Rowan Resins 427 Plus Epoxy Grout

Installation Bulletin RR 427P

Revised November 06

Description
Rowan Resin 427 PLUS is a high performance, three component, modified epoxy resin-based grout with a variable fill ratio. Installation procedures for this material will differ greatly from cementitious or inorganic grouts.

If the planned procedure differs from that discussed herein, the user is urged to contact the Robt. L. Rowan & Assoc., Inc. sales representative to determine whether additional or revised information will be required.

Pre-Grout Checklist
The following checklist may be used to ensure that all necessary steps have been taken before the grout is mixed and placed.

- Store all grout components so temperatures are 60˚ to 80˚F (16˚ to 27˚C)
- Check aggregate for dryness – squeeze a handful; if it clumps or packs, it is too wet.
- Foundation should be chipped to remove laitance with a pneumatic or electric 15-30 lb. chipping gun with a flat chisel point. (No Bush Head or Scabbler)
- Any metal surface to be bonded should be sandblasted and kept dry.
- Check that concrete is thoroughly dry.
- Check that bolts/sleeves are sealed and dry.
- Shade the foundation from direct sunlight at least 24 hrs before and 48 hrs after grouting.
- Enclose and heat surrounding areas, if necessary, to maintain baseplate and foundation temperatures above 50˚F (10˚C). Avoid localized heating (hot spots).
- Jackscrews should be coated with putty and wrapped with tape. Landing plates should be round with no sharp edges.
- Before assembling the forms, the surfaces of the forms that will be in contact with the grout should be thoroughly coated with two coats of paste wax. Wax should be kept off the concrete.
- Check that forms are assembled liquid tight.
- Have caulk or aerosol foam or other leak stopping material handy in case leaks appear.
- Head boxes and pulling tools are required to ensure grout placement from one side of skids to the other Do not pour from both sides. Have enough mortar mixers and manpower to place the mixed grout from one side only within the working time. Plan on a min. of 6-10 minutes to mix and place one unit. Plan accordingly.
- Grout mixing tools, wheelbarrow, buckets, etc. must be clean and dry. Cover floor around mixing and grouting areas to aid in cleanup.
- Follow safety precautions. Read MSDS sheets.
- Use necessary safety equipment: dust masks, gloves, goggles, etc.

Preparation
Foundation

1. The foundation should be cured 28 days and the concrete kept dry until grouted. Recommended procedures per ACI and GMRC are as follows: “Concrete shall be maintained above 50˚F (10˚C), and in a moist condition for at least the first seven days. 4,000-psi (28 Mpa) minimum strength concrete should be specified”. After wet curing, the concrete is to be kept dry
2. The concrete surface must be chipped with a chisel point (no bush hammer) so aggregate is exposed to ensure all laitance and weak float are removed. Chamfering the edge of the concrete 45˚ to about a 2 in. width is desirable (see figure 1).
3. The concrete base shall be clean, dry, and free of oil, wax, and other contaminants.
4. Be sure all water is removed from anchor bolt sleeves. This may be done with a siphon, vacuum pump, or a rubber hose and bulb. The residual moisture must also be removed by either forced air or evaporation.
5. Seal the anchor bolt hole with felt, form rubber, or other means to keep grout out of the sleeve.
6. Cover all shims and leveling screws with putty or clay to keep the grout from adhering. Shims or jack pockets may be formed with wood and forms filled with damp sand. Jack screw landing pads shall be round with all sharp edges “broken” 1/16” min.
7. Shims/Jack screws should be removed after grout cures.

Robt. L. Rowan & Assoc., Inc. · 3816 Dacoma · P.O. Box 920760 · Houston, Texas 77292-0760
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8. SHADE THE FOUNDATION FROM DIRECT SUNLIGHT FOR AT LEAST 24 HOURS BEFORE AND 48 HOURS AFTER GROUTING.

Equipment

The bonding surfaces of the base to be grouted should be sandblasted to "near white metal" and be free of coatings, wax, grease or scale. Other mechanical methods, such as grinding or sanding are also effective but do not produce as high of bond strength as sandblasting.

Primer should be used only when a long delay between cleaning and grouting could allow excessive rusting or contamination. Priming, if required, must be performed when the relative humidity is less than 80% and the temperature of the surface to be primed is at least 5˚ F (3˚ C) higher than the dew point.

The grout should come up at least ¾ in. onto the equipment. It may be advisable to mask above the area with masking tape. To permit easy clean-up, wax or cover all surfaces where the grout may splash or spill. An epoxy grout cleaning solvent is recommended and can be purchased additionally from Rowan & Assoc.

