INSTALLATION SPECIFICATION RESIN-BASED POLYMER CONCRETES AND GROUTS

1. SCOPE

1.1 This specification governs the installation of the following Armor resin-based polymer concretes:

CE-152 Pennchem™ Novolac XF Grout
CE-183 Tufchem™ Epoxy Grout
CE-240 Acrocast™ Grout
CE-268 Acrocast XF Grout
CE-278 Pennchem Novolac Grout
CE-370 Tufchem XF Grout
CE-184 Tufchem Epoxy Polymer Concrete
CE-186 Tufchem XF Polymer Concrete
CE-277 Pennchem Novolac Concrete
CE-284 Acrocast Concrete
CE-292 Acrocast XF Concrete

1.2 With respect to the product designations above, “Tufchem” indicates a bisphenol-A epoxy-based polymer concrete, “Pennchem” indicates a high functional novolac epoxy polymer concrete, and “Acrocast” indicates a vinyl ester-based polymer concrete. The designation “XF” indicates a high flow (eXtra Flow) filler system.

1.3 This specification therefore covers two types of polymer-based compounds: epoxy and vinyl ester. While both polymers have their own unique characteristics, many steps are consistent across both polymer types. Where there are distinct handling and application differences, they are noted.

1.4 Use this specification in conjunction with mix and use instructions outlined on the specific TDS (technical data sheet).

2. MIXING AND APPLICATION

2.1 Armor polymer concretes should be mixed in accordance with mix ratios outlined in the most current printing of the appropriate product data sheet. Some variation of the filler loading (but not the resin:hardener ratio) is permitted to improve flow and handling characteristics. Consult product data sheets or Armor for specific details.

2.2 Mechanical mixing is recommended. All tools, as well as the mixer, must be clean and dry. Place all equipment and materials close to the work to allow for continuous placement.

2.3 Pour the selected resin into a clean, dry container. Pour the hardener into resin. Stir the resin/hardener mixture until a uniform color is obtained (at least two minutes).

2.4 Pour the mixed resin/hardener into a clean, dry mechanical mixer suitable for powder addition.

2.5 Slowly add the measured amount of polymer concrete or grout filler while continuously mixing. Grout filler differs from polymer concrete filler. Grout filler utilizes finer aggregate fractions for improved flow characteristics. Polymer concrete fillers utilize filler fractions as large as 3/8” (9 mm) for thicker pours.

2.6 Continue to mix until all aggregate particles are uniformly coated with the resin/hardener mixture.

2.7 Never add water, Portland cement or any other additive to Armor polymer concrete or grout components or mixes.

3. STRUCTURAL GROUTS – SUBSTRATE PREPARATION

3.1 Prepare the concrete surface in accordance with industry practice as outlined in NACE No. 6/SSPC-SP 13. Criteria for acceptance shall be as noted in section 6, Acceptance Criteria. Consult Armor if job specific circumstances are such that the above acceptance criteria cannot be met. Exact surface preparation method shall be determined by installation contractor based on his personal preferences, experience, equipment, access, and job specific circumstances.

3.2 For new structural base plate applications, prepare the bottom of machinery base plates and other metal bonding surfaces in accordance with SSPC-SP 6/NACE 3 Commercial Blast. If base plates are already set in place, clean out bolt holes and exposed surface areas that will be in contact with grout in accordance with SSPC-SP2 Hand Tool or SSPC-SP3 Power Tool Cleaning. Remove all dust and loose material prior to commencement of grouting.

3.3 For structural base plate applications, set base plate or equipment in position. Allow provision for air relief when grouting. Align and level equipment using shims and accepted industry practice.

3.4 Seal areas not to be grouted, such as pan or anchor bolt sleeves. Armor grouts will penetrate even very fine cracks in forms.

4. FORMWORK

4.1 Vertical castings require formwork to retain the wet polymer concrete or grout. Before erection, cover forms with plastic or other suitable and compatible release agent. If there are any questions about releasing agent compatibility, consult Armor. Forms not so treated will bond to grout.

