

SECTION 033500
DECORATIVE CONCRETE ENGRAVING AND FINISHING SYSTEM

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PART 1 - GENERAL

A. SECTION DESCRIPTION: This section includes decorative concrete floor finishes; preparation, staining, sealing, engraving and coating systems for interior and exterior locations.

B. SECTION INCLUDES

1. Cleaner, degreaser, neutralizer and stripper
2. Specialty engraving tools and equipment
3. Templates, edging and associated equipment
4. Acid based- and water-based stains and color extenders
5. Interior acrylic sealer
6. Interior Floor Finish
7. Interior 2-part epoxy coating system
8. Exterior acrylic sealer
9. Low VOC exterior acrylic sealer

C. RELATED SECTIONS

1. Section 01330 – Submittal Procedures
2. Section 018113 – Sustainable Design Requirements
3. Section 030130 – Maintenance of Cast-in-Place Concrete
4. Section 03300 – Cast-in-Place Concrete
5. Section 03330 – Architectural Concrete
6. Section 035300 – Concrete Topping
7. Section 090190 – Maintenance of Painting and Coating
8. Section 096723 – Resinous Flooring
9. Section 09960 - High Performance Coatings

D. REFERENCES

1. ASTM D-2369 – 10: Standard Test Method for Volatile Content of Coatings
2. ASTM D-3960 – 05: Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
3. ASTM D-2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation
4. ASTM D-638: Standard Test Method for Tensile Properties of Plastics
5. ASTM D-695: Standard Test Method for Compressive Properties of Rigid Plastics
6. ASTM D-790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
7. ASTM D-2240: Standard Test Method for Rubber Property—Durometer Hardness
8. ASTM D-1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
9. ACI 503.4 (1992): Epoxy Standard

E. SUBMITTALS

1. Provide submittals in accordance with provisions of specification Sections 01300 and 018113.
2. Product Data: Manufacturer's Technical Data Sheets and Material Safety Data sheets for each product to be used, including:
 - a) Cleaner, degreaser and stripper
 - b) Surface etcher
 - c) Water- based and acid-based stain
 - d) Neutralizer
 - e) Acrylic sealer
 - f) Interior acrylic and 2-part epoxy coating
 - g) Exterior acrylic and low-VOC acrylic sealer
 - h) Maintenance and cleaning instructions
3. Selection Samples: For each concrete stain or pigment specified, two sets of color chips or printed literature representing the manufacturer's full range of available colors.
4. Installer's References: List of successfully completed projects, including project name, location, type and area quantity (square feet) of concrete stain and finish system installed.
5. List of areas indicating which areas are to receive concrete stain and finish.
6. Scaled Illustration(s) of each design for each area to be engraved into surface of concrete slab.
7. Manufacturer standard template and custom template cut sheets.

8. On Site Mock-Up: Provide a mock-up for evaluation of stain color, finish and workmanship under field conditions. Mock-up shall be minimum 2' x 2' in area for each specified color. Mock-up shall be applied to the surface of a concrete pad built from batch concrete used in the primary slab, and finished and cured in manner substantially similar to the primary slab. Do not proceed with concrete stain and finish until workmanship, color, and sheen of mock-up are approved by Architect.

9. LEED CREDIT CATEGORIES

a) Product Data for Materials and Resources Credit 5 (MRc5)(For LEED-NC, LEED-Schools, and LEED-CS 2009): For locally extracted, harvested, recovered and manufactured materials, Contractor shall provide the following documentation to the LEED project consultant:

- 1) Documentation substantiating the geographic source of concrete finish material extraction is located within a 500 mile radius of the project site.
- 2) Documentation substantiating the geographic source of concrete finish manufacture is located within a 500 mile radius of the project site.
- 3) Cost sheets indicating quantities of concrete finish purchased in dollar amounts, including costs incurred for delivery, transportation and sales tax. Cost data shall exclude labor costs associated with installation of the concrete finish system.

b) Product Data for Indoor Air Quality Credit 4.2 (IEQc4.2) (For LEED-NC and LEED-CS 2009): For Low-Emitting Materials, Paints and Coatings used in the interior of the building, Contractor shall provide the following documentation to the LEED project consultant:

- 1) MSDS or Technical Data sheet indicating the quantity of Volatile Organic Compounds present in primer products does not exceed 100g/L
- 2) MSDS or Technical Data sheet indicating the quantity of Volatile Organic Compounds present in floor coating products does not exceed 50g/L
- 3) MSDS or Technical Data sheet indicating the quantity of Volatile Organic Compounds present in floor stain products does not exceed 100g/L
- 4) MSDS or Technical Data sheet indicating the quantity of Volatile Organic Compounds present in floor sealer products does not exceed 100g/L

