

## SECTION 03 35 43

## POLISHED CONCRETE FINISHING (WITH DYE)



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**PART 1 GENERAL**

1.01 SUMMARY

- A. Section Includes
  1. Grinding of the slab surface to receive clear reactive, penetrating liquid hardener/densifier.
  2. Application of clear reactive, penetrating liquid hardener and concrete dye.
  3. Progressively polishing and burnishing of the slab surface to achieve Finish Requirements.
  4. Application of stain resistant surface treatment.
- B. Related Requirements
  1. Section 01 25 00- Substitution Procedures.
  2. Section 01 33 00- Submittal Procedures.
  3. Section 01 45 80- Testing Laboratory Services.
  4. Section 01 60 00- Product Requirements.
  5. Section 01 74 00- Cleaning and Waste Management.
  6. Section 03 30 00- Cast-in-Place Concrete.
  7. Section 07 90 00- Joint Sealants.

1.02 REFERENCES

- A. The date of the standard is that in effect as the date of receipt of bids for the project.
- B. Living Building Challenge (LBC).
- C. Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
- D. NSF International/Nonfood Compound Registration.

- E. American National Standard Institute / National Floor Safety Institute ANSI/NSFI B101.1 Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials
- F. ASTM International (ASTM):
  - 1. C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
  - 2. C1353 – Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
  - 3. D523- Standard Test Method for Specular Gloss.
  - 4. D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
  - 5. D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
  - 6. E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.
  - 7. G154 -Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene before the start of work on new concrete slabs, patching of existing concrete slabs and start of application of concrete finish system.
  - 1. Require attendance of parties directly affecting work of this Section, including the Owner's Representative, Contractor, Architect, concrete installer, and applicator. Meeting should only convene when required parties are present.
  - 2. Review the following:
    - a. Physical requirements of completed concrete slab and slab finish.
    - b. Locations and time of test areas.
    - c. Protection of surfaces not scheduled for finish application.
    - d. Surface preparation.
    - e. Application procedure.
    - f. Final appearance of dyed concrete.
    - g. Quality control.
    - h. Cleaning.
    - i. Protection of finish system.
    - j. Coordination with other work.

### 1.04 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's product data sheets and tested physical and performance properties on products to be used for the work.
- B. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
- C. Certificates:
  - 1. Certificates by manufacturer stating that installer is listed applicator of special concrete finishes, and has completed the necessary training programs.
- D. Floor Protection Plan.

### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications:

1. Applicator to be familiar with the specified requirements and the methods needed for proper performance of work of this section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 5 projects of similar scope and complexity.
- B. Mock-up: On site, prior to the start of the polished concrete finishing process.
  1. Require attendance of parties directly affecting work of this Section, including the Contractor, Architect, applicator, and Owner's Representative.
  2. Notify the above parties one week in advance of date and time when mock-up will be completed.
  3. Demonstrate the materials, equipment and application methods to be used for work specified herein in pre-approved location approximately 50 sq. ft. in area or as directed by the [Architect][ Owner's Representative].
  4. Retain approved mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.
- B. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.
  1. Store containers upright in a cool, dry, well-ventilated place, out of the sun with temperature between 40 and 100 degrees F (4 and 38 degrees C).
  2. Protect from freezing.
  3. Store away from other chemicals and potential sources of contamination.
  4. Keep lights, fire, sparks and heat away from containers.
  5. Do not drop containers or slide across sharp objects.
  6. Do not stack pallets more than three high.
  7. Keep containers tightly closed when not in use.

#### 1.07 FIELD CONDITIONS

- A. Environmental limitations:
  1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.
- B. Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.
- C. Protect the completed slab to prevent damage by the other trades during floor completion.
- D. Temperature Limitations:
  1. Apply when surface and air temperature are between 40 degrees F (4 degrees C) and above 95 degrees F (35 degrees C) unless otherwise indicated by manufacturer's written instructions.
  2. Apply when surface and air temperatures are expected to remain above 40 degrees F (4 degrees C) for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- E. Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.
- F. Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.

- G. Apply a minimum of 24 hours after rain event. Suspend application when rain is anticipated for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- H. Temporary Heat: Ambient temperature of 50 degrees F (10 degrees C) minimum.
- I. Ventilation: Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Substitutions: [No Substitutions] [In accordance with Section 01 25 00 – Substitution Procedures].

### **2.02 MATERIALS**

- A. Pre-Densifier Concrete Cleaner: Cleaner to remove dirt, oil, grease, and other stains from existing slab surface.
  - 1. Product: Consolideck Cleaner/Degreaser manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, [www.prosoco.com](http://www.prosoco.com).
- B. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier.
  - 1. Product: Consolideck LS, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, [www.prosoco.com](http://www.prosoco.com).
  - 2. Subject to compliance with the following requirements:
    - a. Living Building Challenge 2.0/2.1 Red List Compliant.
    - b. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
    - c. Comply with national, state and district AIM VOC regulations and contain 50 g/L or less.
    - d. Registered as an approved NSF International/Nonfood Compound Registration.
    - e. Abrasion Resistance: Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.
    - f. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
    - g. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
    - h. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
    - i. Water Vapor Transmission: 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).
    - j. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
- C. Translucent Concrete Dye: General Purpose water-carried, penetrating, translucent colored dye.
  - 1. Product: Consolideck GemTone Stain manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, [www.prosoco.com](http://www.prosoco.com).
  - 2. Subject to compliance with the following requirements:
    - a. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
    - b. Comply with national, state and district AIM VOC regulations.
- D. Interior Concrete Protective Treatments:

1. General Purpose high-gloss film forming premium sealer, lithium silicate hardener/densifier.
  - a. Product: Consolideck LSGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
  - b. Subject to compliance with the following requirements:
    - i. Living Building Challenge 2.0/2.1 Red List Compliant.
    - ii. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
    - iii. Comply with national, state and district AIM VOC regulations.
    - iv. Registered as an approved NSF International/Nonfood Compound Registration.
    - v. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
    - vi. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
    - vii. Adhesion: : Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
    - viii. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
2. General Purpose medium gloss, film forming sealer
  - a. Product: Consolideck PolishGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
  - b. Subject to compliance with the following requirements:
    - i. Living Building Challenge 2.0/2.1 Red List Compliant.
    - ii. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
    - iii. Comply with national, state and district AIM VOC regulations.
    - iv. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
    - v. Coefficient of Friction: Greater than 0.60 dry, greater than 0.60 wet when tested in accordance with ASTM C1028.
    - vi. Stain Resistance: Achieve limited or no adverse effects when tested in accordance with ASTM D1038.
    - vii. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

## 2.03 EQUIPMENT

- A. Auto Scrubber Machine: For cleaning operations.
- B. Hand Grinder or stand-up edger for edge grinding/polishing.
- C. Polishing Equipment:
  1. Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum.
- D. Diamond Segments:
  1. Use heads from the same manufacturers throughout the entirety of the project.
- E. Diamond Heads Types:
  1. Metal Diamonds: 60, 80 or 150.
  2. Hybrid Style Diamonds: 50 or 100.
  3. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1300 and 3000 (if necessary).
- F. Burnishing Machine and Burnishing Pads to produce specified results.

1. Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.
2. Burnishing Pads: as recommended by protective treatment manufacturer.
  - a. White Burnishing Pad, non-abrasive,
  - b. Consolideck Heat Pad manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrate with installer present for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Notify the [Architect][ Owner's Representative] in writing of conditions detrimental to the proper and timely completion of the work.
- B. Do not begin installation until unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

#### **3.02 PREPARATION**

- A. Clean dirt, dust, oil, grease and other contaminants that interfere with penetration or performance of specified product from surfaces. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of product.
- B. Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of product.
- C. Variations in substrate texture and color will affect final appearance and should be corrected prior to application of sealer/hardener system and the polishing steps.
- D. Protect surrounding areas prior to application. If product is accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.
- E. Avoid contact in areas not to be treated. Avoid contact with metal, glass and painted surfaces.
- F. Seal open joints in accordance with Section 07 90 00.
- G. Apply specified sealants and caulking and allow complete curing before application of penetrating concrete hardener/densifier.
- H. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.03 CONCRETE POLISHING**

- A. Adhere to industry standard polishing procedures for dry and wet grinding/polishing is acceptable when industry standard polishing procedures are adhered to.
- B. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final polishing passes..
- C. Sequential progression of diamond polishing steps shall be required and limited to no more than double the grit value of the previous diamonds used.
- D. Overlap adjacent polishing passes by 25 percent
- E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.

- F. Progressively grind and polish the slab surface utilizing approved diamond segments as necessary to produce Finishing requirements.

