

Bulletin # 642H

Bulletin Introduction

The following CHOCKFAST Installation Procedures have been written as an aid for contractors and end-users that are applying CHOCKFAST in the field. Proper pour sizes, the use of expansion joints, and temperatures are emphasized in this bulletin.

Application procedures are included for CHOCKFAST Red, CHOCKFAST Red SG, CHOCKFAST Blue, CHOCKFAST Black and CHOCKFAST® Orange. The procedures are described in a sequence that follows Bulletin No. 643 entitled "*Standardized CHOCKFAST Design For Integral Gas Engine Compressors.*" If only one product is being used, the section describing the application of that particular product may be used independently.

These procedures may be followed, modified or rejected by the Owner, Engineer, Contractor or their Representative since they and not CHOCKFAST (ITW Philadelphia Resins) are responsible for proper grout installation planning and executing. When the planned procedures differ from those discussed herein, the User is urged to contact the local CHOCKFAST Distributor or ITW Philadelphia Resins to discuss alternate methods.

Preparations for Grouting

The following applies to all types of grouts.

Grout should be stored in a shaded or air-conditioned area with ambient temperatures between 16°-35°C (65°-95°F).

New concrete foundations must be adequately cured before setting mechanical units. ITW Philadelphia Resins will not assume the responsibility for the foundation design, concrete formulation, or structural integrity of the machinery foundation. Tensile strength and dimensional stability in particular develop slowly, so allow ample time for proper concrete curing. Consult a CHOCKFAST Representative in reference to concrete cure times.

Under no circumstances should oil, grease, water, etc soil the surface of the foundation.

To achieve good grout bond, chip concrete foundation to a rough finish, exposing 50% aggregate (fractured, coarse aggregate), using a small chipping hammer or equivalent. Avoid deep holes or grooves that could hinder the flow of grout.

Remove loose concrete pieces from the top of the foundation and from within the grout pockets. All surfaces to come in contact with the grout must be blown clean of dust and particles with *oil-free air* or swept with bristled brush.

Surfaces to be grouted should be kept dry. If foundation should be left overnight, tarp surface to prevent dew moisture and surface contamination from other operating machinery.

The bedplate should be clean, bright metal. Although CHOCKFAST Black and Orange are designed to eliminate the need for costly machining of bedplates, proper smoothing of sharp frets left by previous steel chocks or pock marks left by previously used cement grouts is important. Any sharp frets on the equipment baseplate must be ground off smooth to avoid potential cracks in the epoxy chock.

Bedplates should be inspected while the maximum amount of space is available between chipped concrete and the raised equipment. Badly corroded bedplates should be sandblasted to a white metal finish. ITW Repair Compound should be faired into pockmarks left by the corrosive influence of cement grouts.

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12 times the anchor bolt diameter from the top should be wrapped with 1/4" thick neoprene foam rubber. This will prevent CHOCKFAST from sticking to the bolt and allow it to free stretch when tensioned and to allow for baseplate thermal growth. The 1/4" neoprene rubber should be used all the way to the bottom of machinery bedplates when isolating bolts. See Bulletin No. 660 entitled "*Common Hold Down Bolt Arrangements*" for more information on the grouting of hold down bolts. For grouting large anchor bolts (typically 2" or M52) see Bulletin No. 615.

Wooden forms need to be carefully constructed to prevent leakage. Where removal of forms will be required, coat inside of wooden form with sealer (lacquer) and then 2 coats of a good paste wax to prevent adhesion of grout.

For installations of CHOCKFAST Red, expansion joints should be provided at least every 2.15m (7') in both directions. On all installations where the cured grout temperature may drop to 13°C (55°F) or below, the expansion joint spacing should not exceed 1.1m (3'6"). For installations of CHOCKFAST Blue, expansion joints should be provided at least every 1.1m (42") and pours should not normally exceed 1.1m x 1.1m x 36mm thick (42" x 42" x 1-1/2" thick).

Expansion joints must go completely through the CHOCKFAST Red to the underlying concrete foundation. Expansion joints can be made from rigid Styrofoam, redwood, neoprene rubber, etc., but in any case, must be oil tight. Expansion Joint Compound should be used to seal expansion joints, so please see Bulletins 645 and 662 for information on this product and on expansion joints in general.

