

1.0 SCOPE

- 1.1. This specification is to provide the product and procedural information necessary for the proper installation of Chockfast Red Versaflo Epoxy Grout under dynamic equipment.
- 1.2. This specification covers the use of Chockfast Red Versaflo when mixed in correct proportion amounts.
- 1.3. The words “grout”, “epoxy grout”, “high-flow”, “pumpable” and used in this document shall refer to Chockfast Red Versaflo Epoxy Grout.

2.0 PRODUCT

2.1. Description -

Chockfast Red Versaflo is a three-component, 100% solids epoxy grout. Chockfast Red Versaflo offers high-flow qualities for improved working and placement – and it is easily pumpable. Chockfast Red Versaflo is suitable for small and large volume pours - achieving excellent cured properties for dependable, long-term service.

2.2. Features & Benefits –

2.2.1. Working Properties

- 2.2.1.1. Fluid consistency allows large quantities of grout to be pumped using peristaltic and worm drive (progressive cavity) type pumps.
- 2.2.1.2. When installed using a pump and hose, CHOCKFAST® Red Versaflo allows installers to easily overcome the challenges presented by areas of limited or difficult access, such as those found on large skid packages, elevated structures, or in congested areas.
- 2.2.1.3. Formulated to maximize flow efficiency without the need to alter aggregate loads on site.
- 2.2.1.4. Can also be poured using traditional placement methods
- 2.2.1.5. Working Time: 90 minutes at 90°F (32°C) to 240 minutes at 60°F (10.0°C).
- 2.2.1.6. Typical application pour depths from 1” to 4” (25 mm to 100 mm).
- 2.2.1.7. High 24-hour ambient cure strengths.

2.2.2. Performance Properties

- 2.2.2.1. Fixed support of heavy machinery bases and dynamic equipment with a critical requirement to maintain precise alignment.
- 2.2.2.2. Maintains precise equipment alignment through exceptional structural properties - high resistance to compressive, tensile, flexural & shear loads and has excellent bond strength.
- 2.2.2.3. High effective bearing area (EBA), in excess of 95%.
- 2.2.2.4. Superior adhesion makes for a perfect conduit between equipment and foundation for efficient transfer and dissipation of applied loads and vibration.
- 2.2.2.5. Superb damping of vibration.
- 2.2.2.6. Excellent chemical resistance and durability in severe industrial environments and weather conditions.
- 2.2.2.7. Maintains physical properties even at shallow depths

2.3. Packaging –

2.3.1. Chockfast Red Versaflo is available in the following package sizes and yields –

- 2.3.1.1. Standard Unit - Resin (Part A): 3.51 gallons (13.29 liters) in one - 6 gallon (22.71 liter) pail; Hardener (Part B): 1.32 gallons (4.997 liters) in 1 - 2 gallon (7.57 liter) pail; and 5 – 50.00 lb. (22.68 kg) bags of Aggregate (Part C). The shipping weight of one standard unit of Chockfast Red Versaflo is 293.62 lbs. (133.18 kg). One unit will yield 2.18 ft³; 16.31 gallons (0.062 m³; 61.73 liters) of grout.

2.4. Material Storage and Handling -

- 2.4.1. Grout shall be kept dry and protected from extreme temperatures. All epoxy resin and hardener liquids, and the aggregate (Parts A, B, and C) shall be stored in a dry, sheltered storage area and pre-conditioned to a preferred temperature range of 65 °F (18 °C) to 80 °F (27 °C).
- 2.4.2. All stored product components (Parts A, B, and C) shall attain pre-conditioned temperatures at least 24 hours prior to mixing so plan for the necessary lead time to accomplish this. Where practicable, components should be removed from shipping pallets and placed to allow the maximum air circulation around cans and bags for faster, even conditioning.
- 2.4.3. All product components (Parts A, B, and C) are packed in pre-measured amounts. Use care when transporting containers and bags of aggregate to prevent dents, punctures or tears. Repair as quickly as possible should this occur. Ensure that the aggregate component (Part C) is absolutely dry at the time of mixing.