- 5) MSDS or Technical Data sheet indicating the quantity of Volatile Organic Compounds present in waterproofing sealer products does not exceed 100g/L

F. QUALITY ASSURANCE

1. Installer shall have demonstrated success in application of similar decorative concrete floor finish systems in past projects. See "List of References" section under Submittals (Part 1 – E) specifications.
2. Installer shall employ persons trained in proper application of concrete floor finish systems.
3. Installer shall use concrete floor finish materials, tools and products from a single manufacturer.
4. Installer shall provide actual work sample in accordance with "On-site Mock Up" section under Submittals (Part 1 – E) specifications.
5. In providing the installation, the installer warrants that the work will be performed in a good and workmanlike manner and that installed materials will be new and of good quality.

G. DELIVERY, STORAGE, AND HANDLING

1. All preparation, stain, and finish materials should be protected from weather, sun, and heat and stored in a cool, dry area.
2. Store acid-based stain products away from combustible material and sources of heat.
3. Keep flammable materials away from ignition sources.
4. Store preparation, stain and finish materials in manufacturer's unopened packaging until ready for installation.
5. Protect materials during handling and application to prevent damage or contamination.
6. Tightly close container lids immediately during and after use.
7. Dispose of solvent-based materials in accordance with requirements of local authorities having jurisdiction.
8. Do not transfer products to unmarked containers. Do not reuse empty containers, which may contain hazardous product residues.

H. PROJECT CONDITIONS

1. Protect concrete surfaces to receive decorative concrete finish from adhesives, tar, paint, plaster or other construction materials that adversely impact slab preparation procedures.

2. Observe and maintain temperature, humidity, and ventilation conditions recommended by manufacturer for each product during installation.
3. Install concrete finish system to concrete surfaces that have sufficiently cured. Measure slab moisture and pH levels in accordance with manufacturer recommendations. Proceed with installation after slab is determined to be ready to receive finish.
4. Restrict access to areas of work by other trades during preparation, staining, sealing and coating installation.
5. Control airborne dust and other particulate debris during sealing and coating installation.
6. Restrict access to areas of work by other trades until after concrete finish is cured or dried.

I. SEQUENCING

1. Pre-installation Meeting: Conduct a meeting of the concrete finish installer, Prime Contractor and Project Architect before the start of application of concrete floor finish system.
 - a) Review area access control methods, dust and debris control methods and sequencing with other trades.
 - b) Review concrete preparation, stain, sealing, and coating methods.
 - c) Walk through site to identify areas of special treatment or preparation needs.
 - d) Evaluate on-site mock-up for conformance with contract documents.
2. Install concrete floor finish system at appropriate time within overall project sequence to maximize satisfactory installation quality and minimize detrimental conditions or damage.

PART 2 - PRODUCTS

- A. Acceptable Manufacturer: Engrave-A-Crete, Inc. 403 Oak Avenue, Mansfield, MO 65704.
Tel: (800) 884-2114. Web: www.engagecrete.com
- B. CR-580 Degreaser
 1. Type: A multipurpose, high-strength industrial cleaner and degreaser. Used during the initial cleaning process to remove grease, grime, oily films and to suspend particles in order to ensure a clean surface.
 2. Water-soluble, corrosive solution containing sodium hydroxide.

C. CR-585 Neutralizer

1. Type: A concentrated pH balancing solution to be used following the application of CR-765 Surface Prep & Etch and after the application of RAC stain. Increases the pH level of the concrete surface to ensure stain and sealer performance.
2. Water-soluble, corrosive solution containing ammonium hydroxide and other proprietary neutralizing agents.

D. CR-590 Paint and Sealer Remover

1. Type: A liquid surface treatment that breaks the chemical bond of paint, sealers, glues and adhesives over concrete.
2. Partially-soluble solution containing N-Methyl-2-Pyrrolidone.

E. CR-765 Surface Prep and Etch

1. Type: A liquid surface treatment used to prepare concrete surfaces before applying stains and sealers. Removes topical laitance and creates a porous surface to increase the penetration of concrete stains and sealers. Produces minimal fumes, is biodegradable and safe for use near grass and plants.
2. Water soluble, corrosive solution containing phosphoric acid and other proprietary additives.

F. CR-601 through CR-612 Reactive Acid Chemical Stain:

1. Type: A single-component solution of acidic metallic ion particles that chemically react with the free alkali particles in the cement to form oxides that become a permanent part of the concrete substrate.
2. Color CR-601: Black Walnut. A corrosive water-based solution containing hydrochloric acid, manganese chloride, and sodium dichromate.
3. Color CR-602: Rich Mahogany. A corrosive water-based solution containing hydrochloric acid, ferric chloride, ferrous chloride and chromium chloride.
4. Color CR-603: Clay Canyon. A corrosive water-based solution containing hydrochloric acid, ferric chloride, ferrous chloride and chromium chloride.
5. Color CR-604: Western Saddle. A corrosive water-based solution containing hydrochloric acid, ferric chloride and ferrous chloride.
6. Color CR-605: Brown Stone. A corrosive water-based solution containing hydrochloric acid, manganese chloride, sodium dichromate, chromium chloride and ferric chloride.
7. Color CR-606: Golden Sand. A corrosive water-based solution containing hydrochloric acid and ferrous chloride.

8. Color CR-607: Olive Mist. A corrosive water-based solution containing hydrochloric acid, cupric chloride, phosphoric acid and sodium dichromate.
9. Color CR-608: Azure Sky. A corrosive water-based solution containing hydrochloric acid, cupric chloride and phosphoric acid.
10. Color CR-609: Mossy Oak. A corrosive water-based solution containing hydrochloric acid, cupric chloride, phosphoric acid, manganese chloride and sodium dichromate.
11. Color CR-610: Summer Wheat. A corrosive water-based solution containing hydrochloric acid, ferrous chloride, cupric chloride, phosphoric acid and sodium dichromate.
12. Color CR-611: Mountain Road. A corrosive water-based solution containing hydrochloric acid, manganese chloride, sodium dichromate, and chromium chloride.
13. Color CR-612: Honey Oat. A corrosive water-based solution containing hydrochloric acid, ferrous chloride, manganese chloride and sodium dichromate.

G. CR-645 Reactive Acid Chemical Stain Color Extender

1. Type: A proprietary reactive-acid-stain dilution formula used to achieve a lighter shade of color. Maintains the proper pH balance of the entire mix of stain, and contains proprietary enhancers to maintain vivid tones.
2. Water soluble, corrosive solution containing hydrochloric acid and other proprietary additives.

H. Water Reducible Concentrate Stain

1. Type: A UV-stable, water-dilutable, pigmented acrylic stain, as an alternative to solvent and acid based stains
2. Water-soluble solution containing propylene glycol, butyl glycol, butyl cellosolve, dipropylene glycol monomethyl ether, and 2,2,4-trimethyl -1,3-pentanedioil monoisobutyrate
3. Color: CR-700 Midnight Sky
4. Color: CR-701 Cloudy Lake
5. Color: CR-702 Alpine Green
6. Color: CR-703 Dark Olive
7. Color: CR-704 Sage
8. Color: CR-705 English Ivy
9. Color: CR-706 Mustard Seed
10. Color: CR-707 Custard
11. Color: CR-708 Beach Sand
12. Color: CR-709 Autumn Umber

13. Color: CR-710 Chestnut
14. Color: CR-711 Caramel
15. Color: CR-712 Soft Terra Cotta
16. Color: CR-713 Pumpkin
17. Color: CR-714 Cedar Brown
18. Color: CR-715 Burnt Sienna
19. Color: CR-716 Fire Brick
20. Color: CR-717 Fossil Wood
21. Color: CR-718 Mocha
22. Color: CR-719 Tobacco Leaf
23. Color: CR-720 Dark Slate
24. Color: CR-720 Onyx
25. Color: CR-721 Charcoal
26. Color: CR-722 Winter White
27. Color: CR-900 Sangria
28. Color: CR-901 Sapphire Blue
29. Color: CR-902 Emerald
30. Color: CR-903 Golf Course
31. Color: CR-904 Sunshine
32. Color: CR-905 Radiant Red

I. CR-515 Inside Acrylic

1. Type: a water-based acrylic sealer for concrete floors that provides deep rich color appearance along with a beautiful gloss. CR-515 Inside Acrylic has excellent water and efflorescent resistance and superior durability. It has strong UV resistance and adhesion to a wide variety of substrates and it will not chalk or yellow. It is recommended that CR-515 Inside Acrylic be top-coated with CR-520 Inside Floor Finish.
2. Water-soluble solution containing acrylic polymers and maleic anhydride.
3. Performance
 - Percent solids by weight – 31% (ASTM D2369)
 - 60 degree gloss – 100% (ASTM D523)
 - Pencil Hardness – 4B (ASTM D3363)
 - Flexibility – Greater than 32% elongation (the maximum for ASTM D522)
 - Impact Resistance – 40 inch-lbs (ASTM D2794)
 - Abrasion Resistance – Wear index of 0.248, CS17 wheels, 1000g load (ASTM D4060)

Chemical Resistance – 1 hour spot test (ASTM D1308)

- 2) Water – No softening, blistering, flaking or discoloration
- 3) Detergent– No softening, blistering, flaking or discoloration
- 4) Dilute Base (pH13) – No softening, blistering, flaking or discoloration
- 5) Dilute Acid (pH2) – Discoloration, but no softening, blistering or flaking
- 6) Gasoline– No softening, blistering, flaking or discoloration
- 7) Motor Oil– No softening, blistering, flaking or discoloration
- 8) Red Wine– No softening, blistering, flaking or discoloration
- 9) Ketchup – No softening, blistering, flaking or discoloration
- 10) Mustard– Discoloration, but no softening, blistering or flaking

A. ME-335, ME-337 and ME-353 Non-Skid Additive

1. “Fine” grade, “Coarse” grade and “Aggressive” grade aluminum oxide grit to be broadcast during final application of clear acrylic or epoxy coatings to improve skid resistance of decorative concrete finishes.

B. CR-520 Inside Floor Finish

C. Type: a high gloss, durable and renewable maintenance coating for interior decorative concrete finishes. CR-520 Inside Floor Finish must be applied over a sealer (CR-515 Inside Acrylic or CR-530 Inside Epoxy)

1. Water-soluble solution containing glycol-ether DPM, glycol-ether PE, acrylate polymer and ethylene polymer.

D. CR-530 Inside Epoxy, Epoxy Pigments, and Colored Epoxy Chips

1. Type: a two component, 100% solids resin used as a low-, medium- or high-build coating. Can be used as a stand-alone coating on interior floors or can be top coated with CR-520 Inside Floor Finish.
2. Performance properties:
 - a) Tensile strength, psi (ASTM D-638): 6,230
 - b) Ultimate elongation, % (ASTM D-638): 11
 - c) Compressive yield strength, psi (ASTM D-695): 9,850
 - d) Ultimate compressive strength, psi (ASTM D-695): 19,501
 - e) Ultimate flexural strength, psi (ASTM D-790): 9,680
 - f) Hardness, Shore D (ASTM D-2240): 83
 - g) Bond strength to concrete (ACI 503.4-2.3.2.2): concrete fails before loss of bond
3. Epoxy “part A” is a slightly-soluble liquid containing diglycidyl ether of bisphenol A, benzyl alcohol and cresyl glycidyl ether.
4. Epoxy “part B” is a moderately-soluble liquid containing polyoxypropylene amine,

amino ethyl piperazine, nonyl phenol, benzyl alcohol, isophorone diamene, 1,5 pentandiamine, 2 methyl and diglycidyl ether of bisphenol A.

5. Colored pigments to be incorporated into "part A" component of Epoxy coating: CR-410 White; CR-411 Black; CR-412 Blue; CR-413 Green; CR-414 Yellow; CR-415 Red.
6. Metallic pigments to be incorporated into "part A" component of Epoxy coating: CR-420 Bronze Metallic; CR-421 Copper Metallic; CR-422 Gold Metallic; CR-423 Silver Metallic.

E. CR-560 Outside Acrylic/ 400 VOC

1. Type: a clear, solvent-based, 25% solids acrylic coating designed for exterior decorative concrete finishes. Outside Acrylic has excellent gloss, stain-resistance, is easy to clean and non-yellowing. (For Exterior Use Only, VOC compliant in all US state jurisdictions except California)
2. Solvent-soluble acrylic polymer containing acetone, p-chlorobenzotri fluoride and aromatic petroleum distillates.

F. CR-570 Outside Acrylic/100 VOC

1. Type: a clear, solvent-based, 25% solids acrylic coating designed for exterior decorative concrete finishes. Outside Acrylic has excellent gloss, stain-resistance, is easy to clean and non-yellowing. (For Exterior Use Only, VOC compliant in all US state jurisdictions)
2. Solvent-soluble acrylic polymer containing acetone, p-chlorobenzotri fluoride and aromatic petroleum distillates.

G. Specialty Tools

1. Cobra precision concrete engraver
 - a) Additional components as necessary to achieve design character of decorative concrete finish: "stand on" base, center pivot, connecting bar assembly, aluminum connecting bars, connecting bar support wheels, dynamic-directional wheels, straight-line wheels, linear carriage, linear tracking bars, linear full bases, trammel- point and parallel-edge marker kits and engraving blades of appropriate thickness.
2. Mongoose 411 precision concrete engraver
 - a) Additional components as necessary to achieve design character of decorative concrete finish: center pivot, connecting hubs, trammel points, parallel edge marker kit, black- and non-marking wheel kits, and engraver blades of

appropriate thickness.

3. Mochton Stylus "Shark" precision concrete engraver
4. Mochton Stylus "Barracuda" precision concrete engraver
5. Mini-Mochton Stylus "Wasp" precision concrete engraver
6. Sandroid recirculating blast system

H. Templates: Standard, Corners, Borders, Medallions, and Custom

1. Precision-manufactured 1/4" thick HDPE plastic templates to achieve design character of decorative concrete finish
2. Standard Templates: grout line template, letter template, address number, large cobblestone fan, small cobblestone fan, flagstone, ashlar slate, herringbone, country brick, river rock
3. Nautical Templates: sextant, anchor border, anchor, light house, sailboat w/ rope border, flag, sailboat, rope, waves
4. Ocean Life Templates: marlin, dolphins, angel fish, ray, sea horse, sea grass, whale, hidden fish, school of fish
5. Southwest Templates: lizard, coyote, rug, cactus, road runner, bush, simple border, turtle, rectangle border
6. Border Templates: barbed wire, curve, Celtic, square, corner 1, corner 2, rope, deco, geometric, vine, wave, phoenix, Celtic braid, ivy, plants, knots, fleur de lis, intertwining
7. Corner Templates: Roman, vine, fan, club 2, square diamond, fleur de lis 2, triangle, square, 3-leaf, fleur de lis 1, harp, club, diamond; clover
8. Oriental Templates: cherries, love, lantern, shrine, earth, lotus medallion, iris, bird, flower border, symbol border
9. Custom HDPE Templates: custom design options available from Engrave-a-Crete
10. Custom Flexi-Blast Templates: custom design options available from Engrave-a-Crete
11. Custom Bello Imperial Stencils: custom design options available from Engrave-a-Crete. Single use stencils constructed of heavy, sticky-back vinyl.

PART 3 – EXECUTION

A. EXAMINATION

1. Conduct pre-installation meeting in accordance with specifications Part 1, section I and walk through site to identify areas of special treatment or preparation needs.
2. Determine that new concrete has adequately cured through measurement of pH and

moisture levels at various points of the installation.

3. Confirm that concrete surface is clean, dry, structurally sound, and free from dust, particulates, oils, paint, bituminous materials, curing and sealing compounds, adhesives, and other contaminants.
4. Do not begin installation until substrates have been properly prepared and are ready to receive decorative concrete finish.

B. PREPARATION

1. Follow Technical Data Sheet surface preparation instructions for the stain/material being used.
2. Protect existing wall surfaces, trim and other fixtures using securely fastened polyethylene sheets during decorative concrete finish process. Do not apply tape directly to the concrete.
3. Ensure that access restrictions and coordination with other trades are managed to provide a secure, clean work environment.
4. Observe safety precautions as recommended by manufacturer, OSHA, and other regulating jurisdictions addressing: ventilation rates, respiratory protection, eye protection, ear protection, clothing and skin protection, and jobsite notifications

C. CONCRETE ENGRAVING AND "KALEIDOCRETE" SYSTEM

1. Coordinate concrete engraving sequence and methods with the design requirements of the project.
2. Lay out design on prepared slab in conformance with the design illustration approved during the Submittals procedure of these specifications:
 - (a) Identify straight-line design components and utilize string-line chalk marking method. Do not use red or blue chalk.
 - (b) Identify consistent-radius design components and utilize soapstone marker to lay out elements.
 - (c) Identify free-form design components and utilize soapstone marker to lay out elements.
 - (d) Identify template-design components and utilize gray aerosol primer to lay out elements.
3. Set up proprietary engraving tools to ensure proper depth of cut, sight alignment, jig attachment and wheel configuration, as appropriate for design elements.
4. Install center pivot or linear rail mounts at appropriate locations on slab and secure using masonry screws.
5. Adhere to quality control tolerances during engraving:

- (a) Depth of engraving shall be consistent across the entire surface of the concrete, [1/16"] [1/8"] [3/16"] below surface.
 - (b) Straight lines shall not deviate more than +/- 1/8" per 10 linear feet.
 - (c) Curved elements shall follow an even curvature, without visually discernable deviations.
- 6. Touch up areas of engraving:
 - (a) Manually engrave slab at locations of fine infill work.
 - (b) Bevel and stain areas of excess engraving.
 - 7. Clean and remove debris and grit from work area as the installation progresses.
 - 8. Upon completion of engraving operations, proceed with clean-up and supplemental sealing and/or coating applications.