### 3.04 APPLICATION OF PENETRATING TRANSLUCENT DYE AND CONCRETE HARDENER/DENSIFIER

- A. Dilute translucent dye with fresh water, or other approved solvent as recommended by manufacturer to create desired color. (Apply within 24 hours of dilution).
- B. Lightly wet a clean microfiber pad with diluted translucent concrete dye, leaving the pad damp.
- C. Apply prepared diluted translucent dye to the clean, dry concrete with a low pressure sprayer with a conical spray pattern per manufacturer's recommendations. (Typically after 200 -grit).
- D. Using pre-wet microfiber pad, immediately spread the spray-applied diluted translucent dye to ensure uniform wetting and color distribution.
- E. Allow treated surface to dry for one hour minimum prior to walking on or auto scrubbing.
- F. Remove excess stain residue by cleaning slab with auto scrubber or dry burnisher and allow treated surface to dry.
- G. Dry polish floor with 400 grit resin diamonds.
- H. Clean slab with auto scrubber and allow surface to dry.
- I. Apply second coat of penetrating diluted translucent dye, if desired. (Repeating above steps A through E) Allow treated surface to dry for one hour minimum prior to auto scrubbing or burnishing (As an alternative, both coats of dye may be applied at 400 grit, waiting one hour after each coat prior to auto-scrubbing or burnishing).
- J. Remove excess stain residue by cleaning slab with auto scrubber or dry burnisher and allow treated surface to dry.
- K. Apply a single coat of hardener/densifier with a low pressure sprayer fitted with a 0.5 gpm spray tip
- L. Apply sufficient material to wet the surface without producing puddles. Use a clean soft-bristle push broom or microfiber pad to spread the hardener/densifier evenly to achieve uniform wetting. Avoid spreading once drying begins. Scrubbing is not necessary.
- M. Allow treated surface to dry.
- N. Continue progressively dry polishing floor with required resin diamonds to produce desired final finish.

### 3.05 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

- A. Application of general purpose, high gloss protective treatment:
  1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
  2. Lightly wet a clean microfiber pad with concrete protective treatment and wring out excess, leaving the pad damp.
  3. Working from one control joint to another, apply a light, fine spray of concrete protective treatment to a small section of the floor using a clean, pump-up sprayer fitted with a 0.5 gpm spray tip , at an estimated coverage rate of 2000 to 3000 square feet per gallon.
  4. Using the damp microfiber pad and firm downward pressure, immediately spread the protective treatment to produce a thin, even coating. Spread the product as far as possible while maintaining a wet edge. Properly applied, protective treatment dries quickly. Stop spreading once drying begins. Avoid overlapping.
  5. Allow to dry tack free, typically 20 to 60 minutes.
  6. Once dry, high- speed burnish slab surface fitted with burnishing pad to increase gloss and to help the treatment fuse and bond with the concrete for increased

- durability and longevity. Surface temperatures immediately behind the burnisher must achieve 90.5 degrees Fahrenheit. (Burnish between coats if multiple applications are desired.)
7. Repeat above steps 1 through 6, as necessary for additional applications of protective treatment, to achieve desired final finish (Maximum 3 coats).
- A. Application of general purpose, medium gloss protective treatment:
1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
  2. Lightly wet a clean microfiber pad with PolishGuard and wring out excess, leaving the pad damp.
  3. Spray-apply protective treatment using a clean, pump-up sprayer fitted with a 0.5 gpm conical or fan spray tip at an estimated coverage rate of 400 to 800 square feet per gallon. Work from one control joint to another.
  4. Spread with the damp microfiber pad. Maintain a thin, even coating and wet edge. Stop spreading once drying begins. Do not overlap. Repeat steps 1 through 4. Two coats are recommended for maximum protection.
  5. To increase gloss, wait at least 60 minutes after the final coat is applied, and then use a high-speed burnisher fitted with a white polishing pad. Burnish at a fast walking pace.

### 3.06 SLAB PROTECTION

- A. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.
- B. Do not drag or drop equipment or material across the slab which will scratch or chip it.
- C. Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.
- D. Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.
- E. Develop a concrete protection procedure which addresses the following procedures:
  1. Communication of protection plan to subcontractors and vendors.
  2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.
- F. Provide a clean slab using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's recommendations.

### 3.07 FINISHING REQUIREMENTS

- A. Appearance:
  1. Interior exposed colored finished slab areas must consist of the following:
    - a. Slab surface must meet the desired sheen and color, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.

END OF SECTION