

## **SECTION 033543 - POLISHED CONCRETE FINISHING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Provide the work of this Section in accordance with requirements of the Contract Documents.
- B. This section includes, but is not limited to:
  - 1. Polished concrete finishing, (**PC-01**).
  - 2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Division Section "Cast-in-Place Concrete."
- C. Related Requirements:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete not designated as polished concrete.

#### **1.2 DEFINITIONS**

- A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

#### **1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Cast-in-place concrete subcontractor.
    - e. Polished concrete finishing Subcontractor.
  - 2. Inspect and discuss conditions of substrates, surface preparation and other preparatory work performed by other trades.
  - 3. Review curing procedures, construction joints, concrete repair procedures, concrete finishing, dust-control procedures, cleaning and protection of polished concrete and adjacent surfaces.
  - 4. Review detail conditions at penetrations, terminations, and perimeter conditions.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated, including manufacture's specifications and installation instructions.
- B. Sustainable Design Action Submittals:

1. Laboratory Test Reports: For liquid floor treatments, indicating compliance with requirements for low-emitting materials.
- C. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- D. Samples for Initial Selection: For each type of product requiring color selection.
- E. Samples for Verification: 12 inch square samples for each type of exposed color of polished concrete finish, indicating full range of color, texture and pattern variations expected. Prepare samples from same material as to be used for the Work.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- C. Material Test Reports and Certificates: For each of the following, signed by manufacturers:
  1. Repair materials.
  2. Liquid floor treatments and sealers.
- D. Field Test Reports: Showing compliance with requirements.

#### **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For polished concrete floors to include in maintenance manuals. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use. Include precautions against cleaning products and methods which may be detrimental to polished finishes and performance.

#### **1.7 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer (applicator) who is acceptable to liquid floor treatment manufacturer to install manufacturer's products.
  1. Engage an installer who is certified in writing by liquid floor treatment manufacturer as qualified to install manufacturer's products.
  2. Engage an installer who hold a valid and current Master Craftsman accreditation from the Concrete Polishing Association of America CPAA.
  3. Engage an installer who has not less than five years satisfactory experience in polished concrete finishing.
  4. Engage an installer who has satisfactorily completed not less than five projects of similar complexity and scope to that specified for this project.
- B. Manufacturer Qualifications: Manufacturer shall have not less than ten years satisfactory experience in the manufacture of liquid floor treatments for polished concrete finishing.
- C. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample

submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
  2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  3. Demolish and remove field sample panels when directed.
- D. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build 100 sf mockups in the location indicated or, if not indicated, as directed by Architect.
  2. Demonstrate curing, finishing, and protecting of polished concrete.
  3. Mockup: mockup the following finishes
    - a. Polished concrete without stain
    - b. Non-polished concrete with hard trowel finish.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

## **1.9 FIELD CONDITIONS**

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting polished concrete finishing.
- B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during polished concrete finishing.
- C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- D. Close spaces to traffic during polished concrete finishing application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.
  1. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.
- F. Damage and Stain Prevention: This finish will be applied over existing concrete, with some pits filled and a recessed area leveled. Take precautions to prevent damage and staining of concrete floor surfaces to receive polished concrete finishing application.

1. Protect concrete surfaces from petroleum, oil, hydraulic fluid, or other liquid dripping.
2. Prohibit vehicle parking over concrete surfaces.
3. Prohibit pipe cutting operations over concrete surfaces.
4. Provide floor protection for all equipment working over concrete surfaces.
5. Prohibit ferrous metals storage on or over concrete surfaces.
6. Protect from acids and acidic or alkaline detergents or solutions contacting concrete surfaces.
7. Protect from all activities including but not limited to fire proofing, spray insulation, masons, steel erectors and painting over concrete surfaces.
8. Do not allow other trades to mark on the floor with any material (including tape) other than orange, blue or white chalk.
9. Prohibit storage or lying of any material for a minimum of 28 days after concrete placement. After 28 days use cardboard in between any materials laid on concrete and if the floor is covered with any material such as Masonite, plywood or plastic sheets all seems must be taped to ensure even vapor transmission from the curing process.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE CRITERIA**

- A. Source Limitations: Obtain primary liquid floor treatment materials through one source from a single manufacturer. Provide secondary materials including patching and fill materials and repair materials of type and from source recommended by manufacturer of primary materials.
- B. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008-inch wear n 30 minutes; and up to 400% increase in abrasion resistance.
- C. Impact Strength: ASTM C805 – 21% increase impact strength.
- D. Reflectivity: 30% increase in reflectivity.
- E. Dynamic Coefficient of Friction (DCOF): For flooring installed on walkway surfaces, provide products with the following values determined by testing identical products in accordance with ANSI A326.3 using the BOT-3000 to measure slip resistance of flooring, with the following minimum classification, reference category and performance:
  1. Level Surfaces and Treads
    - a. Interior, Dry (ID):  $\geq 0.42$  dry DCOF.
    - b. Interior, Wet (IW):  $\geq 0.42$  wet DCOF
    - c. Interior, Wet Plus (IW+): minimum DCOF of 0.50.
    - d. Exterior Wet Classification (EW): Minimum DCOF of 0.55.
    - e. Oils/Greases (O/G): Minimum DCOF of 0.55.
  2. Ramp Surfaces: 0.55 minimum DCOF