3.0 SITE PREPARATION

3.1. General -

- 3.1.1. For best results, Chockfast Red Versaflow Epoxy Grout shall be mixed and placed when the ambient temperatures of the work environment and contact surfaces are between 55 - 90°F (15.6 - 32.2°C).
- 3.1.2. If weather (i.e. temperature, sunlight, moisture, wind) or other conditions warrant it, the entire work area shall be enclosed by a temporary shelter and properly pre-conditioned to the requirements stated above for the entire duration of placement and the complete cure of Chockfast Red Versaflow.

3.2. Equipment Leveling -

- 3.2.1. It is recommended that removable alignment devices, such as jack bolts, jacking screws, or leveling screws, be used as the primary method for establishing vertical alignment and temporary support of equipment bases prior to grouting. All leveling and alignment devices should be removed after the grout has cured but before the anchor bolts are tightened. While most equipment manufacturers use leveling bolts in the design of their base fabrications, contact a local representative of the Chockfast Worldwide Distributor Network or ITW if other leveling methods are used.
- 3.2.2. The use of permanent shims is not recommended unless provisions are made for their full removal after the grout has cured and proper patching of all remaining voids.
- 3.2.3. Use of anchor bolts with nuts underneath the base structure for vertical alignment and equipment support prior to grouting is also not recommended.
- 3.2.4. All jack bolts shall bear on pads made from 3" (75 mm) diameter round bar stock cut into ½" (12 mm) thick sections, or equivalent. Square jack bolt pads are unacceptable. Prior to setting any equipment on the concrete foundation, all jack bolt pad locations shall be established. Each jack bolt pad shall be properly leveled and secured to the prepared concrete using a high compressive strength and low shrinkage two-part epoxy paste adhesive, such as Phillybond #6.
- 3.2.5. Leveling bolts, anchor bolts or other items, which must be kept free from bonding with the grout, shall be protected with pipe insulation, duct tape, weather-stripping, high-temperature non-melt grease or other approved material.
- 3.2.6. All equipment alignment is to be checked and confirmed for accuracy just prior to commencing grouting operations.

3.3. Surface Preparation of Concrete and Metal Surfaces -

- 3.3.1. For new concrete equipment foundations, the concrete shall be allowed to cure for a minimum of 28 days prior to the application of Chockfast Red Versaflow to assure time for full development of concrete strengths and negate the effects of shrinkage.
- 3.3.2. If grouting must proceed within 28 days of pouring concrete, consult a local representative of the Chockfast Worldwide Distributor Network or ITW before beginning the work.
- 3.3.3. Because concrete equipment foundations are subject to applied dynamic loads, it is recommended that new concrete foundations be tested for tensile strength in addition to compressive strength to ensure all values meet design requirements prior to grouting.

- 3.3.4. For new concrete, prepare all areas to be covered with epoxy grout by chipping and removing all concrete laitance. For existing concrete surfaces, prepare all areas to be covered with epoxy grout by chipping and removing all concrete laitance, dirt, dust, and oil-soaked or damaged concrete. Use a chipping gun with moil point or other, approved device. High-dynamic devices such as jackhammers, which may create micro-cracks in the concrete, are not recommended.
- 3.3.5. A properly prepared concrete surface should exhibit an irregular, rough, sound, and clean profile with consistent chipped and broken exposed aggregate across the entire required bonding surface to promote good bonding between the concrete and the epoxy grout.
- 3.3.6. Remove all water and dry out each foundation bolt sleeve. A pliable material (i.e. elastomeric epoxies or other approved material) may be used to fill each foundation bolt sleeve to inhibit the introduction of water, oils, or other foreign materials while also permitting necessary bolt stretch.
- 3.3.7. Seal each foundation bolt sleeve tightly at the top to prevent epoxy grout from entering the sleeves.
- 3.3.8. Metal surfaces such as sole plates, rails, leveling bolt pads, machinery or equipment bases to be embedded in epoxy grout shall be thoroughly cleaned of any rust, oil, paint, grease, dirt, or other foreign matter to promote a good bond with the epoxy grout. The best bond will be established on a surface that has been sandblasted to white metal then cleaned with IMPAX IXT-59 solvent prior to grouting.

