

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 01 Specification sections, apply to work of this section.
- B. Section 033000, Cast-In-Place Concrete

1.2 DESCRIPTION OF WORK

- A. Diamond polishing concrete floors.

1.3 SUBMITTALS

- A. Product Data: for each product proposed.
- B. Test and Evaluation Reports: independent third-party test reports indicating compliance with specified requirements.
- C. Manufacturer's Instructions:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Concrete grinding procedures.
- D. Field Quality Control Submittals:
  - 1. Manufacturer's certification
  - 2. Final coefficient of friction test results.
- E. Qualification Statements
  - 1. Applicator's statement of qualifications.
  - 2. Applicator's certification by manufacturer.
- F. Closeout Submittals
  - 1. Manufacturer's instructions for cleaning and maintenance.
    - a. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
    - b. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.
  - 2. Warranty Documentation.

3. Material Safety Data Sheets.

1.4 QUALITY ASSURANCE:

- A. Reference Standards:
  - 1. ACI – American Concrete Institute
    - a. 302.1R – Guide for Concrete Floor and Slab Construction
  - 2. ANSI – American National Standards Institute NFSI – National Floor Safety Institute
    - a. B101.3 – Measuring Wet DCOF of Common Hard Surface Floor Materials
  - 3. ASTM – ASTM International (formerly American Society for Testing and Materials)
    - a. E 430 – Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.
    - b. E 1155 – Determining FF Floor Flatness and FL Floor Levelness Numbers
  - 4. CPAA – Concrete Polishing Association of America.
- B. Applicator's Qualifications
  - 1. Polishing and application of liquid products shall be by an applicator certified by the manufacturer of either the liquid applied products or the polishing equipment for application of its complete system.
  - 2. Company shall have successfully completed a minimum of 5 projects similar in nature, size, and extent to this Project that are more than 2-years old.
  - 3. Company shall be familiar with special requirements indicated; and having complied with the requirements of authorities having jurisdiction.
  - 4. Supervision: Maintain competent supervisor who is at Project during times specified work is in progress and is currently certified as Craftsman or Master Craftsman by CPAA.
- C. Mock-ups
  - 1. Prepare an area not less than 150 square feet for each scheduled finish, including edges and joints, in location approved by Architect.
  - 2. Use same personnel, including supervisors, that will perform work.
  - 3. Work shall be representative of those to be expected for work.
  - 4. Finish various components to show maximum variation that will exist in work.
  - 5. Maintain field mock-up(s) during construction in an undisturbed condition as a standard for judging completed work.
  - 6. Approved mock-up area(s), if undamaged, may remain as part of the completed Work.

1.5 SITE CONDITIONS:

- A. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.
  - 1. Prohibit vehicle parking over concrete surfaces to be polished.
  - 2. Prohibit pipe cutting operations over concrete surfaces to be polished.
  - 3. Prohibit storage of any items over concrete surfaces to be polished for not less than 28 days after concrete placement.
  - 4. Prohibit ferrous materials storage over concrete surfaces to be polished.
  - 5. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces to be polished.
  - 6. Protect from acids and acidic detergents contacting concrete surfaces to be polished.
  - 7. Protect from painting activities over concrete surfaces to be polished.
  
- B. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting liquid applied product application.

1.6 WARRANTY

- A. Manufacturer shall warrant completed floor finish for not less than ten (10) years from the date of Certified Completion. Defects subject to warranty correction shall include:
  - 1. Dusting due to abrasion.
  - 2. "Yellowing" or other discoloration.
  - 3. Measurable loss of sheen.
  - 4. Measurable degradation of slip resistance.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. Floor finishing shall be an integrated system of products and procedures for diamond polishing concrete floors using multi-step wet/dry mechanical process, and accessories indicated, specified, or required to complete polishing.
  
- B. Floor finishing system shall be a certified system of the manufacturer of either the liquid applied products or the polishing equipment.

## 2.2 PERFORMANCE CRITERIA

- A. Slip Resistant: Surfaces shall be stable, firm and slip resistant compliant with CBC 11B-302.1.
- B. FDA and/or USDA authorized for food-handling areas.
- C. Products shall contain not VOCs.

## 2.3 LIQUID APPLIED PRODUCTS

- A. Liquid Densifier: Odorless, non-hazardous, silicate that penetrates concrete to react with free lime and calcium hydroxide to produce permanent chemical reaction that hardens and densifies concrete surface.
- B. Color
  - 1. Dyes: Extremely fine molecules of color solvent or dye for mixing with water or acetone that is designed to penetrate and color concrete surface.
  - 2. Pigmented Microstains: Extremely fine pigment particles in water-based silicate solution that penetrates concrete and reacts with calcium hydroxide to lock in color particles.
  - 3. Owner to select color from contractor provided catalogue of samples.
- C. Polish Guard Sealer: Non-film forming, stain resistant, food resistant, chemical stain resistant, impregnating sealant designed to be used on concrete surfaces previously densified.

## 2.4 ACCESSORIES

- A. Patching Compound: Compound composed of 40 percent portland cement, 45 percent limestone, and 15 percent vinyl acetate copolymer, when mixed with dust salvaged from grinding process forms a paste that hardens when surface imperfections are filled.
- B. Grout Material: Clear modified silicate sealant, containing no pore clogging latex, when mixed with dust salvaged from grinding process forms a paste that reacts with calcium hydroxide in concrete that hardens when surface imperfections are filled.
- C. Protective Cover: Non-woven, puncture and tear resistant, polypropylene fibers laminated with multi-ply, textured membrane, not less than 18 mils in thickness.