Forming

1. Protect the foundation and equipment from rain/moisture. Water tends to prevent grout bond and inhibit cure.
2. Areas not to be grouted must be sealed off.
3. Forms should be no greater than 6 in. away from the edge of each individual base, rail or soleplate on the sides where the grout is not being poured. Excessive non-load bearing areas increase thermal stress and may result in excessive cracking. On the pouring side forms are typically 2 to 6 in. from the edge of the supporting area. However, this may vary depending on the application. Moderate to large size equipment or difficult/narrow placement applications should utilize an extended head form ("head box") to create additional head pressure and enhance placement. Consult Rowan & Assoc. Inc. for specific recommendations.
4. Before erecting the forms, cover them with *extra heavy coats* of paste wax (which can be purchased additionally from Rowan & Assoc., Inc.) The top of the form should extend at least ¾ in. above bottom of rail or plate.
5. Forms must be liquid tight. They may be sealed with putty, foam or caulk. Seal wood forms to vertical concrete surface by applying putty, foam or caulk below top of concrete, then press form into place.
6. Expansion joints will reduce the possibility of cracking. On multiple soleplate installations, each soleplate should be isolated. We recommend our Rowan Blue Silicone for expansion joints as it is specifically made to resist oils and chemicals and will not allow penetration to the concrete foundation.

Deep Pour Recommendations

Where a deep pour is necessary, 3/8 in. to ½ in. rebar on 8 to 12 in. centers may be used to minimize stress cracking. A bottom tier should be located about 2 in. above the foundation surface. Additional tiers, if required, should be spaced equal distances in the grout pour with vertical supports as required. All rebar must be 2 in. from any finished gout surface.

For deep pours, it is best to let existing rebar protrude from the foundation on 12 to 18 in. centers around the perimeter, about 6 to 12 in. in from the edge. This will serve to tie the deep pour to the foundation. The first pour should be within 2 to 3 in. of the bottom of the base. The final pour should not be made until the first pour is hard and has returned to ambient temperature, usually within 24 to 30 hours.

Tools

1. Head boxes and "grout pulling tools" are required for skids or large pump bases.
2. Clean & dry the mortar mixer. Remove all possible concrete.
3. Clean & dry wheelbarrows, buckets, or shovels for transporting the grout.
4. Have plenty of rags for wiping hands and tools.
5. Have cleaning solvent ready for cleaning tools.

Grout

1. Aggregate must be completely dry. Store covered & on pallets. Before use, check for moisture by squeezing a handful.
2. In cold weather, store at room temperature for at least 72 hrs plus.
3. In hot weather, store in a cool, shaded area.

Safety

For industrial & professional use only. Keep out of the reach of children. These products contain chemicals that may be potentially harmful to your health if not stored & used properly. Please read all MSDS precautions before using this product.

Flash Point:

Rowan Resin 427 Plus Liquid Resin - 400˚F (204˚C)
Rowan Resin 427 Plus Hardener -240˚F (116˚C)

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Mixing
Full Unit: 216 lb. Unit yields 1.73 cu. ft.
Unit consists of:
1 ea. Liquid Resin - 20.2 lb.
1 ea. Hardener - 7.6 lb.
4 ea. Aggregate - 47 lb.

Mixing Instructions

1. Do not add solvent, water, or any other material to the grout.

2. Do not alter the liquid/hardener proportions.

3. Pour hardener into the pail of liquid resin and hand stir with a wooden paint padle for three minutes.

4. After 3 minutes, pour into the mixer without delay.

5. Add the grout aggregate one bag at a time (AFTER THE LIQUID/HARDENER MIX HAS BEEN POURED INTO THE MIXER) until all components are completely wet (approx. 2 minutes). The first batch may be slightly less fluid than later batches because some of the liquid is absorbed in wetting the mixer. Withholding ½ to 1 bag of aggregate from the first batch will compensate for lost liquid.

6. The amount of aggregate used should be adjusted for the temperature and type of pour. The temperature of the grout, foundation, & equipment base are more important than the air temperature since they will affect the grout flow rate.

   The required flow is related to the grout thickness (between the foundation & the base) and the flow distance. The maximum amount of aggregate should be used that will still produce sufficient flow. At lower temperatures, flow is reduced so the amount of aggregate is reduced to compensate for the increased viscosity. Large open areas or deep grout pours with short flow distances will not require the same amount of flow and should be done with higher amounts of aggregate. The following recommendations provide general guidelines of the amount of aggregate that can be excluded from a full size (4 bag) unit.