D. PAINT AND SEALER REMOVER

- 1. Utilize CR-590 Paint and Sealer Remover to treat any areas for paint, bituminous materials, curing and sealing compounds, adhesives, and other similar contaminants.
- 2. Observe coverage rates as recommended by manufacturer:
 - (a) Thin coatings of paint or sealer: 200 – 400 SF/ gallon
 - (b) Thick coatings of paint or sealer: 100 - 200 SF/ gallon
 - (c) Carpet glue and other adhesives: 100 SF/ gallon
 - (d) Epoxies and urethanes: 100 SF/ gallon
- 3. Very smooth continuous urethane or epoxy surfaces may require an additional "de-glossing" procedure using a rotary floor buffer with black pad or sanding attachment.
- 4. Roll, brush or spray CR-590 to completely wet areas to be stripped. Allow to soak for 1 hour and test a small area for coating removal. Allow more time to soak as necessary. Maintain wet CR-590 surface for duration of soaking and apply more product as necessary. Polyethylene barrier may be laid over wet surface to help maintain wet application. Do not allow stripper to dry on the concrete surface.
- 5. Clean up with squeegee and wet vacuum until concrete surface is free of contaminants. Allow concrete to dry thoroughly prior to subsequent surface treatments.
- 6. Do not thin or reduce CR-590 Paint and Sealer Remover.
- 7. Follow CR-590 Paint and Sealer removal with CR-580 Degreaser.

E. DEGREASING

- 1. Utilize CR-580 Degreaser after CR-590 Paint and Sealer Remover to treat any areas for grease, oils and other similar contaminants that prevent the ability of stain to penetrate and react with the concrete substrate.

- (a) Apply Degreaser to exterior concrete surfaces and scrub using a stiff-bristled broom. Rinse with pressure washer and potable water.
 - (b) Apply Degreaser to interior concrete surfaces and scrub using a rotary floor buffer and nylon bristle brush attachment, black pad or sanding screen. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
 - (c) Continue to apply Degreaser to affected areas, scrub and rinse until water is no longer repelled from affected area.
 - (d) Do not allow Degreaser to dry on concrete surface.
2. Utilize CR-580 Degreaser for general cleaning applications prior to staining.
 - (a) Apply Degreaser to exterior concrete surfaces and scrub using a stiff-bristled broom. Rinse with pressure washer and potable water.
 - (b) Apply Degreaser to interior concrete surfaces and scrub using a rotary floor buffer and nylon bristle brush attachment, black pad or sanding screen. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
 - (c) Do not allow Degreaser to dry on concrete surface.
3. Allow prepared concrete surfaces to dry thoroughly prior to subsequent surface treatments.

F. SURFACE ETCHING AND NEUTRALIZING

1. Utilize CR-765 Surface Prep and Etch as a required preparation for all water-based stain (WRC Stain) applications.
2. Observe dilution and coverage rates as recommended by manufacturer:
 - (a) Preparation for Water Reducible Concentrate Stain: 1 part Surface Prep & Etch with 4 parts potable water
 - (b) (Optional) Preparation for Reactive Acid Chemical Stain: 1 part Surface Prep & Etch with 10 parts potable water
 - (c) Apply diluted solution at a rate of 1 gallon per 100 square feet
3. Apply diluted Surface Prep & Etch using a plastic sprinkler can to concrete surfaces and scrub using a stiff-bristled broom. Wet surfaces will bubble and fizz. Thoroughly scrub surfaces for duration of chemical activity. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
4. Do not allow Surface Prep and Etch to dry on concrete surface.
5. Spray diluted CR-585 Surface Neutralizer to treated areas and scrub using a stiff-bristled broom. Rinse with potable water and collect rinse water with squeegee and wet vacuum.