Although the best recommendation is to apply epoxy grout to white bare steel, it is understood this is not always practicable. If a base plate or skid is not to be installed for a period of time, ITW recommends that a high quality, straight epoxy or primer containing organic zinc be applied at 3 mills or less to the sandblasted and cleaned steel. Then, just prior to installing equipment using Chockfast epoxy grouting products, the bottom or mounting surfaces should be cleaned and degreased with either a solvent wash or a cleaning product that does not leave a residue.
- 3.3.9. All solvent used for cleaning just prior to grouting shall be allowed to evaporate before grouting begins.
- 3.3.10. The entire foundation and grout bed as well as all sole plates, rails, and machinery shall be protected from direct sunlight, rain, and sudden temperature changes during the site preparations, grout placement and grout curing cycle.

3.4. Formwork -

- 3.4.1. Forms may be of standard lumber or any material of sufficient strength and stiffness to withstand the pressure of the grout and must fully contain the grout until cured. Forms shall be constructed to allow for applying hydraulic head or pumping methods needed to facilitate the filling of the grout bed area.
- 3.4.2. The contractor shall verify the finished elevation of the formwork to ensure that the elevations meet or exceed the finished level of the grout. Chamfer strips should be fastened horizontally to the inside faces of all forms at finished grout elevation to avoid sharp corners.
- 3.4.3. Forms are to be completely sealed and rendered leak-free with heavy consistency, pliable, non-melt caulking or mortar. Chockfast Red Versaflow is not self-sealing and can leak from the forms until the grout sufficiently hardens.
- 3.4.4. All formwork in contact with the epoxy grout should be coated with a minimum of three coats of a paste wax to help with trouble-free release of forms. Polyethylene sheeting is also acceptable and must be stretched tight and secured to prevent folds and wrinkling.

3.5. Expansion Joints (also referred to as control joints) -

- 3.5.1. Thermal shock of the grout is unavoidable in many equipment operating environments, but it can be anticipated and planned for through the considerate and intentional placement of prefabricated expansion joints. The items addressed here can reduce the potential for cracks.
- 3.5.2. Expansion joints extend transversely across or longitudinally down the foundation from one side to the other as required. All joints should be made of dense, compressible, closed cell foam or other suitable, approved material.
- 3.5.3. Expansion joints should be placed in pre-established locations and spacing to allow for stress-relief of the grout during cool-down after initial cure and from thermal shock during extreme cooling periods when in service.

3.5.4. Expansion joints also serve as partitions that facilitate installation by dividing large pour areas into smaller, more manageable sections.

3.5.5. Expansion joints should be positioned and bonded to the concrete foundation with adhesive prior to setting the equipment in place.

3.5.6. For assistance with joint locations and spacing, consult a local representative of the Chockfast Worldwide Distributor Network or ITW for recommendations.

3.6. Additional Stress Points -

3.6.1.1. Other conditions can create stress in cured grout which may contribute to cracking and should be addressed as follows:

3.6.1.1.1. Inside corners – On any formwork where forms will cast a 90° (32°C) inside vertical corner in the grout or concrete, the corner should be formed instead with a 3" (75 mm) minimum radius.

3.6.1.1.2. Items with sharp corners – Any items such as jack bolt pads, skid flanges, or other steel items with vertical corners which will come in contact with or embedded into the grout shall be prepared with sufficient radius or otherwise prepared to minimize the effects any sharp vertical corners.

3.6.1.1.3. Piping - Embedded pipes in the grout such as for drains, electrical conduit, etc., may also cause cracks. Contact a local representative of the Chockfast Worldwide Distributor Network or ITW if this type of embedment is planned.

4.0 INSTALLATION

4.1. SITE PREPARATIONS

4.1.1. General –

4.1.1.1. All epoxy grout components, tools, equipment, labor and training necessary for timely and proper placement of the mixed epoxy grout shall be procured and ready prior to beginning any grouting operation.