Where CHOCKFAST Blue is used as an overlay on top of CHOCKFAST Red, the expansion joints in both products must coincide with each other. Under no condition should the CHOCKFAST Blue bridge an expansion joint in the CHOCKFAST Red. The expansion joint must be effectively sealed to protect the underlying concrete against penetration by oil or other contaminants. It is highly recommended that a secondary seal be incorporated into the expansion joint design with the use of Expansion Joint Compound material. Guidance on expansion joint design and complete information on EXPANSION JOINT COMPOUND may be found in Bulletins No. 645 and 662.

Warning: Expansion joints should not be placed near anchor bolts, be bridged by sole plates or rails, or be penetrated by rebar. To do so defeats the purpose of the expansion joint. Some equipment manufacturers require that their equipment be mounted on continuous rails. In this case it may be advantageous to provide for longitudinal growth of the rail with the implementation of abbreviated expansion joints located at each end of the rail.

Steel reinforcing bars, known as rebar, are a familiar feature of concrete structures. They are used to improve the tensile and shear strength of the structure. The coefficients of linear thermal expansion of steel and concrete are similar and compatible, but epoxy resin products have a coefficient two to five times as great and this can cause cracks to form.

The tensile strength of CHOCKFAST products is at least six times that of concrete, the shear strength at least five times, so horizontal rebar is not as important as it is with concrete. In fact, the use of horizontal rebar is not recommended when using CHOCKFAST grouts.

Where significant unloaded areas of CHOCKFAST Red or CHOCKFAST Blue will occur it is advisable to tie them to the concrete with short vertical pieces of rebar or "All-Thread" rod. **This should always be done on new concrete**, at corners and edges in general and prevents tensile failure of the concrete.

Where possible the dowels should be arranged as follows: 12" apart; 3" in from the edge of foundation and not closer than 1" from the CHOCKFAST top surface.

CHOCKFAST Red Pouring Procedures

CHOCKFAST Red is a three-component, high-strength, 100% solids, epoxy grouting compound. See Technical Bulletin No. 617 for its Physical Properties.

To ensure proper mixing and pouring viscosity of the CHOCKFAST Red system, pre-condition the resin, hardener and aggregate at 18°-35°C (65°-95°F) for 48 hours prior to mixing. It is extremely important to pre-condition the CHOCKFAST Red aggregate as they will determine the temperature of the grout mixture.

Pour the CHOCKFAST Red hardener into the CHOCKFAST Red resin and mix 3-4 minutes with a "Jiffy" type mixing blade and a 1/2" (12mm) slow speed drill motor. Prior to starting the drill, completely submerge the mixing blade into the liquids. This will prevent the formation of air bubbles that could be transferred into the final product.

Caution: Under no circumstances should the mixing of the CHOCKFAST Red resin and hardener be attempted in the mortar mixer.

CHOCKFAST Red should be mixed with a slow speed (15-20 rpm) portable mortar mixer of sufficient size to enable the mixing of two complete units 90.6 liters (3.2 cu.ft.) of CHOCKFAST Red epoxy grout. Mixing quantities greater than two units in a single mortar mixer is not recommended due to of the increased chance for proportioning error.

With the blades of the mortar mixer stopped, add the pre-mixed resin and hardener and one (1) bag of aggregate. The blades of the mortar mixer may be started at this time.

Progressively add the remaining aggregate assuring a homogeneous mix. **Note:** On the initial first unit mix, a 1/2 bag of aggregate, 10.4 kilograms (23 lb.) should be withheld to facilitate wetting out of the mortar mixer.

It is important to minimize air entrapment in the mixed unit of CHOCKFAST Red, therefore a mortar mixer speed of 15-20 rpm is recommended. When the CHOCKFAST Red resin, hardener and aggregate have been pre-conditioned to 21°C (70°F) or above, the grout material should be mixed only long enough to wet out the 4 bags of aggregate. When the CHOCKFAST Red components are below 21°C (70°F) a slightly longer mixing time may be necessary to obtain a suitable flowability. Unnecessarily long mixing time can entrap an excessive amount of air. Once the CHOCKFAST Red is thoroughly mixed the blades of the mortar mixer should be stopped. To facilitate unloading of the mortar mixer bucket, the blades may be rotated slightly after the bucket has been tilted to assist in rapid grout extraction from the mixer.