4.1 Build forms with adequate strength, suitably anchored and shored to withstand pressure of pour. Insure all form areas that will be in contact with wet polymer concrete are fully treated with a form release agent.

4.3 Seal forms with putty or equal to prevent leakage during grouting.

4.4 Allow sufficient clearance between the formwork and the edges of the base plate or material to be anchored for easy working of the grout or concrete. 4" (100 mm) is suggested.

5. PLACING STRUCTURAL GROUT OR POLYMER CONCRETE

5.1 For structural grout applications, place grout continuously, pouring from one side or end only. This avoids air entrapment. Work grout under frame with push rods, strips or vibrator.

5.2 If chains are to be used to spread grout into tight cavities and assist in flow, place them first.

5.3 Be sure grout completely fills space to be grouted, and that grout is compacted and free of air pockets. Use vibrators diligently to avoid resin separation.

5.4 Materials are designed to be used within a temperature range of 50°F-90°F (10°C-32°C). Consult Armor for advice regarding cure accelerators or modified placement techniques when ambient, substrate, or material temperatures fall outside this range.

5.5 On deep pours or pours over large surface areas, consideration should be given to the incorporation of suitable reinforcements to accommodate potential shrinkage and thermal stresses which may develop within the polymer concrete/grout.

5.6 For depths of over 12" (300 mm), multiple pours may be advisable. Consult Armor for project specific details.

5.7 Avoid placement staging that may require a drop of mixed material greater than 3 feet (1m) or more to avoid segregation.

6. FINISHING

6.1 For structural grout applications, remove chains and tools used for placing the grout after grout has been placed but before grout begins to harden. Finish exposed surface with a flat trowel.

6.2 For polymer concrete topping applications, finish exposed surfaces by dry troweling and optionally follow by rolling with a short-nap paint roller. Do not over finish or over trowel. Application of a light misting of WD-40 may help eliminate surface tension bubbles and should be first tried in a small discrete area.

7. CURE SHRINKAGE STRESSES

7.1 These placing techniques and anchoring guidelines are meant to enhance bond to an existing substrate and minimize shrinkage cracks resulting from curing resin-based polymer concretes and grouts. These recommendations do not provide any guidance on structural reinforcement, please consult a qualified professional engineer.

7.2 Large flat pours such as floor overlays usually require the use of a checkerboard placing technique, whereby smaller alternating sections are poured at different times to accommodate shrinkage stresses which may propagate as hairline cracks. For tank pads that are circular, use a similar technique using a pie-shaped layout. This is especially important for vinyl ester-based compounds, but it is good practice for all resin types. The rule-of-thumb limit before attending to this detail for vinyl ester-based compounds is approximately 100 square feet (10 m^2). For epoxy-based compounds that exhibit less shrinkage this can be relaxed to a nominal 15’ x 15’ (4.5 m x 4.5 m) or more depending on project specifics. Consult Armor to review project-specific questions.

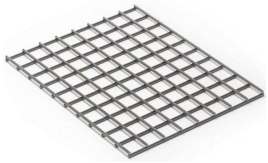
7.3 After stripping the casting forms around the sections placed first, infill the skipped sections within 24 hours to promote adhesion between sections at the cold joints. If the project schedule does not permit skipped sections to be promptly filled, adhesion at cold joints may be improved by roughening the bonding surfaces.

8. *ANCHORS AND REINFORCING*

8.1 Stress cracks can be caused by curing shrinkage, movement or excessive thermal shock. They tend to radiate from internal corners in horizontal pours placed around other structures, such as equipment foundations, columns, and pilasters. When placing concrete around existing structures, consider adding reinforcement at internal corners or dividing the pour into sections, bisecting the internal corners with cold joints. When

designing new structures, consider sloping the sides or chamfering the vertical corners of the foundations to avoid 90-degree angle intersections with the resinous concrete floor.

