

## SECTION 03 35 00

## INTERIOR CONCRETE POLISHING (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 Sections

1. Section 01 33 00- Submittal Procedures.
2. Section 01 45 80- Testing Laboratory Services.
3. Section 01 60 00- Product Requirements.
4. Section 01 74 00- Cleaning and Waste Management.
5. Section 03 30 00- Cast-in-Place Concrete.
6. Section 07 90 00- Joint Sealants.

## 1.02 REFERENCES

- A. Living Building Challenge (LBC) 2.0/2.1.
- B. Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
- C. NSF International/Nonfood Compound Registration.
- D. American National Standard Institute / National Floor Safety Institute ANSI/NSFI B101.1-2009 Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials
- E. American Society for Testing and Materials:
  1. ASTM 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. ASTM D523- Standard Test Method for Specular Gloss (60°).
  3. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

4. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
5. ASTM E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.
6. ASTM G154 -Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

### 1.03 SUBMITTALS

- A. Product Data:
  1. Submit manufacturer's product data sheets on all products to be used for the work.
    - a. All Specified Concrete Surface Treatments.
- B. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
- C. Test Reports
  1. Provide test reports confirming compliance with specified performance criteria.

### 1.04 QUALITY ASSURANCE

- A. Penetrating Concrete Hardener/Densifier and Surface Protectant Treatment Installer Qualifications:
  1. Provide letter of completion from chemical manufacturer stating that installer is listed applicator of special concrete finishes, and has completed the necessary training programs at time of Bid and within submittal package.
  2. Applicator shall 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. Pre-Installation Meeting: Shall 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 all 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.
- C. Mock-up shall take place 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. Contractor to 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 Architect or Owner's Representative.
4. Retain acceptable mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.

#### 1.05 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 all 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.

#### 1.06 PROJECT 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. The completed slab shall be protected to prevent damage by the other trades during floor completion.
- D. Temperature Limitations:
  1. Do not apply when surface and air temperature are below 40 degrees F (4 degrees C) or above 95 degrees F (35 degrees C) unless otherwise indicated by manufacturer's written instructions.
  2. Do not apply when surface and air temperatures are not 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. Do not apply under windy conditions such that the concrete surface treatment may be blown to surfaces not intended.
- F. Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.
- G. Do not apply earlier than 24 hours after rain or if rain is predicted 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 MATERIALS

- A. Pre-Densifier Concrete Cleaner: Shall remove dirt, oil, grease, and other stains from existing slab surface.
  - 1. Consolideck Cleaner/Degreaser manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, (NO SUBSTITUTE).
  - 2. Auto Scrubber Machine: equipment used for cleaning operations, as required to produce specified results.
- B. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier shall penetrate and react with concrete to produce insoluble calcium silicate hydrate within the concrete pores. The penetrating concrete hardener shall reduce dusting, increase abrasion resistance and not contribute to surface crazing/surface Alkali Silicate Reactions (ASR).
  - 1. Consolideck LS, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, (NO SUBSTITUTE).
  - 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 be 50 g/L or less.
    - d. Registered as an approved NSF International/Nonfood Compound Registration.
    - e. Abrasion Resistance: >50% 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: >0.60 dry, >0.60 wet when tested in accordance with ASTM C1028.
    - h. Adhesion: >10% increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
    - i. Water Vapor Transmission: 100% 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:
  - 1. General Purpose water-carried, penetrating, translucent colored dye to improve and/or produce desired colored final finish.
    - a. Consolideck GemTone Stain manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, (NO SUBSTITUTE).
    - b. Subject to compliance with the following requirements:
      - i. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
      - ii. Comply with national, state and district AIM VOC regulations.
- D. Interior Concrete Protective Treatments:
  - 1. General Purpose high-gloss film forming premium sealer shall contain lithium silicate hardener/densifier to improve the surface sheen, and surface hardness.
    - a. Consolideck LSGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, (NO SUBSTITUTE).
    - b. Subject to compliance with the following requirements:
      - iii. Living Building Challenge 2.0/2.1 Red List Compliant.
      - iv. Recipient of Scientific Certification System (SCS) Indoor Air Quality Gold Certification.
      - v. Comply with national, state and district AIM VOC regulations.

- vi. Registered as an approved NSF International/Nonfood Compound Registration.
  - vii. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
  - viii. Coefficient of Friction: >0.60 dry, >0.60 wet when tested in accordance with ASTM C1028.
  - ix. Adhesion: : >10% increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
  - x. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
2. General Purpose medium gloss, film forming sealer to treat surfaces to increase resistance damage from water, staining and abrasion.
- a. Consolideck PolishGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com, (NO SUBSTITUTE).
  - 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: >0.60 dry, >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.

## 2.02 EQUIPMENT

- A. Auto Scrubber Machine: equipment used for cleaning operations, as required to produce specified results.
- B. Hand Grinder or stand-up edger for edge grinding/polishing.
- C. Polishing Equipment:
  - 1. Polishing machines shall be in full operating condition during the duration of the work to achieve specified Finishing Requirements.
  - 2. Dry grinding/polishing machines must 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: 80 or 150.
  - 2. Hybrid Style Diamonds: 50 or 100.
  - 3. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1500 and 3000 (if necessary).
- F. Burnishing Machine and Burnishing Pads shall be used 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. Surfaces that are in question or that will affect the execution or quality of work must be brought to the attention of the Owner's Representative before work may begin.

### **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 – Joint Sealants.
- 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 GENERAL REQUIREMENTS**

- A. Dry and wet grinding/polishing is acceptable when industry standard polishing procedures are adhered to.
- B. Between and after final polishing passes, thoroughly scrub and rinse slab surface with clean water and vacuum with auto-scrubber.
- 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%.
- E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.
- F. Include all work necessary to achieve specified Finish Requirements.

### **3.04 INTERIOR CONCRETE POLISHING**

- A. Factory Trained Applicator reserves the right to change grit starting level and all other aspects that will contribute to the specified gloss in the specifications. The remaining process follows:
- B. Progressively grind and polish the slab surface utilizing approved diamond segments as necessary to produce Finishing Requirements while meeting the general requirements.

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

- A. Dilute GemTone Stain 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 GemTone Stain, leaving the pad damp.
- C. Apply prepared GemTone Stain 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 GemTone Stain 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 GemTone Stain, if desired. (Repeating above steps A-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.

### 3.06 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

- A. Application of general purpose, high gloss protective treatment (LSGuard):
  - 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 LSGuard and wring out excess, leaving the pad damp.
  - 3. Working from one control joint to another, apply a light, fine spray of LSGuard 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 2000-3000 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 20-60 minutes.
  - 6. Once dry, high- speed burnish slab surface fitted with Consolideck Heat 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°F. (Burnish between coats if multiple applications are desired.)
7. Repeat above steps 1-6, as necessary for additional applications of LSGuard, to achieve desired final finish (Maximum 3 coats).
- B. Application of general purpose, medium gloss protective treatment (PolishGuard):
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 PolishGuard using a clean, pump-up sprayer fitted with a 0.5 gpm conical or fan spray tip at an estimated coverage rate of 400-800 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 1-4. 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.

### 3.07 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. Tires shall be inspected 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.
  3. Contact PROSOCO, Inc. at 800.255.4255 to obtain manufacturer recommended Concrete Floor Protection Plan, if necessary.
- F. Provide a clean slab surface at all times, in accordance with manufacturer's recommendations.

### 3.08 FINISHING REQUIREMENTS

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

END OF SECTION