Rowan Resins 668 BF Chock Grout
Installation Bulletin

Increased Strength for Mounting Dynamic Equipment

Revised September 03

Description:

Rowan 668 BF chock grout is a high performance, three-component, modified epoxy resin-based grout. It can be placed 1" to 3" (25 to 76 mm) thick on a base grout pour directly to the concrete or steel-to-steel.

Installation procedures contained in this bulletin are as specific as possible but cannot cover all variations in field conditions; therefore, supervisors experienced in installing grouting materials may sometimes deviate slightly from the published procedures to fit specific field and service conditions. If additional information on installation procedures is required, please contact Robt. L. Rowan & Assoc., Inc.

Pre-Grout Checklist:

THE FOLLOWING CHECKLIST MAY BE USED TO ENSURE THAT ALL NECESSARY STEPS HAVE BEEN TAKEN BEFORE ANY GROUT IS MIXED OR PLACED.

- Store grout at 60˚ to 80 ˚F (16˚to 27 ˚C). Keep aggregate dry.
- Chip foundation to remove laitance.
- Clean prepared metal surfaces of base or plate to be grouted at least 1" (25mm) up from bottom.
- Minimum surface prep would be wire brushing or grinding.
- Make sure concrete is oil-free and dry. Remove all dust and contaminants.
- Make sure bolts and sleeves are sealed and dry.
- Provide shade from hot sunlight for at least 24 hours prior to and 48 hours after grouting. Protect your work area from inclement weather.
- Heat surrounding areas, if necessary, to obtain base plate and foundation temperatures above 55°F (13°C) to increase grout workability and reduce cure time.
- Putty around jackscrews or wedges.
- Be sure forms are well sealed; "liquid tight."
- Wax forms with at least two heavy coats of paste wax.
- Wax other surfaces that are to be protected from grout spillage.
- Prepare tools for pushing grout.
- Have rags and pails of solvent available.
- Mixer, wheelbarrows, buckets, etc. should be clean and dry.
- Cover the floor around equipment to aid in cleanup.
- Check aggregate by squeezing a handful; if it remains in a ball, it is too wet.
- Follow proper safety precautions when pouring grout.
- Pour the hardener into the pail of grout liquid and stir until well mixed (approximately 3 minutes with paddle, electric or air drill).
- Pour the mixture (catalyzed material) into a mortar or concrete mixer.
- Put the grout aggregate into the mixer gradually and mix until completely wetted out. (Use all aggregate contained in the unit.)
  NOTE:
  (1) Do not add water to any components.
  (2) Do not use wet aggregate.
  (3) Do not alter proportions of materials.
- Pour the grout under the equipment from one side to the other and/or from one end to the other.
- Check frequently for leaks; leaks do not self-seal. If not stopped, leaks will cause voids.
- Forms should be left in place until the grout is hard enough that it can't flow.

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- Jackscrews may be loosened and equipment placed in operation when design strength of the grout has been reached.

Establishing Chock Size:

The size or area of chock for equipment support should be determined based on the total compressive load to be transferred. The maximum suggested operating stress for 668 BF chock grout is 1000 psi (3.5 MPA). Allow for possible errors in field forming and area lost for the anchor bolt and jackscrew (if used). Other factors such as alignment sensitivity on a given piece of equipment, extent of dynamic loading, and temperature may be reasons to decrease design stress.

For equipment, which uses one size anchor bolt (and one tightening torque) with uniform weight distribution, the chock area will be the same for each bolt location. The total static compressive load to the foundation is produced by the equipment weight along with the clamping force produced by the anchor bolts. Where appropriate, torque reaction force should be calculated and added to the total chock load.

For applications where the equipment weight will be equally distributed over the anchor bolts, the contribution of weight will be equal to the equipment dead weight [lbs. (kg)] divided by the number of chocks. The anchor bolt load can be calculated as follows:

$$F\ bolt = \frac{torque\ [fl.\ lbs\ (m\ kg)] \times 60}{bolt\ diameter\ [in.\ (mm)]}$$

Though friction on threads can vary, the above formula is a good approximation for oiled threads. The total chock area would then equal equipment weight transferred for each bolt plus the anchor bolt load divided by the design stress.

$$Chock\ area = \frac{F\ bolt\ [lbs.\ (kg)] + F\ equipment\ wt.\ [lbs.\ (kg)]}{[in^2\ (mm^2)]\quad design\ stress\ [psi\ (MPa)]}$$

Where equipment weight will not be evenly distributed or bolt diameter or torque will vary, each chock or anchor bolt location can be calculated individually using the same formula.

Preparation:

Base grout pour
- The base grout pour should have sufficient time to cure before chock grout application.
- The base pour should be free of any oil, water or other contamination and be solvent wiped.

