting).