

CORROSION ENGINEERING INSTALLATION SPECIFICATION

TUFCHEM[®] SILICATE CONCRETE - TROWEL GRADE

1. APPLICATIONS

- 1.1 TUFCHEM Silicate Concrete - Trowel Grade is an inorganic acid resistant polymer concrete topping. Consult product data sheet CE-257 for more detail. When fully cured, TUFCHEM Silicate Concrete - Trowel Grade is resistant to all concentrations of most acids including sulfuric, hydrochloric, nitric, chromic, acetic and phosphoric.
- 1.2 TUFCHEM Silicate Concrete - Trowel Grade is not resistant to acid fluorides or hydrofluoric acid and it should not be used in alkaline or caustic environments.
- 1.3 It is important that the first chemical exposure of cured TUFCHEM Silicate Concrete - Trowel Grade be of an acidic nature, whether from general industrial processes or acidic solution splash and spill events. If the initial exposure is alkaline rather than acidic, the surface of TUFCHEM Silicate Concrete - Trowel Grade may be affected and show erosion, exposing the aggregate matrix. Conditions to avoid before acidic exposure include general water exposure from plant cleanup or washdown procedures and exposure to rain or run-off onto the newly installed TUFCHEM Silicate Concrete - Trowel Grade.

2. REQUIREMENTS

- 2.1 Concrete surfaces against which TUFCHEM Silicate Concrete - Trowel Grade is to be cast shall be clean, sound, hard and of a roughened profile. To enhance the intimate mechanical bond, the concrete surface shall be roughened (1/8"-1/4"^o (3-6 mm) profile minimum). TUFCHEM Silicate Concrete - Trowel Grade can also be cast over PENNGUARD[®] Block linings.

3. INSTALLATION

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- 3.1 TUFCHEM Silicate Concrete - Trowel Grade is not a hydraulic cement (Portland Cement, calcium aluminate cement) based concrete and thus certain aspects of its installation must be duly followed as noted herein.
- 3.2 Paddle type mortar mixers capable of mixing a minimum of 5-7 cubic ft. (0.15 cu m) of a 140 pound per cubic ft (2.2 gm/cm³) wet density product shall be used for the mixing of the concrete.
- 3.3 Mixers shall be clean and dry at their time of use. Any remnants of hydraulic cement based concretes or mortars which are attached to the mixing drum or mixing paddles shall be removed or neutralized before charging the mixer with the TUFCHEM Silicate Concrete - Trowel Grade components so as to prevent any contamination of the concrete's hardening system. Portland cement concrete mixes are alkaline in nature and the hardening system for TUFCHEM Silicate Concrete - Trowel Grade is acidic. Remnants of alkaline compounds in the mixing equipment can potentially neutralize and prevent the set of TUFCHEM Silicate Concrete - Trowel Grade.
- 3.4 Contractor will not begin to mix or place TUFCHEM Silicate Concrete - Trowel Grade if the weather is threatening, unless a shelter is constructed to protect the mixing and casting operations so as to prevent contamination of the mix.
- 3.5 The mix ratio of filler:solution shall be 6.0:1 and in no case outside a range of between 5.5 to 6.5 parts filler:1.0 part solution by weight depending on the finishers' preference
- 3.6 The TUFCHEM Silicate Solution shall be added first to the mixer followed by the addition of the TUFCHEM Silicate Concrete - Trowel Grade Filler. The combination of solution and filler shall be mixed until a uniform fully wetted out mix is achieved. (Typically a mixing time of 2 minutes after the addition of the last bag of filler will result in a satisfactory mix.)
- 3.7 Never add sand, pea gravel or other aggregates to TUFCHEM Silicate Concrete - Trowel Grade under any circumstances.
- 3.8 The finishing of the surface of TUFCHEM Silicate Concrete - Trowel Grade shall be undertaken with a wood float and/or a steel trowel. Do not over finish so as to create a skin on the placed material. TUFCHEM Silicate Concrete - Trowel Grade is an industrial material and cannot be finished glass smooth. If the placement of the TUFCHEM Silicate Concrete - Trowel

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Grade is disrupted, the surface against which new material is to be placed when the operation resumes shall be left as a roughened finish edge so that resumed placement of the product will well wet the interface and provide good mechanical bond. Consult Corrosion Engineering for further suggested construction joint details, but in general treat these details as if the pour was being made using Portland cement concrete based mixes.

- 3.9 TUFCHEM Silicate Concrete - Trowel Grade does not cure like concrete. There is no “fat” or cement paste in the material, and hence it does not respond to attempts to float cement paste to the top to work back and forth and tightly close the surface. Generally, place the TUFCHEM Silicate Concrete - Trowel Grade, and follow by a single wood float finish and/or a light steel trowel finish, and leave it. TUFCHEM Silicate Concrete - Trowel Grade develops a surface skin within 20 minutes to a few hours after placement depending upon temperature, and will appear to cure from the top down. Once this skin has formed, do not disturb it. Material has passed the point where further finishing can be done.
- 3.10 Any exposed surface of TUFCHEM Silicate Concrete - Trowel Grade shall be protected for a minimum of 24 hours while curing at 70°F (21°C). Do not apply curing compounds, burlap or water for curing. Lower temperatures (do not install below 50°F, (10°C) of the wet concrete mix or its components, application temperature, ambient air temperatures, or curing temperatures will significantly retard the setting time and rate of strength development.
- 3.11 It is recommended that the TUFCHEM Silicate Solution and TUFCHEM Silicate Concrete Trowel Grade Filler be brought to a minimum temperature of 50°F (10°C) at time of mixing. Ambient air temperature at time of mixing and placement and immediate to the location of material casting shall be a minimum of 50°F (10°C) . The minimum curing temperature of the placed castable shall be 70°F (21°C). Curing temperatures shall not exceed 100°F (38°C).
- 3.12 No addition of water or any other additives shall be added to this specially formulated composition.
- 3.13 Use water for cleaning tools, mixing equipment and paddles, wheelbarrows, shovels, conveyors, etc. For cleaning the mixer, the placement of pea gravel stone or other rounded aggregate into the mixer with water will help clean the surfaces of the mixer.