## 2.5 POLISHING EQUIPMENT

- A. Field Grinding and Polishing Equipment:
  - 1. Variable speed, multiple head, counter-rotating, walk-behind machine with not less than 600 pounds of down pressure on grinding or diamond polishing pads.
  - 2. If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.
- B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.
- C. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 1000 to 2000 revolutions per minute and with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 degrees F.
- D. Metal Bonded Pads: Grinding pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.
- E. Resin Bonded Pads: Polishing pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.
- F. Burnishing Pads: Maintenance pads for use with high speed burnishing equipment.

## 2.6 FINISHES

- A. Surface Class – Grinding
  - 1. Class B – Fine Aggregate (Salt and Pepper) Finish: Remove not more than 1/16 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying fine aggregate with no, or small amount of, medium aggregate at random locations.
- B. Gloss Level – Polishing
  - 1. Level 2 – Medium Gloss Appearance:
    - a. Procedure: Not less than 5 step process with full refinement of each diamond pad up to 800 grit resin bonded pad with one application of densifier.
    - b. Gloss Reading: Not less than 55 according to ASTM E 430 before polish guard application.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. For new concrete, verify all of the following:
  - 1. Concrete has cured for at least 28 days, or to a strength of 3500 psi, whichever is greater.
  - 2. Concrete has been finished to ACI 302.1R, Class 5.
  - 3. Floor is flat and level to ASTM E 1155.
    - a. See Section 033000 Cast-In-Place Concrete for overall values of flatness and minimum local values of flatness.
  - 4. No petroleum products have been used, or accidentally spilled, on concrete.
- B. Proceeding with work of this Section indicates acceptance of conditions.

#### 3.2 PREPARATION

- A. Ensure surfaces are clean and free of dirt, oil, grease, previous coatings or sealers, and other foreign matter detrimental to performance of concrete finishing materials.
- B. Ensure Soundness of concrete for polishing. Any loose, crumbling, or deteriorated concrete shall be repaired.

#### 3.3 INITIAL GRINDING

- A. Use grinding equipment with metal bonded diamond grinding pads.
- B. Begin grinding in one direction using sufficient size grid pad.
- C. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 150 grit.
- D. Achieve maximum refinement with each pass before proceeding to finer grit pads.
- E. Vacuum floor using squeegee vacuum attachment after each pass.
- F. Continue grinding until aggregate exposure matches approved field mock-ups.
- G. After initial grinding, treat any surface imperfections as follows:
  - 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 present after construction.

### 3.4 COLORING

- A. Apply color after initial grinding and prior to, after, or in conjunction with densifier, as recommended by color and densifier manufacturer(s).
- B. Apply solution by methods and techniques required by manufacturer to produce finish matching approved mock-ups.
- C. Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.
- D. Maintain consistent saturation throughout application.
- E. Avoid splashing, dripping, or puddling of solution on adjacent substrates.
- F. When color matches approved mock-ups, neutralize as required by manufacturer.

### 3.5 DENSIFIER APPLICATION AND GROUT GRINDING

- A. Liquid Densifier Application: Apply undiluted to point of rejection, remove excess liquid, and allow to cure according to manufacturer's instructions.
- B. Grout Grinding:
  1. Use grinding equipment and appropriate grit grinding pads.
  2. While applying fresh grout material prior to, grind concrete in direction perpendicular to initial grinding to remove scratches.
  3. Vacuum floor using squeegee vacuum attachment after each pass.

### 3.6 HONING AND POLISHING

- A. Honing:
  1. Use grinding equipment with resin bonded diamond grinding pads.
  2. Grind concrete in one direction starting with 50 grit pad and make as many sequential passes required to remove scratches, each pass perpendicular to previous pass, up to 400 grit pad reaching maximum refinement with each pass before proceeding to finer grit pads.

3. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.
- B. Polishing:
1. Using polishing equipment with resin bonded diamond polishing and burnishing pads.
  2. Begin polishing in one direction starting with 800 grit pad.
  3. Make sequential passes with each pass perpendicular to previous pass using finer grid pad with each pass, up to 800 grit for Level 2 Medium Gloss.
  4. Achieve maximum refinement with each pass before proceeding to finer grid pads.
  5. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.
  6. Continue polishing until gloss appearance, as measured according to ASTM E 430, Matches approved field mock-ups.
- C. Polish Guard Sealer: Uniformly apply and remove excessive liquid according to manufacturer's instructions.
- D. Final Polish: Using burnishing equipment and finest grit burnishing pads, burnish to uniform sheen matching approved mock-up.

### 3.7 FIELD QUALITY CONTROL

- A. Completed floor coefficient of friction shall be tested using ANSI/NFSI B101.3.

### 3.8 CLOSEOUT ACTIVITIES

- A. Maintenance Training: CPAA Master Craftsman shall train Owner's designated personnel in proper procedures for maintaining polished concrete floor.

### 3.9 PROTECTION:

- A. Covering: After completion of polishing, protect polished floors from subsequent construction activities with protective covering.

END OF SECTION