Note: Small quantities of CHOCKFAST Red (one unit at a time) may be hand mixed in a wheelbarrow with a hoe. Mixing of the resin and hardener must be accomplished separately as outlined in paragraph 2.

Pour the CHOCKFAST Red as soon as possible after mixing. The pot life of this product is approximately 2-3 hours at 21°C (70°F). Although CHOCKFAST Red is generally self-leveling, at temperatures below 18°C (65°F) rakes or paddles can easily be used to achieve complete filling of prepared areas. CHOCKFAST Red may be used at thicknesses between 50mm (2.0") and 450mm (18"). Individual pours should generally not exceed 450mm thick x 21.5m long x 2.15m (18" thick x 7' long x 7' wide).

Cure time for CHOCKFAST Red is as follows:

- 54 hours @ 16°C (60°F)
- 36 hours @ 21°C (70°F)
- 24 hours @ 27°C (80°F)
- 18 hours @ 32°C (90°F)

Protect recently poured grout from any sudden temperature changes and direct sunlight.

Additional layers of CHOCKFAST Red may be poured providing the previous pour has returned to ambient temperature and its surface has been roughed up with a chipping hammer, sand blasting or other approved means.

If a cap of CHOCKFAST Blue is to be poured onto the CHOCKFAST Red it may be poured as soon as the CHOCKFAST Red will support firm thumb pressure yet allow a slight denting of the CHOCKFAST Red surface, and still has a tacky feel to it. This will enable the two grouts to both chemically and physically bond.

CHOCKFAST Red SG Pouring Procedures

CHOCKFAST Red SG is a three component, high strength, 100% solids epoxy grouting compound which is used to grout large machinery and to support soleplates in all types of foundation designs with clearances as little as 25mm (1"). CHOCKFAST Red SG has extremely high physical properties and negligible shrinkage, making it ideal for final positioning of critically aligned equipment within close tolerances. Skid mounted compressors, extruders, turbines, pumps, motors and crane rails are just a few types of equipment supported on CHOCKFAST Red SG.

CHOCKFAST Red SG may be used in any thickness greater than 25mm (1"); however, individual pours should generally not exceed 100mm (4") in thickness and 1.5m (5') in length. Expansion joints should be provided at least every 1.5 m (5ft.). When using CHOCKFAST Red SG for crane rail applications expansion joints may be placed every 3m (10').

The same mixing and pouring procedures used for CHOCKFAST Red should be used with CHOCKFAST Red SG.

CHOCKFAST Blue Pouring Procedures

CHOCKFAST Blue is a two-component, 100% solids, pourable epoxy-based grouting compound containing aggregate that is most commonly used for severe applications.

When pouring CHOCKFAST Blue on top of CHOCKFAST Red one of the following procedures should be followed: 1) CHOCKFAST Blue may be poured directly on CHOCKFAST Red when the CHOCKFAST Red will support firm thumb pressure, yet allow a slight denting in its surface, and still have a tacky feel. This will allow the two grouts to chemically as well as physically bond. 2) If the CHOCKFAST Red has become hard then the surface must be abraded by chipping or sandblasting to establish a suitable surface profile, prior to pouring the CHOCKFAST Blue.

CHOCKFAST Blue contain aggregate pre-mixed into the resin. To ensure proper mixing and pouring viscosity, rotate the resin container upside-down during the pre-conditioning period to aid in mixing. This will compensate for the aggregate that may have settled during storage and transportation. Thoroughly mix hardener and resin until homogeneous color and texture is apparent (3-1/2 to 4 minutes) using a KOL mixer or large Jiffy mixer blade in 18 mm (3/4") drilling machine. It is important that the KOL mixer blade contact the entire surface on the inside and bottom of the CHOCKFAST Blue can to insure a homogeneous mix. **Never scrape mixed material from the sides or bottom of the container.**

Use grout as soon as possible after mixing. CHOCKFAST Blue pot life is approximately 35 to 50 minutes at 21°C (70°F). Cure time for CHOCKFAST Blue is as follows:

- 36 hours @ 16°C (60°F)
- 24 hours @ 21°C (72°F)
- 16 hours @ 27°C (80°F)
- 12 hours @ 32°C (90°F)

NOTE: For additional design considerations, please see Technical Bulletin No. 643 entitled "CHOCKFAST Foundation Design for Gas Engine Compressors."