4.1.1.2. All segments of preparation shall be conducted in a manner consistent to allow proper and timely review of preparations and intended procedures well ahead of any grouting operation being performed.

4.1.1.3. All mixing and placing equipment shall be clean and dry. Check all powered equipment to make sure it is operable, in good working order and meets the safety regulations required in the work environment.

4.1.1.4. Once grouting operations commence, the work shall be carried out in a continuous manner until completion of the installation.

4.2. GROUT MIXING –

4.2.1. A mixed standard unit of Chockfast Red Versaflow will yield 2.18 ft³ or 16.31 gallons (0.062 m³; 61.73 liters)

4.2.2. Blending liquid resin (A component) and hardener (B component) – To mix a single standard unit batch of grout, pour one - 2 gallon (7.57 liter) can of hardener into one - 6 gallon (22.71 liter) can of resin. Mix thoroughly using a Jiffy Mixing Blade at a speed of 250-300 rpm for a recommended 3 minutes.

4.2.3. Adding aggregate (C component) - After the liquids are mixed, add the first bag of aggregate (C) and the liquid components into mortar mixer before turning on the mixer. After starting mixer, steadily add the remaining bags, one at a time, necessary to achieve the full unit mixture and yield. The standard unit requires a total of five - 50 lb (22.68 kg) bags. After the last bag is added, mix only until the aggregate has been wetted out by the liquids and no pockets of dry aggregate can be observed. Care must also be taken during this step not to over-mix. Do not add solvent, water, or foreign material when mixing grout or permit such on the grout bed surface until full cure of the grout occurs.

4.2.4. Repeat this procedure for each standard unit batch of Chockfast Red Versaflow required.

4.3. Working and Curing Times –

- 4.3.1. The working time (or “pot life”) indicates the time interval between mixing an epoxy grout and when hardening begins to take place and begins to affect proper placement. The length of the “working time” is influenced by the temperature of the grout components at the time of mixing; the ambient temperature of the work area; the temperature of any surface which comes in contact with the grout and by the volume of the grout used.
- 4.3.2. Curing time indicates the approximate time required for the grout to achieve the compressive strength values as noted in the chart found in Section 4.3.5.1.
- 4.3.3. Where temperatures in the work area or the foundation are lower than recommended for placement and cure, the cure time of the grout bed shall be extended to compensate.
 - 4.3.3.1. When external heating of the workplace is used, do not exceed the maximum published temperature limits. The external heat must be distributed uniformly throughout the work area.
 - 4.3.3.2. Take care when using natural gas or propane heat sources, as these will often output unburnt hydrocarbons that can accumulate on mounting surfaces and impair the adhesion between the epoxy grout and the mounting surface.
- 4.3.4. Higher than recommended temperatures in the work area or the foundation will accelerate the cure of the grout.

4.3.5. Approximate Working and Curing Times –

4.3.5.1. The following chart represents the approximate working and curing times for Chockfast Red Versaflo at different ambient temperatures:

| | 50°F(10.0°C) | 70°F(21.1°C) | 90°F(32.2°C) |
|--------------------------|----------------------|-----------------------|-----------------------|
| 1 DAY CURE | 620 psi (4.3 MPa) | 3,100 psi (21.4 MPa) | 11,300 psi (77.9 MPa) |
| 3 DAY CURE | 3,500 psi (24.1 MPa) | 11,200 psi (77.2 MPa) | 12,700 psi (87.6 MPa) |
| 7 DAY CURE | 9,000 psi (62.0 MPa) | 13,000 psi (89.6 MPa) | 13,700 psi (94.5 MPa) |
| APPROXIMATE WORKING TIME | >240 minutes | 150 minutes | 90 minutes |

4.4. GROUT PLACEMENT & FINISHING –

4.4.1. Grout Placement Options -

4.4.1.1. Head Boxes & Head Troughs –

- 4.4.1.1.1. If Chockfast Red Versaflo is to be mixed and poured using conventional techniques, it is advisable to construct and use head boxes and/or head troughs during placement to assist the flow of the grout under the equipment through hydraulic head pressure.
- 4.4.1.1.2. Head boxes or troughs are to be constructed as required to fit the needs of the application and to the degree necessary to place all the grout to its proper location within its prescribed working time. (Figure 1)
- 4.4.1.1.3. For dimensions longer than three feet, place plywood baffles at no more than three feet spacing within the box or trough to assist in maintaining hydraulic head on the grout during placement.
- 4.4.1.1.4. Consult a local representative of the Chockfast Worldwide Distributor Network or ITW for recommendations for setup on specific applications.

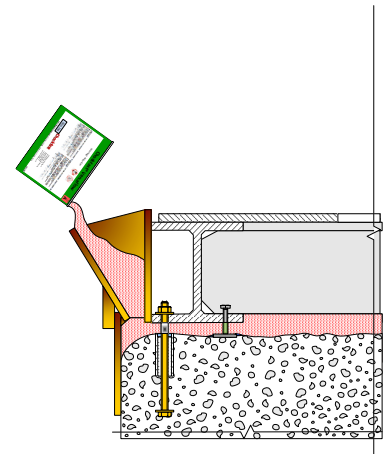


Figure 1

4.4.1.2. Pumping Equipment –

- 4.4.1.3. Peristaltic or progressive cavity type pumps can also be used for placement of mixed batches

of Chockfast Red Versaflow in large quantities. (Figures 2, 3, 4) For additional recommendation on suitable pump options and sources, contact a local representative of the Chockfast Worldwide Distributor Network or ITW.

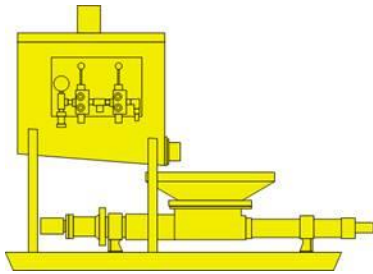


Figure 2: Progressive Cavity Grout Pump with attached mixer

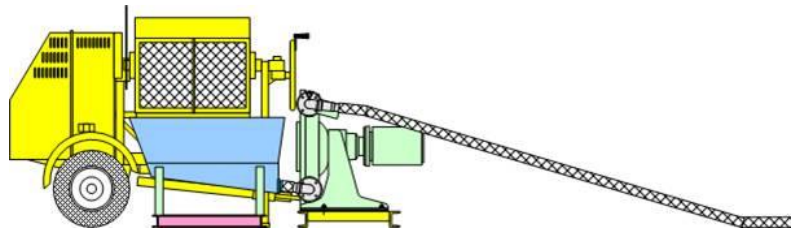


Figure 3: Peristaltic Grout Pump with mortar mixer and hopper

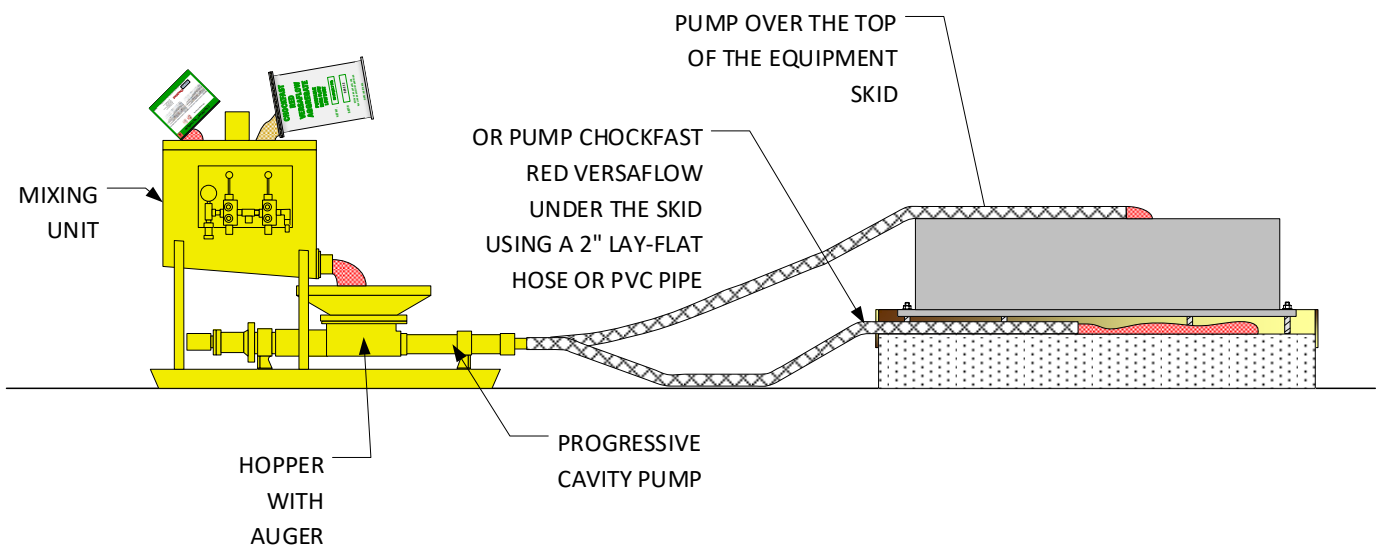


Figure 4: Placement of Grout using a Progressive Cavity Pump

- 4.4.2. Once grouting has commenced, completely fill the entire boundaries of the formwork and all vertical clearances required to establish full contact with all necessary structural bearing surfaces of the equipment and epoxy grout.
- 4.4.3. The grout shall be placed using best practices consistent with preventing the creation of voids under any structural bearing surfaces of the equipment.
- 4.4.4. Use of mechanical vibrators to assist in grout placement is not recommended.
- 4.4.5. Check forms frequently during application for leaks. Seal or plug any leaks immediately.
- 4.4.6. All placement of the grout must be completed within the grout working time as indicated on the chart in Section 4.3.5.1. - Average Working and Curing Times.
- 4.4.7. All formwork shall be left in place until grout has solidified.
- 4.4.8. Once the grout bed has attained full cure, leveling bolts used for support during the grouting and curing period can be loosened for loads to be transferred completely onto the grout. All anchor bolts shall then be tensioned to their desired value in accordance with prescribed methods.
- 4.4.9. Temporary shelters and conditioning –
 - 4.4.9.1. In cold temperature applications, where temporary shelters and conditioning are required, this shall

