SURFACE PREPARATION RECOMMENDATIONS FOR CHOCKFAST EPOXY CHOCKS AND GROUTS

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PRODUCT DESCRIPTION

Chockfast epoxy chocks and grouts are designed and used to create reliable rotating machinery and mechanical equipment foundation systems or structures. By seamlessly connecting the various components, epoxy grouts and chocks promote the creation of a “monolithic” structure that acts as a single structure. To promote the achievement of these goals, this guide provides the best recommendations on preparing mounting surfaces for effective structural connections.

STEEL AND OTHER METAL RECOMMENDATIONS

Chockfast epoxy chocks and grouts will bond to most any metals, including but not limited to properly prepared steel, aluminum, and cast iron. The following general recommendations are provided to promote effective adhesion to metal surfaces.

BARE METAL

At a minimum, all metal surfaces must be dry, clean, and free of all previous coatings, rust, and surface contamination. Ideal surface preparation is abrasive blast to a near-white finish (SSPC-SP 10 / NACE No. 2), though a commercial blast finish (SSPC-SP 6 / NACE No. 3) is the minimum acceptable. Prior to installation of a Chockfast epoxy chock or grout, perform a final removal of all blast residue, deposits of oil, dust, or grease by wiping with a lint-free rag and a non-residue leaving solvent, such as per SSPC-SP1.

> NOTE – Epoxy chocks, including Chockfast Black, Chockfast Gray, and Chockfast Orange, will typically recommend applications of an approved release agent prior to the pouring of the material. For more specifics on this step, please refer to Technical Guide 694.

PRIMERS

Although the best recommendation is to apply Chockfast epoxy grouting and chocking compounds to properly prepared, bare steel, it is understood this is not always possible. If a steel plate or structure is not to be installed for a period of time, a high quality, straight epoxy or epoxy-based primer may be applied at 3 mills (76.2 microns) dry film thickness (DFT) or less to the sandblasted and cleaned steel. Then, just prior to installing equipment using Chockfast epoxy products, the bottom and/or mounting surfaces should be cleaned and degreased with either a solvent wash or other cleaning product that does not leave a residue.

It is recommended that at no time should any primer containing inorganic zinc be used with Chockfast epoxy grouts or chocks. While these types of primers adhere well to steel and promote epoxy adhesion, they tend to have very low internal tensile strength and often allow the bond between the epoxy and the steel to easily break.

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While not experts on primers beyond those within the ITW product portfolio, cursory reviews are performed on individual products from other suppliers for any areas of concern, mainly dry film thickness or containing inorganic zinc. Please contact a local representative of the Worldwide Distributor Network or ITW Performance Polymers for further support in reviewing specific primers.

CONCRETE RECOMMENDATIONS

Chockfast epoxy chocks and grouts are specifically designed for effective adhesion to concrete and cement-based materials. The following general recommendations are provided to promote the creation of effective foundation systems using cement-based technology.

CURE TIME

The best recommendations for new concrete foundations are that standard cement be given 21-28 days for curing and hi-early cement blends be given 7 days minimum for sufficient curing. Additionally, concrete compressive strength shall be a minimum of 3500 psi (24.1 MPa) and concrete tensile strength shall be a minimum of 350 psi (2.41 MPa).

Specifically, it is important to ensure that the “effectual moisture” (moisture from the concrete that, if in contact with epoxy, can affect the cure and bond of said epoxy) is not present when installing on the surface of the concrete. If a suitable cure time is given to consume the effectual moisture in the concrete, shrinkage will have also abated. This is often measured through moisture vapor transmission rates. These should be low, as water at the interface of the concrete and the epoxy grouts could compromise the bond integrity of the epoxy material in contact with any moisture. This may result in a reduced adhesive bond between the Chockfast epoxy and the concrete.

The main thing to stress is that the concrete foundation should have largely completed the hydration cycle, as well as the expected shrinkage of the concrete. If the concrete blend is still gaining in strength, then the hydration cycle is ongoing, and the concrete is giving off water. This is why recommendations do not strictly go by reaching design strength or even a percentage of the design strength, since concrete mixes have been encountered that reached the advertised design strength in the specified time frame but gained another 30-40% in strength over a short time. When looking at the strength development curve, one will typically see the strength gains starting to level off and this is the indication that the hydration cycle is mostly complete. In a 28-day mix, this will typically occur around 18-21 days, though it is affected by many different factors, including ambient temperature, presence of moisture during cure, size of pour, concrete mix design, raw component purity and source, to name a few.

