-USE ENTIRE SPEC IF YOU HAVE 4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE(30 MPA - 20 MM - 345 KG HP CEMENT CONCRETE),

-IF YOU HAVE OTHER TYPE OF HP CONCRETE USE ONLY THE CRACK SEALING PORTION 11-29-12

**EXPOSED CONCRETE DECK CRACK SEALING**

Concrete crack sealing shall only be performed on concrete decks whose surface is to remain exposed as called for on the Plans. Concrete crack sealing shall not be performed on any concrete decks where any waterproofing membrane with an asphalt wearing surface shall be installed, since the waterproofing membrane seals any cracks present in the concrete deck surface from water infiltration.

After the 14 day concrete bridge deck curing period has been completed and prior to the application of loaded vehicles, the Engineer shall survey the entire deck to determine if there are any cracks present. The Engineer shall determine width of cracks found using a crack width indicating comparator card made of clear plastic with lines of specified width on the cards. These cracks are assumed to be non-moving and to have been caused by inadequate control of shrinkage or temperature stresses during curing. Cracks that are of structural concern shall be repaired by other methods determined by the Engineer. All required crack sealing and crack repairs shall be performed by the Contractor without additional compensation. The Contractor shall be required to seal cracks even if the environmental conditions during placement and curing satisfied specification requirements.

The type of Cement Concrete crack sealing required shall be determined as a function of the surface type and maximum crack width as follows:

Top surfaces of exposed concrete bridge decks with slopes up to and including 15%:

* Cracks less than 0.006” (0.15 mm) wide shall be ignored;
* Cracks greater than or equal to 0.006” (0.15 mm) wide and less than 0.020” (0.50 mm) wide shall be sealed with an approved methacrylate;
* Cracks greater than or equal to 0.020” (0.50 mm) wide shall be sealed using either epoxy injection or methacrylate with a sand filler.

Undersides of bridge decks and top surfaces of exposed concrete bridge decks with slopes greater than 15%:

* Cracks less than 0.006” (0.15 mm) wide shall be ignored;
* Cracks greater than or equal to 0.006” (0.15 mm) wide and less than 0.020” (0.50 mm) wide shall be sealed with an approved silane sealer;
* Cracks greater than or equal to 0.020” (0.50 mm) wide shall be sealed using epoxy injection.

Before sealing, the concrete must be clean, sound, and free of any contaminants and surface moisture. Any other surface contaminants shall be removed by abrasive blast cleaning. Once all concrete surface contaminants are removed, the concrete shall be swept clean and blown off using oil-free compressed air immediately prior to applying the sealer.

Crack sealing materials shall be applied by skilled applicators under a supervisor with proven successful experience in applications with a similar scope of work. All crack sealing materials shall be applied strictly in accordance with the manufacturer’s instructions within the allowable ambient temperature range restrictions. If a heated enclosure is used to accomplish this, the heating units shall be properly vented to the outside of the enclosure to prevent products of combustion from exhausting within the enclosure.

Silane Crack Sealer shall consist of a clear, breathable, high-performance, 100 percent solids by weight Silane sealer for protecting new and existing concrete surfaces. It must penetrate deeply, sealing out water, chloride ions, and acids, and prevent damage from freeze/thaw cycles. The Silane Crack Sealer material shall be listed on the MassDOT QCML.

The methacrylate crack sealer shall consist of a high molecular weight low viscosity methacrylate monomer. The methacrylate material shall, as a minimum, provide the following as applied properties:

|  |  |  |
| --- | --- | --- |
| **Property** | **Value** | **Test** |
| Viscosity | < 25 cps | ASTM D2393-86 |
| Bond Strength | > 1500 psi | ASTM C882 |
| Tensile Elongation | > 3% | ASTM D638 |

A dam shall be created on either side of the crack with silicone caulk. Methacrylate shall then be poured into the valley created by this dam. The methacrylate shall be refilled as necessary as it seeps into the crack to ensure the crack is completely filled. If large quantities of methacrylate are used and the crack is not getting filled, the crack should be filled with pre-bagged dried silica sand filler and the crack shall then be re-filled with methacrylate. Once the methacrylate stops seeping into the crack, the Contractor shall remove the silicone caulk dams and any remaining methacrylate contained within with a putty knife or other tool that can scrape them off the concrete surface.

Epoxy injection crack sealing shall be performed using an Epoxy-Resin for Cement Concrete Crack Injection that conforms to AASHTO M235, Type IV, Grade I. The cracks shall be cleaned with compressed air. Surface mounted injection ports shall then be installed over the centers of the cracks and mounted with rapid setting epoxy material. The spacing of these ports shall be contingent upon the crack sealing material and the injection equipment chosen. Socket porting shall be allowed provided that a hollow drill bit and vacuum system is used to prevent debris from entering the cracks. The crack widths shall be noted during port installation. After the ports are installed, the crack surfaces shall be sealed with a high modulus, 100% solids, moisture tolerant epoxy paste adhesive. This material shall be capped with fine sand before it is cured. After the capping material has cured, the cracks shall be injected with the epoxy resin compound. The injection pressure used to seal the cracks shall be based upon a number of factors including crack width, crack depth, and the epoxy material used. Injection shall be accomplished using a metered system. The system shall be equipped with a pressure gauge accurate for the pressures anticipated for this work. Injection shall start at the widest point of the crack and shall continue until the narrowest portions of the crack have been filled. Injection shall continue until refusal. If epoxy is observed at adjacent ports, the adjacent port shall be capped and injection shall continue until refusal occurs. Once refusal occurs, injection shall continue at the next wet port until refusal is reached.

After the methacrylate and/or epoxy injection crack sealing has been completed and prior to cutting grooves in the concrete deck surface in accordance with Subsection 901.66 H 2 of the Supplemental Specifications, those deck areas where the repairs were made shall be ground down to the clean concrete substrate using a grinder in order to remove any cured methacrylate and/or epoxy paste remaining on top of the bridge deck surface. All surface mounted injection ports shall also be removed or ground down to the level of the surface of the bridge deck.