Temperature	Typical Pours	Thin Pours and/or Long Flow Distance
90°F (32°C)	-	-
70˚ to 90°F (21˚ to 32°C)	-	Up to ½ bag
50˚ to 70°F (10˚ to 21°C)	Up to ½ bag	½ to 1 bag

No more than one full bag of aggregate should be removed from a full size (4 bag) unit or 12 lb. from a 0.43 ft^3.

7. Pour the grout into a wheelbarrow or buckets for transporting to the pour area. Remove it within 10 to 15 minutes. The hardening will slow after pour has been made because of the concrete/engine base.

8. After the job is complete, clean all equipment with an epoxy grout cleaning solvent (additionally available from Rowan & Assoc.)

Working Time
The following is a guide for the working time of fresh grout mix at various ambient temperatures. The working time begins when the hardener is added to the liquid. Do not let the liquid/hardener mix stand without adding aggregate. This material produces an exothermic reaction (heat is generated). If the material is allowed to exotherm without aggregate, the resulting temperature can cause decomposition or gassing, releasing potentially hazardous fumes. If the catalyzed resin cannot be used immediately, the material should be spread over a large open area to allow the heat to dissipate normally.

Temperature °F (°C)	Working Time – Minutes
90 (32)	50 to 60
70 (21)	90 to 120
50 (10)	120 to 150

Placing the Grout

1. For flat bottom plates and bases, the grout should be poured from one side through to the other across the short dimension.

2. When grouting closed areas, start at one end of the form and fill the cavity completely as you advance toward the other end to prevent air entrapment.

3. The grout will flow but can be helped with pushing tools like banding straps or plywood strips. Push with long slow strokes on the surface rather than short jabs under the machine, which will create air pockets. Do not vibrate.

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4. Where grout cannot be adequately worked to fill the cavity due to large size or limited space, a head box will greatly assist flow. A sturdy wooden box or sheet metal dam may be used.

5. Check frequently for leaks. Leaks do not self-seal. If not stopped, they may cause voids.

Curing
Jackscrews may be loosened and equipment placed in operation when design strength of the grout has been achieved. The grout will not harden below a temperature of approx. 35˚F to 40˚F. For best results, grout should be installed and cured at temperatures above 55˚F. Water will inhibit the cure and strength of the grout, so the grout must be protected from rain until it hardens.

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

Cure Time vs. Temperature
The following is a guide for final cure time. Again, the baseplate and foundation may be cooler than room temperature.

Cure Rates
Compressive Strength (ASTM C 579, Method B)

Hours	psi 45˚F	MPa (7˚C)	psi 75˚F	MPa (24˚C)	psi 90˚F	MPa (32˚C)
8	-	-	-	-	-	-
16	-	-	9,500	(66)	10,000	(69)
24	-	-	10,000	(69)	13,000	(90)
48	4,500	(31)	13,000	(90)	16,000	(110)
72	6,600	(46)	13,500	(93)	16,000	(110)
96	8,000	(55)	14,000	(96)	16,000	(110)

Temperatures vary so radically, day vs. night, etc. 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.

Cracking
Epoxy-based grouts will sometimes develop cracks. Cracking is generally caused by thermal stresses, temperature differences from season to season, and operating to non-operating temperatures.

Cracking often occurs on the shoulder surface near sharp corners of the baseplate and at anchor bolts. Horizontal edge cracks may occur just below the grout/concrete interface, especially in outdoor installations exposed to low temperatures. Chamfering the concrete edge helps reduce this cracking.

Finishing & Cleanup
A smooth finish may be obtained by brushing the surface with Rowan Epoxy Solvent , Mineral Spirits or xylene. Best results can be obtained by smoothing the surface several times just prior to hardening of the grout.

Risks
- Causes eye irritation.
- May cause allergic skin reaction.
- May cause lung irritation and allergic respiratory reaction.
- Harmful if swallowed.

Precautionary Measures
- Do not get in eyes, on skin, on clothing.
- Avoid prolonged or repeated skin contact.
- Wear an appropriate, properly fitted respirator during and after application unless air monitoring demonstrates vapor/mist levels are below applicable limits. Follow respirator manufacturer's directions for use.
- Wash soiled clothing before reuse.

First Aid
In case of eye contact, flush immediately with plenty of water for 15 min. For skin, wash thoroughly with soap. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. Keep container closed when not is use. In case of spillage, absorb with inert material and dispose of in accordance with applicable regulations. For additional information, refer to the MSDS sheet on jobsite or call 800-231-2908.

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