Technical Bulletin 213

Epoxy Grout - Concrete Surface Preparation

PROPERLY PREPARED FOUNDATION SURFACE FOR EPOXY GROUTING. FOR EXPANSION JOINTS, REFER TO SECTION E.

All surfaces in contact with Five Star® epoxy grouts shall be clean and free of oil, grease, laitance, and other bond inhibiting contaminants. A stable foundation system and maximum grout bonding will only be achieved by ensuring that the concrete foundation in contact with the grout has been properly roughened, cleaned, and dried prior to applying the epoxy grout.

A. Concrete Foundation Requirements

In many instances the foundation beneath the grout has been recently repaired or newly constructed. In these cases, consideration must be given to whether that concrete foundation has sufficiently developed/cured before preparing the foundation and installing grout on top of it. The safe advice is to wait 28 days for the concrete foundation to fully develop before preparing the foundation and placing grout on top of it. Concrete that is less than 28 days old may still be dimensionally unstable (not strong enough and still shrinking). In addition to dimensional stability, concrete that is still hydrating is also still giving off moisture.

Where the project schedule does not allow waiting 28 days for the foundation or foundation repairs to fully cure, the project engineer, or "engineer of record" must decide whether the concrete foundation can be prepared and grouted. The engineer's decision is typically based on compressive strength testing and specific knowledge as to what type of concrete has been used in the repair/construction of the foundation. Five Star Products manufactures fast setting concretes that can be ready to place grout on hours after setting.

Dimensional stability is the primary consideration. Installing grout on a foundation that may still shrink could potentially cause alignment and cracking issues. Epoxy grouts will bond to concrete that is still hydrating because the moisture content still dissipating after several days of curing is not significant enough to disrupt bond development. Epoxy coatings are more sensitive to moisture than epoxy grouts because coatings are typically applied as thin films.

Essentially, the more time the concrete foundation has to develop strength and hydrate the better.

B. Roughening

Prior to roughening, if the concrete surface has been exposed to oils, greases, and/or chemicals, it may be necessary to core sample to determine the depth of concrete that needs to be removed.

When concrete is curing, water and fine particles migrate upward resulting in a weak layer at the surface. Adding excessive water and over finishing the concrete intensifies this process. This weak concrete layer is referred to as the surface laitance and needs to be removed prior to grouting.

Surface laitance removal should result in coarse aggregate exposure. The surface profile recommendation is to create a minimum ¼ inch (6 mm) peak to valley amplitude. This is also referred to as an International Concrete Repair Institute Concrete Surface Profile (ICRI CSP) of 6 or greater. This level of surface preparation typically involves mechanical means. For a discussion on ICRI CSP surface designations and approved methods for attaining them see ICRI Guideline No. 310.2R-2013 *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair*.

Whatever method is employed to roughen the surface, care should be taken not to contaminate the substrate, polish the substrate, or use a procedure that is so aggressive that it fractures or introduces microcracking in the concrete foundation. A surface retarder may be used on fresh/new concrete to achieve the proper profile. If a surface retarder is used, the surface retarder manufacturer's installation instructions must be followed.

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C. Cleaning

Cleaning refers to completely removing the dirt, dust, and debris from the roughening process as well as any oil, grease, or other bond-inhibiting contaminants on or in the substrate. Cleaning methods commonly employed include blowing off the surface with oil free compressed air (the air source must be oil free because any oil introduced to the concrete surface will interfere with the bond) and/or high pressure washing. After the final cleaning, the surface should be allowed to dry before applying epoxy grout.

D. Epoxy Grout and Surface Dryness/Moisture

Five Star recommends that bonding surfaces for epoxy grouts be dry prior to installing the grout. In high humidity environments this can present a challenge. As stated previously, a minimal amount of moisture on the surface of concrete does not significantly interfere with the bond of epoxy grout to concrete. Concrete foundations that are exposed to the elements are not “bone dry” unless they have been exposed to elevated temperatures for several hours.

It is common to plan epoxy grout installations early in the day to take advantage of cooler temperatures. Due to the transition between the cooler nighttime versus daytime temperatures, it is not unusual to observe a slightly darkened surface indicating some moisture condensing in the surface of the concrete. Because this moisture is not significant, it is acceptable to place epoxy grout on this surface. However, every attempt should be made to make the concrete foundation/epoxy grout bonding surface as dry as possible.

E. Expansion Joints

Expansion/isolation joints are best installed after surface preparation but prior to the equipment being set and aligned. Expansion/isolation joints shall be incorporated into large grout pours if the grout must travel in multiple directions. These joints aid in grout placement and can function as control joints to reduce the probability of cracking. Expansion/isolation joints are recommended to be installed at full depth every 4 to 8 feet (1 – 2 m) across the short dimension and shall not bridge a structural support. Typically made from closed-cell foam in a ½ inch to 1 inch (13 – 25 mm) width, expansion/isolation joints are glued into position with a suitable caulk/adhesive. For more information, refer to Technical Bulletin415 *Expansion Joints in Grout Placemen*t.

For additional information, contact your Five Star® Technical Sales Representative.

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