remain in place until cure of the grout is complete. To avoid possible cracking due to thermal shock, temperatures shall then be reduced gradually inside the temporary shelter (a rate of reduction of not more than 4°F (2°C) per hour) until normal ambient temperatures are reached. Once this is achieved, the shelter can be fully dismantled.

4.4.9.2. In hot temperature applications where temporary shelters and conditioning are required, this shall remain in place until the grout is hard to the touch and tack free. Once this is achieved, the shelter can be fully dismantled.

5.0 CLEANUP

- 5.1. Immediately after grouting is completed, clean all equipment and tools using water through a high-pressure washer and IMPAX IXT-59 (or similar approved solvent) where necessary.
- 5.2. All unused mixed grout, spent packaging and associated debris generated during the grouting operation shall be disposed of in accordance with prevailing environmental guidelines and authority at the work site.

6.0 TESTING

- 6.1. All cube samples for compressive testing shall be taken, handled and tested in accordance with procedures as provided by ITW.
- 6.2. The number, frequency and location of cube samples taken for compressive testing shall be as directed by the project engineer.
- 6.3. Product used for cube samples shall be consistent and representative of mixed material used in the actual grout pour and shall not be taken from product waste or potentially contaminated product.

7.0 HEALTH & SAFETY PRECAUTIONS:

- 7.1. Always follow all safety precautions and use appropriate protection safety clothing and equipment when using Chockfast Red Versaflow. Refer to Material Safety Data Sheets for Chockfast Red Versaflow prior to commencing any work.

8.0 DOCUMENTATION

- 8.1. Keep detailed records during all aspects of the grouting preparations, installation and curing process. Ensure proper documentation of all weather and temperature conditions during the time period the work was performed and describe all measures taken to conform to procedures and recommendations outlined in this specification.

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