Chocking directly to concrete
- The concrete should be cured and chipped; recommendations can be found in installation procedures.
- The concrete should be free of any oil, water or other contamination.
- The exposed concrete outside the chock area should be sealed with an oil or chemical-resistant coating.

Chocking steel to steel
- Both steel surfaces should be free of oil, water or other contamination.

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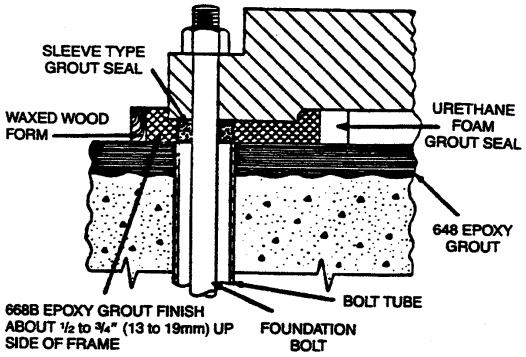
- Both steel surfaces should ideally be sandblasted to white metal. Other mechanical methods, such as grinding and sanding, are also effective but do not produce as high a bond strength as sandblasting.
- When a permanent bond is not desired, apply a thin layer of mold release agent to one of the steel surfaces to prevent bond of the grout to the steel.

Forming:

1. Open cell urethane foam is generally used under the frame. When using foam, precautions should be taken to properly support the foam. The foam should have a minimum width of 2" (50 mm) and a depth 1 to 2" (25 to 50 mm) larger than required for the chock. The foam will be held in place by compression. The form area, outside of the frame (shoulders) should be approximately 2" (50 mm) in width to allow for placement of the grout, and at least ¾" (19 mm) above the bottom of the base.
2. The shoulder pouring area can be formed with foam, steel or wood. The foam must be supported so the forms do not break during the pouring operation. Contact adhesive and caulk can be used to seal any joints or edges. The forms must be liquid tight.
3. The steel, wood or foam should be coated with paste wax to allow for easier removal.
4. Typical epoxy chock thickness should be from 2" to 3" (50 to 76 mm). The grout should be poured at least ¾" (19 mm) above the bottom of the base being grouted.
5. A 2" (50 mm) shoulder should be formed for proper pouring and grout head.
6. Tape-back-foam should be applied to the vertical edge of the steel frame to allow for thermal growth of the equipment.

FORMING EPOXY CHOCK



Grout:

1. The aggregate must be completely dry. It should be stored under cover and on pallets. Before using, check for moisture by squeezing a handful. The clumping or balling of aggregate when squeezed indicated the presence of moisture, and moist aggregate should be used.
2. In cold weather, store in a warm place for at least 24 hours; 70°F (21°C) is preferred. In hot weather, store in a cold, shaded area.
3. 668 BF Resin and Hardener should be stored at the same temperature as the aggregate. All components should be ideally be brought to between 60° and 80°F (16° and 27°C) 24 hours prior to pouring.

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Safety:

668 BF Chock Grout is a high performance epoxy system that is formulated for industrial and professional use only. These products contain chemicals that may be COMBUSTIBLE and potentially HARMFUL to your health if not stored and used properly. Hazards can be significantly reduced by observing all precautions that are found on MSDS sheets, product labels, and technical literature. Please read literature carefully before using product.

Warning: When using resin and cleanup solvent use proper respiratory protection or sufficient ventilation. Combustible and flammable liquids should be used in a controlled environment and kept away from heat sparks and open flames.

Caution: This mixture is a reactive thermosetting resin and curing agent. When mixed together, this produces an exothermic reaction (heat is generated). This material should be used in accordance with installation procedures. If the catalyzed epoxy resin cannot be used within working time, the material should be spread out on a large open surface which will allow the heat to dissipate.

When mixing and applying, avoid contact with resin and amine hardener which may cause skin rash, irritation or other allergic reaction. Protective gloves, clothing and goggles should be used when handling these materials.

General First Aid: If swallowed seek medical assistance. If contact occurs, remove contaminated clothing and flush skin or eyes with plenty of water. If overexposure to vapors occurs, remove victim from exposure; if breathing difficulty occurs administer oxygen and seek medical aid.

Mixing:

These proportions are superseded by those on the package label if they differ:

Full Unit 63 lbs (28.5kg) 10.47ft^3(0.01 3 m^3)

668 B Grout Liquid	One 9.06 lb (4.11kg) can
668 B Grout Hardener	One 1.5 lb (0.68 kg) bottle
668 BF Grout Aggregate	One 53 lb (24.04 kg) bucket

Mixing Instructions

1. Do not add solvent, water or any other material to the grout.
2. Do not alter the liquid/hardener proportion.
3. Pour the hardener into a pail of grout liquid and stir until well mixed (approximately 3 minutes).
4. Pour the mixture into the mixer or wheelbarrow without delay. A KOL model M-61 mixer is ideal.
5. Add the grout aggregate slowly and mix until completely wet (approximately 2 minutes).
6. Pour grout into buckets for transporting to the pour-site. Remove the grout from the wheelbarrow/mixer within 10 minutes or it will be difficult to place. After the pour is complete, clean the mixer, wheelbarrow and tools with lacquer thinner. Use caution when using flammable solvents for cleaning.

Working Time

The flowing chart is a guide for the working time of a fresh grout mix at various ambient temperatures. The working time of 668 BF grout mix begins when the hardener is added to the liquid:

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Temperature °F (°C)	Working Time-Minutes
90 (32)	20 to 30
70 (21)	50 to 60
50 (10)	150 to 180

Do not let liquid and hardener stand without adding aggregate. See safety section.

Grout Placement & Temperature Control:

Summer grouting
Avoid high temperature while grouting in the summer High ambient temperatures will increase the heat generated during cure and decrease the working time.

If the packaged grout is above 90°F (32°C), then chill the sealed pails of grout in a tub of water or cover the pails with water-soaked burlap.

PROVIDE SHADE FROM SUMMER SUNLIGHT FOR AT LEAST 24 HOURS BEFORE AND 48 HOURS AFTER GROUTING.

Winter grouting
Temperatures below 60°F (16° C) make the grout stiff and hard to handle; cure time is significantly increased. The baseplate and foundation may be much cooler than the room temperature.

In cold weather, materials should be stored in a warm place. For best handling, the ingredients should be at least 70°F (21° C). When baseplate and the foundation temperature (measured by a contact thermometer) are less than
50°F (10° C), the grout may be so stiff that it will not readily flow. Flowability is also determined by the length and depth of the grout pour, so field judgment may be necessary to determine if area heating is required.

If heating is required, an enclosure (typical materials are polyethylene or canvas) should be erected around the equipment and foundation to be grouted. Forced air or infrared heaters may be used to obtain the necessary heat to increase the baseplate and foundation temperatures [above 50°F (10°C)]. Heat should be applied 1 to 2 days in advance of grouting so uniform baseplate and foundation temperatures are achieved. Avoid exposure to products of combustion when grouting. During grout placement, it is desirable that heat be removed.

Placing the Grout

1. When pouring chock grout, it is advisable to pour on one side of formed chock to minimize air entrapment. Trapped air should pass through the open cell foam, resulting in no air voids. Once the chock grout has been started on one side, the level of grout should be kept filled above the equipment base.
2. 668 BF grout is flowable but can be helped by the vertical movement of a banding strip in the open foam area. Do not vibrate. Low foundation temperatures decrease flowability.
3. Where grout cannot be adequately worked to fill the grout cavity due to large size or limited space, a head box will greatly assist flow. A sturdy wooden box or sheet metal funnel about 6” to 12” (15 to 30 cm) deep may be used.
4. Check for leaks, leaks so not self-seal. If not stopped, they will cause voids.

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5. The grout should always have a minimum of ¾" (19 mm) head in the open form during pouring and cure.

Curing:

Jackscrews may be removed and equipment placed in operation when design strength of the grout has been achieved.

The grout will not harden below a temperature of approximately 35°F (2°C)]. Deterioration of the grout will not occur at low temperatures.

Water will inhibit the cure and strength of the grout, so it must be protected from rain until it hardens.

Cold Weather Curing
The foundation and the equipment base will probably be cooler than room temperature unless room temperature has been consistent for some time. Thus, the foundation and engine temperatures must be used in estimating cure time.

Cure Time vs. Temperature
The following table is a guide for final cure time. As mentioned, the baseplate and foundation temperature should be measured since they may be cooler than room temperature.

Compressive Strength [ASTM C 579-B, modified 1 ½" (38 mm) cubes] (All materials conditioned 24 hours at test temperature prior to pouring.)

Time (hours)	55°F psi	13°C MPa	73°F psi	23°C MPa	90°F psi	32°C MPa
8	-	-	14,500	100	18,600	128
16	9,500	66	17,000	117	19,000	181
24	14,000	97	18,000	124	19,200	132
48	15,300	106	18,800	130	19,200	132

Temperatures vary so radically, day vs. night, atmospheric vs. metal surface, that field judgment must still be used as the final measure. Cured grout should have a solid, almost metallic feel when struck with a hammer. Be sure to check as close to the base of the equipment as possible.

Cleanup:

Clean tools and mixer with Rowan Epoxy Solvent.

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