4. SURFACE TREATMENT

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- 4.1 The surface of TUFCEM Silicate Concrete - Trowel Grade can be protected from developing an etched pebbly-appearing finish if exposed to rinse water too soon before full cure, by applying a surface treatment onto the freshly placed concrete. (Note: the surface etching does not affect the structural integrity of the TUFCEM Silicate Concrete - Trowel Grade, but rather is a surface appearance issue. Application of surface treatment outlined below is suggested to eliminate or minimize this effect.)
- 4.1.1 Surface treatment is NOT generally required where TUFCEM Silicate Concrete - Trowel Grade is used in a flue gas environment. If in doubt, consult with Corrosion Engineering.
- 4.2 Surface treatment can proceed as early as when the installed TUFCEM Silicate Concrete - Trowel Grade has cured enough to accept foot traffic. This time period will vary depending on environmental conditions. It is acceptable to wait up to 24 hours to apply the surface treatment, as long as there is no possibility of the TUFCEM Silicate Concrete - Trowel Grade being exposed to water from any source.
- 4.3 This surface treatment procedure involves diluting muriatic acid and spray applying the solution onto a TUFCEM Silicate Concrete - Trowel Grade substrate. Observe all precautions associated with handling muriatic acid and use all appropriate personal protection equipment.
- 4.4 Acid dilution presents many hazards and should only be done by a knowledgeable and competent person who fully understands all of the hazards involved and is trained in the proper techniques of this operation.
- 4.5 Materials and Equipment Required
- 4.5.1 Safety Gear: All appropriate safety gear including, but not limited to, rubber gloves, rubber boots, goggles and face shields. Consult muriatic acid MSDS for recommendations.
- 4.5.2 Treatment Materials:
- 1) Muriatic Acid, available from hardware supply stores, typically 31% concentration.
 - 2) Plastic five gallon pail for preparing acid mixture.
 - 3) Plastic hand held garden sprayer for applying diluted acid to TUFCEM Silicate Concrete - Trowel Grade surface.
 - 4) Clean/potable water for acid dilution.
 - 5) Wooden or plastic stirring stick.

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4.6 Acid Dilution Procedure

4.6.1 Use all applicable personal protection equipment as specified on muriatic acid container label and MSDS. Prepare this acid mixture in a safe, well ventilated area, away from other workers or equipment that may be affected by acid or mixture exposure or contact.

4.6.2 ALWAYS add ACID to WATER.
Never add water to acid. This order of addition can create dangerous heat generation and splashing of the mixture out of the mix container.

4.6.3 The mixture is prepared as follows:
1) Add three (3) quarts of water to a clean five gallon plastic pail.
2) Slowly add one (1) quart of muriatic acid to the water, gently stirring as the acid is being added.
3) Some heat will be generated while making this dilution. Allow the temperature to stabilize before transferring it to the plastic sprayer/application equipment.

4.7 Surface Treatment Application

4.7.1 Adjust the pattern to a wide fine spray.

4.7.2 Apply JUST ENOUGH of the acid mixture to the TUFCHEM Silicate Concrete - Trowel Grade surface to thoroughly wet the surface.

4.7.3 DO NOT over apply the mixture to create puddles or standing pools of acid.

4.7.4 After applying the acid mixture, keep the area protected from water exposure until the surface has completely dried. Allowing 16 - 24 hours before water exposure will insure that the surface treatment has had time to achieve the full conditioning effects.

5. QUALITY ASSURANCE

5.1 The mix ratio of filler:solution should be 6.0:1 and at no time outside a range of between 5.5 and 6.5 parts filler: 1.0 part solution.

5.2 For determining compressive strength, cubes or cylinders can be use. 2 sets of specimens per set shall be prepared for every 4 cubic yards (3 cu m) to be

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installed. Test specimens shall be prepared in accordance with ASTM C579.

- 5.3 Test specimens shall be used if necessary for compressive strength gain determination. The curing temperature and ambient air temperatures during the curing period shall be reported.
- 5.4 After twenty eight (28) days curing time, final specimens from each set shall be crushed at ambient temperature to determine the ultimate compressive strength. The curing temperatures and ambient air temperatures shall be reported.

6. SAFETY PRECAUTIONS / DISCLAIMER

- 6.1 Read and follow the hazard information, precautions and first aid directions on the individual product labels and material 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.
- 6.2 Please contact Corrosion Engineering for specific recommendations at +1-610-833-4000 or fax +1-610-833-3040.

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