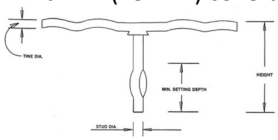
8.2 When polymer concrete is used as an overlay, two-way reinforcement should be considered. A square welded wire rebar mat with spacing ranging from 6”- 24” c/c (150 mm – 600 mm) of stainless steel, frp or alloy suitable for the anticipated chemical service may be used. An alloy welded metal mesh (typ. 2” c/c, 50 mm c/c) has also been used.



8.3 It is important that the reinforcing not be stepped on during the concrete overlay installation and end up at the bottom of the overlay.

8.4 If mesh is used, it can be anchored to the substrate with a tie wire anchor. The polymer concrete overlay should maintain a minimum 1”(25 mm) coverage over the mesh.

8.5 In cases where it may be advantageous to utilize an anchor system in place of mesh, a long horn anchor such as Anchors Unlimited CA-5 series should be considered. Generally, these anchors are placed at 9”-12” c/c and must be of a height to have a minimum of 1” (25 mm) coverage of the concrete above the highest anchor point. Stress points and changes of direction may require tighter anchor spacing. Anchors should be fabricated from stainless steel or alloy if possible, consult with the anchor manufacturer. The polymer concrete overlay should maintain a minimum 1”(25 mm) coverage over the anchor.



8.6 When casting vertical surfaces, attention to a mechanical anchoring system may also be required to insure stability.

8.7 In some cases it may be desirable to place a flexible membrane under the polymer concrete before placement of the overlay. It is noted this may create issues maintaining the liquid-tight integrity of the membrane if using an anchor or reinforcing method as outlined above that would require drilling through the membrane and into the underlying structural slab. Consideration must therefore be given to either developing a method to seal around each anchor penetration point or alternately designing the polymer concrete overlay as essentially an unbonded layer.

9. EXPANSION JOINTS

9.1 When casting polymer concrete over a structural base with expansion joints it is good practice to mirror the expansion joints and create a similar joint in the polymer concrete overlay. Fill the joints in the polymer concrete with the appropriate joint sealant.

10. CURING

10.1 The amount of required cure time is dependent upon a variety of factors including the specific polymer concrete or grout being used, temperature of components during mixing and placing, substrate temperature, ambient air temperature during cure, anticipated loading, traffic and exposure conditions. Consult the applicable technical data sheet for guidelines.

10.2 Allow polymer concrete mixes to cure sufficiently to accept anticipated loads. This will vary with the type of load, i.e. - foot traffic vs. heavy machinery. The exact cure time will vary with the specific polymer concrete formulation and thickness to which it has been cast. Typically, epoxy- based compounds can withstand foot traffic in 24 hours, and full loads in 48 hours assuming temperatures of components and ambient air are 70°F (21°C) during mixing, application and cure. Vinyl ester-based concretes have quicker return-to-service times. Consult the specific product data sheet.

11. EQUIPMENT CLEANING

11.1 Mixing equipment and tools may be cleaned by scraping off all excess material and scrubbing with a scouring pad and soapy water and then rinsing with cool water. This method is quicker and less hazardous than using a solvent. If solvent needs to be used, use xylene or MEK**.**

12. SAFETY PRECAUTIONS DISCLAIMER CONTACT INFORMATION

12.1 Consult current Safety Data Sheets before commencement of work.

12.2 Mixes and applications of this product present a number of hazards. Read and follow the hazard information, precautions and first aid directions on the individual product labels and safety data sheets before using. While all statements, technical information, and recommendations contained herein are based on information our company believes to be reliable, nothing contained herein shall constitute any warranty, express or implied, with respect to the products and/or services described herein and any such warranties are expressly disclaimed. We recommend that the prospective purchaser or user independently determine the suitability of our product(s) for their intended use. No statement, information or recommendation with respect to our products, whether contained herein or otherwise communicated, shall be legally binding upon us unless expressly set forth in a written agreement between us and the purchaser/user. For all Terms and Conditions of Sale see armor-inc.com.

12.3 Please contact Armor for further information at +1-877-98ARMOR (982-7667) or customerservice@armor-inc.com.

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