CHOCKFAST Black Pouring Procedures

CHOCKFAST Black is a specially formulated 100% solids, two-component, inert-filled casting compound, developed for use as a chocking or shimming material.

Once the machinery is in position and aligned, install appropriately sized dams around each anchor bolt to create a mold for the chocks. Dams are typically made from strips of open-cell foam strip placed under the machinery on the sides and back of the mold. It may be convenient to glue these strips to the underside of the machinery if it is to be lowered into position. The desirable chock thickness is 50mm (2"). Foam rubber dams should be checked with a flashlight for tightness.

Jacking bolts which are inside the chock area must be wrapped with duct tape to isolate them from the epoxy chock.

An aerosol release agent, as supplied by ITW Philadelphia Resins, should be sprayed into each prepared chock area. Only spray enough release agent to provide a fine misting of the chock area without puddling.

Front dams should now be positioned. Angle iron should be used and it should be large enough to allow for a 20 mm (3/4") head above the machinery bedplate surface. Dams should be positioned between 20 mm (3/4") and 25 mm (1") away from the bedplate edges.

The overpour area on each chock can be cut off with an abrasive disc in order to provide easy inspection of chock/machinery interfaces and eliminate possible cracking from lateral expansion of equipment frames. **NOTE:** For appropriate sizing of chocks, please see Bulletin No. 643 entitled "Standardized CHOCKFAST Design for Integral Gas Engine Compressors" or contact ITW Philadelphia Resins' Engineering Department or your Authorized CHOCKFAST Distributor.

Equipment alignment and bolt integrity are the responsibility of the equipment owner.

Add the complete container of hardener to resin. A small or medium Jiffy mixer blade, supplied by ITW Philadelphia Resins, inserted in a 12 mm (1/2") variable speed drill is recommended for mixing. Maximum drill speed should be kept below 250 rpm in order to minimize air entrapment and mixing time should be 3 to 4 minutes.

Pour mixed materials into chock mold, from one corner only, to maximize the escape of air through the opposite corner. The air will migrate through the open-cell foam damming and assure good surface contact with the equipment bedplate. **Never scrape mixed materials from the sides or bottom of the container when pouring.**

5. Before torquing bolts and executing final alignment check, allow chocks to cure at least:

- 48 hours @ 16°C (60°F)
- 36 hours @ 18°C (65°F)
- 24 hours @ 21°C (70°F)
- 21 hours @ 23°C (75°F)
- 18 hours @ 26°C (80°F)
- 15 hours @ 29°C (85°F)
- 12 hours @ 32°C (90°F)

NOTE: A good test for proper cure is to test with a Barcol hardness gauge if there is a question regarding cure. A **MINIMUM** Barcol reading of 24 on CHOCKFAST Black indicates that sufficient cure has been achieved to allow release of jacking screws and torque of hold down bolts.

CHOCKFAST Orange Pouring Procedure

The standard pour thickness for a CHOCKFAST Orange epoxy chock is 31mm (1-1/4"). Should the designed thickness be greater than 70mm (2-3/4") please consult the CHOCKFAST Representative or ITW Philadelphia Resins. The amount of hardener mixed with the CHOCKFAST resin must be measured according to chock thickness and equipment baseplate temperature.

Refer to Bulletin NO. 693 for hardener proportioning. All other procedures for the use of CHOCKFAST Orange are the same as for CHOCKFAST Black, ie, preconditioning, sizing chocks, forming, mixing, curing, etc.

Reference For design considerations and application details please request Bulletin No. 643 entitled "Standard Chock Design for Integral Gas Engine Compressors." or contact ITW Philadelphia Resins' Engineering Services Department.

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