SURFACE PREPARATION

It is recommended that Chockfast epoxy grouts and chocks bond to good quality concrete. All laitance must be removed, and coarse aggregate exposed. It is recommended to chip the concrete top surface until 50% broken and exposed aggregate, also known as fractured, coarse aggregate, is visible, since this is a reliable indicator that the concrete binder is stronger than the internal strength of the aggregate. This chipping is done after the concrete is sufficiently cured. Chipping should be accomplished using handheld chipping guns. (Never use jackhammers or bushing tools on new concrete.)

It is further recommended that surface preparation be performed approximately 2” to 4” (50 to 100-mm) outside of the mounting footprint to be installed.

Finally, just before constructing formwork, it should be ensured that the concrete surface is free of any loose material, oil, water or any other contaminant that could inhibit or reduce the effective bond of the epoxy. The use of oil free compressed air, or vacuum cleaners, is highly recommended.

FIGURE 1: CONCRETE SURFACE WITH APPROXIMATELY 50% FRACTURED, COARSE AGGREGATE VISIBLE

USE OF SURACE RETARDERS

When considering the recommended surface preparation of concrete for installations of epoxy grout under mechanical equipment or rotating machinery, it is imperative to understand the role that this process serves in the overall goal of creating a monolithic foundation structure. The primary objective of any foundation structure is to act as much as possible as a single structure- one without any disconnects between the different components.

Industry recommendations and individual manufacturers will provide limited generic guidance, such as removing a certain height from the concrete mounting surface, achieving a specific peak-to-valley distance, or exposing a specified percentage of broken and exposed aggregate. The objective of these recommendations is to provide the greatest chance of removing weak, laitance-rich

material from the surface of concrete. This process also verifies the approximate physical properties of the concrete foundation as installed, helping to ensure that the epoxy grout achieves an adhesive connection to quality concrete. Certain surface preparation methods also provide confidence that the concrete has cured as expected and achieved an effective internal tensile strength. Since the internal tensile strength of the concrete is typically the weakest link in the entire chain of a foundation system, the primary goal of performing effective concrete surface preparation is to ensure that the weak link is as strong as can be reliably achieved.

The recommendation to use surface retarders on concrete surfaces as a method to reduce or eliminate the need to mechanically work the concrete surface is often considered a means of effective surface preparation. It is important to understand the benefits and disadvantages of using this technology. Surface retarders effectively enable the easy removal of the top, laitance-rich surface of the concrete, leaving behind exposed whole aggregate and an irregular top surface. This creates a relatively aggressive surface profile and increases the effective bonding area. The use of surface retarders, however, does not provide any verification of the relative internal tensile strength of the cement-binder within the concrete. There are many instances where surface retarder has been used to achieve successful equipment installations with epoxy grout, however there are also documented cases where premature tensile failure of the concrete below the epoxy grout bond line has occurred.

When evaluating the usage of surface retarder for removal of the laitance-rich surface of the concrete, consider also performing additional evaluations that verify the structural integrity of the concrete foundation as installed.

CONCLUSION

The surface preparation method provides the highest confidence that an epoxy grout is bonding to a high quality and properly cured concrete remains chipping the concrete top surface until fractured, coarse aggregate is visible. This is a strong indicator that the concrete binder is stronger than the internal strength of the aggregate.

Chockfast epoxy grouts will bond tenaciously to any concrete surfaces with which it comes into contact, regardless of the method of surface preparation. If the concrete surface is not prepared or the concrete has not achieved full and proper hydration as intended, then there is an increased potential for an internal tensile failure of the concrete below the epoxy grout bond line. This can result in an unplanned and undesired separation within the “Monolithic” foundation system.

REFERENCE

For any additional recommendations or applications beyond the typical ones listed in this document, please contact a local representative of the Worldwide Distributor Network or ITW Performance Polymers for further support.

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