6. Allow prepared concrete surfaces to dry thoroughly prior to subsequent surface treatments.

G. REACTIVE ACID CHEMICAL STAIN, STAIN EXTENDER AND SURFACE NEUTRALIZER

1. Utilize Reactive Acid Chemical stain as a decorative concrete treatment.
2. Perform scratch test to ensure top surface of concrete is not dusting or disintegrating. Concrete must be free of all dust, particulates and contaminants. Concrete surfaces must be open and porous prior to applying stain.
3. Observe dilution and coverage rates as recommended by manufacturer:
 - (a) Use only CR-645 Color Extender to dilute acid stain.
 - (b) 1:1 dilution ratio treats 200 – 300 square feet
 - (c) 2:1 dilution ratio treats 300 – 400 square feet
 - (d) 4:1 dilution ratio treats 400 – 500 square feet
4. Apply stain using pump sprayer, brush, mop, rag or sponge to areas receiving decorative concrete finish.
5. Apply one or more coats of stain to achieve desired decorative finish.
6. Allow a minimum of 4 hours time between coats of stain and after installation of final finish coat to allow for maximum coloring reaction.
7. CR-585 Surface Neutralizer must be applied to Reactive Acid Stain-treated areas and scrubbed using a stiff-bristled broom. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
8. Remove residue from interior surfaces using rotary floor buffer and nylon bristle brush attachment or white pad. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
9. Remove residue from exterior surfaces using pressure washer and potable water. Collect rinse water with squeegee and wet vacuum.
10. Allow stained concrete surfaces to completely dry prior to subsequent surface treatments and coatings.

H. WATER REDUCIBLE CONCENTRATE STAIN

1. Utilize Water Reducible Concentrate stain as a decorative concrete treatment.
2. Perform scratch test to ensure top surface of concrete is not dusting or disintegrating. Concrete must be free of all dust, particulates and contaminants. Concrete surfaces must be open and porous prior to applying stain. Recommended 220 grit or rougher surface texture.
3. Observe dilution and coverage rates as recommended by manufacturer:
 - (a) Use only distilled water to dilute Water Reducible Concentrate stain.

- (b) Dilute one quart of stain with 4 – 8 quarts of distilled water.
 - (c) One gallon of stain will treat 100 – 500 square feet of surface, depending on porosity of concrete and amount of stain applied.
- 4. Apply stain using HVLP sprayer, airless sprayer, pump sprayer, cotton rag, natural sponge, manufactured sponge, bristle brush and/or foam brush to areas receiving decorative concrete finish.
- 5. Apply one or more coats of stain to achieve desired decorative finish.
- 6. Allow a minimum of 1 hour time between coats of stain.
- 7. Allowed stained concrete surfaces a minimum of 24 hours to completely cure prior to subsequent surface treatments and coatings.

I. CR-515 INSIDE ACRYLIC SEALER

- 1. Utilize CR-515 Inside Acrylic as a sealer of the stained concrete surface.
- 2. Observe coverage rates as recommended by manufacturer:
 - (a) One gallon of Inside Acrylic will treat 200 – 400 square feet of surface, depending on porosity of concrete and amount of sealer applied.
 - (b) Do not thin or dilute Inside Acrylic.
- 3. Apply one coat of CR-515 Inside Acrylic using a 3/8" roller, in a cross-hatch pattern. Apply material only to 'wet' edges, and avoid back-rolling over cured surfaces.
- 4. Apply a second coat of CR-515 Inside Acrylic using a 3/8" roller, in a cross-hatch pattern perpendicular to the first coat. Apply material only to 'wet' edges, and avoid back-rolling over cured surfaces.
- 5. Allow a minimum of 2 hours between coats of sealer.
- 6. Allow a minimum of 4 hours before light traffic is allowed on decorative concrete finish, or before applying CR-520 Inside Floor Finish.
- 7. Allow a minimum of 3 days time before sealer is fully cured.

J. CR-520 INSIDE FLOOR FINISH

- 1. Utilize CR-520 Inside Floor Finish as a protective coating for the sealed concrete surface.
- 2. Observe coverage rates as recommended by manufacturer:
 - (a) One gallon of Inside Floor Finish will treat 1000 – 2000 square feet of sealed concrete.
 - (b) Do not thin or dilute Inside Floor Finish.
- 3. Apply six to eight coats of Inside Floor Finish using a finish mop, in a "figure 8" pattern to assure thorough coverage.
- 4. Allow a minimum of 30 minutes time between coats.

5. Allow a minimum of 5 hours time before light traffic is allowed on decorative concrete finish.

K. INSIDE TWO-PART EPOXY FLOOR SEALER, COATING, COLOR PIGMENTS, METALLIC ADDITIVES, COLORED EPOXY CHIPS AND NON-SKID ADDITIVE