### **2.2 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Advanced Floor Products; Retro Plate 99.

- b. ARDEX Americas; PC 50 Lithium Densifier.
- c. Euclid Chemical Company (The); an RPM company; Euco Diamond Hard.
- d. H&C® Decorative Concrete Products; a brand of Sherwin-Williams Co.; ENDURAPOLISH Clear Liquid Hardener & Densifier.
- e. Laticrete International, Inc.; FGS Hardener Plus.
- f. Moxie International; Moxie Shield 1500 Penetrating Sealer.
- g. PROSOCO, Inc; Consolideck LS.
- h. Questar; DiamondQuest Densifying Impregnator.
- i. Vexcon Chemicals Inc.; Certi-Shine Clear.

## **2.3 RELATED MATERIALS**

- A. Joint Filler: Non-staining joint filler compatible with liquid floor treatments and recommended in writing by liquid floor treatment material manufacturer.
- B. Neutralizing Agent: Tri-sodium phosphate.
- C. Water: Potable.

## **2.4 REPAIR MATERIALS**

- A. Crack Repair Material: Manufacturer's standard product recommended in writing by liquid floor treatment material manufacturer.
- B. Patching Material: Manufacturer's standard product recommended in writing by liquid floor treatment material manufacturer.
- C. Cement Binder Repair Material: Manufacturer's standard product recommended in writing by liquid floor treatment material manufacturer.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Verify that surfaces conform to product manufacturer's requirements for substrate conditions.
  - 2. Verify floor is free of curing membrane, bond-breaker, concrete laitance, and will absorb water per water absorbency test.
- B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

## **3.2 PREPARATION**

- A. Clean substrates of substances incompatible with liquid floor treatments and polishing.
- B. Provide clean, dry, and neutral substrate for liquid floor treatments and polishing.

1. Concrete: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with liquid floor treatments and polishing.
  2. Alkalinity Testing: Perform alkalinity testing in accordance with ASTM F710. Proceed with installation only after substrates have pH between 8 and 10.
  3. Moisture Vapor Transmission Testing: Perform anhydrous calcium chloride testing in accordance with ASTM F1860. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 pounds of water per 1,000 square feet of slab in 24 hours.
  4. Moisture Testing: Perform moisture testing in accordance with ASTM F2170. Proceed with installation only after substrates have maximum 75 percent relative humidity.
- C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.
1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.
- D. Concrete floor slab shall be in place a minimum of 45 days or as directed by the liquid floor treatment manufacturer before application can begin.

### 3.3 POLISHING

- A. General: Comply with polished concrete floor treatment manufacturer's instructions for polishing concrete to produce a consistent finish in contiguous areas.
1. Delay initial grinding until heavy trade work is complete and construction traffic through area is restricted.
  2. Extend polished concrete finishing into recesses and under equipment, casework, and furniture in the spaces shown or scheduled to receive polished concrete finishing. Form a complete floor finish without interruptions or seams.
  3. Polish and finish concrete floor uniformly and neatly around obstructions so as to achieve continuous color, pattern and finish throughout the Work.
  4. Complete polished concrete finishing work prior to contiguous work which might be damaged by water, cement or other materials used.
- B. Treating Surface Imperfections:
1. Mix patching compound and grout material with dust created by grinding operations to match color of adjacent concrete surface.
  2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids.
  3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from 10 feet away under lighting conditions that will be present after construction.
- C. Polish: Level 2: Low sheen, 400 grit.
- D. Aggregate Exposure: Match existing adjacent polished concrete floors with A, Cream (very little aggregate exposure); or Level B, fine aggregate (1/16-inch-deep salt and pepper finish), to be verified in field.
- E. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.

1. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
4. Control and dispose of waste products produced by grinding and polishing operations.
5. Neutralize and clean polished floor surfaces.

### **3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Representative: Manufacturer's technical representative shall examine concrete surfaces to be finished and polished, verify that surfaces conform to product manufacturer's requirements for substrate conditions, and train applicator in application, grinding and polishing of specified systems.
- B. Field Testing: Engage a qualified walkway auditor to perform field testing according to ANSI/NFSI B101.3, and ANSI A326.3 using the BOT-3000, to determine if polished concrete floor finish complies with specified dynamic coefficient of friction.

### **3.5 CLEANING**

- A. Remove grinding dust from installation and adjacent areas.
- B. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to dry thoroughly.
- C. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure terrazzo is without damage or deterioration at time of Final Completion.

### **3.6 PROTECTION**

- A. Protect finished work until fully cured in accordance with manufacturer's recommendations.

### **END OF SECTION**