1. Utilize CR-530 Inside Epoxy as both a surface sealer and a protective coating in the decorative concrete finish.
2. Utilize CR-410; CR-411; CR-412; CR-413; CR-414; CR-415 Pigment as a coloring agent that may be incorporated into the Inside Epoxy coating.
3. Utilize CR-420; CR-421; CR-422; CR-423 Metallic Additive as a coloring agent that may be incorporated into the Inside Epoxy coating.
4. Utilize ME-335; ME-337; ME-353 as a Non-skid Additive that may be incorporated into the Inside Epoxy coating.
5. Observe coverage rates as recommended by manufacturer:
 - (a) One gallon of Inside Epoxy will treat 200 – 400 square feet of concrete, depending on porosity of concrete and amount of epoxy applied.
 - (b) Do not thin or dilute Inside Epoxy.
6. Observe mixing procedures for clear (unpigmented) Epoxy as recommended by the manufacturer:
 - (a) Open containers of part A resin and part B hardener. Add entire contents of part B hardener to part A resin, ensuring entire contents of part B container are used.
 - (b) Completely mix the two components using a paint mixer and low-speed drill for two minutes, making an effort to scrape sides of containers to ensure entire contents are mixed together.
 - (c) Do not thin or dilute Inside Epoxy.
7. Observe mixing procedures for colored Epoxy as recommended by the manufacturer:
 - (a) Open containers of part A resin, Colored Pigment, and part B hardener.
 - (b) Add desired quantity of Colored Pigment to part A resin.
 - (c) Completely mix the colored pigment and part A resin using a paint mixer and low-speed drill, making an effort to ensure entire contents are mixed together.
 - (d) Add entire contents of part B hardener to part A resin, ensuring entire contents of part B container are used.
 - (e) Completely mix the two components using a paint mixer and low-speed drill for two minutes, making an effort to scrape sides of containers to ensure entire contents are mixed together.

- (f) Do not thin or dilute Inside Epoxy.
- 8. Apply one coat of Inside Epoxy using a roller, squeegee, or trowel to achieve a consistent 3 – 8 mil thick coating over the entire surface.
- 9. Broadcast “fine,” “coarse,” or “aggressive” Non-Skid Additive during installation of floor coating.
- 10. Allow a minimum of 6 hours between coats.
- 11. Fully abrade hardened epoxy prior to recoating. Apply Degreaser and water to the surface and scrub using a rotary floor buffer and nylon bristle brush and sanding screen. Rinse with potable water and collect rinse water with squeegee and wet vacuum.
- 12. Allow a minimum of 16 hours before light traffic is allowed on Epoxy coating.
- 13. Allow a minimum of 7 days before Epoxy coating is fully cured.

L. OUTSIDE ACRYLIC SEALER

- 1. Utilize CR-560 Outside Acrylic as a sealer of the stained concrete surface.
- 2. Observe coverage rates as recommended by manufacturer:
 - (a) One gallon of Outside Acrylic will treat 200- 400 square feet of concrete, depending on porosity of concrete and amount of CR-560 Outside Acrylic applied.
 - (b) Do not thin or dilute Outside Acrylic.
- 3. Observe application methods as recommended by the manufacturer:
 - (a) Apply one coat of Outside Acrylic using a pump sprayer, airless sprayer, brush or roller over RAC acid-stained surfaces.
 - (b) Apply one coat of Outside Acrylic using only a pump sprayer or airless sprayer over WRC water-reducible stained surfaces.
- 4. Allow a minimum of 40 minutes time between coats.
- 5. Allow a minimum of 3 hours time before light traffic is allowed on sealed finish.
- 6. Allow a minimum of 3 days time before vehicle traffic is allowed on sealed finish.

M. LOW V.O.C. OUTSIDE ACRYLIC SEALER

- 1. Utilize CR-570 Low VOC Outside Acrylic as a sealer of the stained concrete surface.
- 2. Observe coverage rates as recommended by manufacturer:
 - (a) One gallon of Outside Acrylic will treat 200- 400 square feet of concrete, depending on porosity of concrete and amount of CR-560 Outside Acrylic applied.
 - (b) Do not thin or dilute Outside Acrylic.
- 3. Observe application methods as recommended by the manufacturer:

- (a) Apply one coat of Outside Acrylic using a pump sprayer, airless sprayer, brush or roller over RAC acid-stained surfaces.
 - (b) Apply one coat of Outside Acrylic using only a pump sprayer or airless sprayer over WRC water-reducible stained surfaces.
- 4. Allow a minimum of 40 minutes time between coats.
 - 5. Allow a minimum of 3 hours time before light traffic is allowed on sealed finish.
 - 6. Allow a minimum of 3 days time before vehicle traffic is allowed on sealed finish.

N. PROTECTION

- 1. Avoid washing decorative concrete finishes for the minimum time indicated for the particular final coating.
- 2. Touch-up, repair or replace faulty or damaged finishes as required by Owner, Architect and/or Contractor.

END OF SECTION 03550