SECTION 03354 DIAMOND POLISHING CONCRETE FLOORS

GENERAL

SUMMARY

Section Includes: Products and procedures for diamond polishing concrete floors using multi-step dry mechanical process, and accessories indicated, specified, or required to complete polishing.

DEFINITIONS

Terminology: As defined by CPAA.

REFERENCES


American Concrete Institute: ACI 302. 1R-89, Guide for Concrete Floor and Slab Construction

Other Test:

1. Reflectivity

SUBMITTALS

Product Data: Manufacturer’s technical literature for each product indicated, specified, or required. Include manufacturer’s technical data, application instructions, and recommendations.

Installer Qualifications: Data for company, principal personnel, experience, and training specified in PART 1 “Quality Assurance” Article.

Field Quality Control – Static Coefficient of Friction Test Reports: Reports of testing specified in PART 3 “Field Quality Control” Article.

Maintenance Data: For inclusion in maintenance manual required by Division 01760.

1. Include manufacturer’s instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
2. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

QUALITY ASSURANCE

Polisher Qualifications:

Experience: Company experienced in performing specified work similar in design, products, and extent to scope of this Project; with a record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.

Supervision: Maintain competent supervisor who is at Project during times specified work is in progress, and is have experience completing projects greater than 15,000sf.

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Manufacturer Qualification: Approved by manufacturer to apply liquid applied products. Provide letter from manufacturer stating approved applicator status.

Walkway Auditor: Certified by NFSI to test polished floors for static coefficient of friction according to NFSI 101-A.

Static Coefficient of Friction: Achieve not less than 0.5 for level floor surfaces as determined by quality control testing according to NFSI 101-A.

Field Mock-up for Aesthetic Purposes: Before performing work of this Section, provide as many field mock-ups required to verify selections made under submittals and to demonstrate aesthetic effects of polishing. Approval does not constitute approval of deviations from Contract Documents, unless such deviations are specifically approved by Architect in writing.

Grind, hone, stain and polish one entire room as directed by the architect for each finish approved under sample submittals; include edges and joints. Use same personnel, including supervisors, which will perform work. Install products and materials according to specified requirements. Work shall be representative of the finished product that is to be expected for work. Finish various components to show maximum variation that will exist in work. Approval is for following aesthetic qualities:

- Compliance with approved submittals.
- Uniformity of exposed aggregate.
- Uniformity of sheen.
- Dust control measures will be assessed as part of the mockup review.

Obtain Architect's approval before starting work on Project. Protect approved field mock-ups from elements with weather resistant covering. Maintain field mock-ups during construction in an undisturbed condition as a standard for judging completed work. Do not demolish, alter, or remove field mock-ups until acceptable to Owner and Architect.

Pre-Installation of Concrete Conference: Prior to placing concrete for areas scheduled for polishing, conduct conference at Project to comply with requirements of applicable Division 01 Sections.

Required Attendees:

- Owner.
- Architect.
- Contractor, including supervisor.
- Concrete polisher, including supervisor.
- Technical representative of liquid applied product manufacturers.

Minimum Agenda: Polisher shall demonstrate understanding of work required by reviewing and discussing procedures for, but not limited to, following:

- Tour mock-up and representative areas of required work, discuss and evaluate for compliance with Contract Documents, including substrate conditions, surface preparations, sequence of procedures, and other preparatory work performed by other installers.
- Review Contract Document requirements.
- Review approved submittals.
- Review procedures, including, but not limited to:
1) Details of each step of grinding, honing, staining and polishing operations.
2) Application of liquid applied products.
3) Protecting concrete floor surfaces until polishing work begins.
4) Protecting polished concrete floors after polishing work is completed.

Reports: Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending.

FIELD CONDITIONS

Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.

- Prohibit vehicle parking over concrete surfaces to be polished.
- Prohibit pipe cutting operations over concrete surfaces to be polished.
- Prohibit storage of any items over concrete surfaces to be polished for not less than 28 days after concrete placement.
- Prohibit ferrous metals storage over concrete surfaces to be polished.
- Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces to be polished.
- Protect from acids and acidic detergents contacting concrete surfaces to be polished.
- Protect from painting activities over concrete surfaces to be polished.

Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting liquid applied product application. Concrete must be at least 28 days old.

PART 2 - PRODUCTS

LIQUID APPLIED PRODUCTS

Liquid Densifier: Odorless, non-hazardous, SODIUM silicate that penetrates concrete to react with free lime and calcium hydroxide to produce permanent chemical reaction that hardens and densifies concrete surface.

Manufacturer: Lithic Solutions Colloidal Silca system, Lythic Densifier, Lythic SPD Protector, Retroplate, L&M, or approved equal.

Lythic Duet Colors for Concrete: Ameripolish dye colors

ACCESSORIES

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.

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.

Manufacturer: VersaFlex QuickMender or approved equal.

POLISHING EQUIPMENT

Field Grinding and Polishing Equipment:
Variable speed, multiple head, counter-rotating, walk-behind machine with not less than 600 pounds of down pressure on grinding or diamond polishing pads. Use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments. Provide electrical attachments necessary to connect to existing building power running either 208V or 480V.

**Edge Grinding and Polishing Equipment:** Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.

**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.

**Metal Bonded Pads:** Grinding pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

**Resin Bonded Pads:** Polishing pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

**Burnishing Pads:** Maintenance pads for use with high speed burnishing equipment.

**PART 3 - EXECUTION**

**EXAMINATION**

**Acceptance of Surfaces and Conditions:**

Examine substrates to be polished for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

**PREPARATION**

**Cleaning New Concrete Surfaces:**

Prepare and clean concrete surfaces. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.

**Dust Protection:**

Using plastic, painter’s tape, or other means mask off all walls and cabinets in classrooms, halls, and offices to protect from dust generated during polishing. Cover and protect all furnishings and computers to be sure that they are protected from dust. Use draped plastic to cover door openings into working areas. Verify that HVAC systems are disabled in affected areas and that supply and return grilles are protected from dust.
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Initial Grinding:

Use grinding equipment with metal bonded grinding pads.
Begin grinding in one direction using sufficient size grit pad.
Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 150 grit.
Achieve maximum refinement with each pass before proceeding to finer grit pads.
Vacuum floor using squeegee vacuum attachment after each pass.
Continue grinding until aggregate exposure matches approved field mock-ups.

Treating Surface Imperfections:

Mix patching compound and grout material with dust created by grinding operations to match color of adjacent concrete surface.
Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids.
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.

Liquid Densifier Application: Apply undiluted to point of rejection, remove excess liquid, and allow to cure according to manufacturer’s instructions.

Grout Application:

Prior to honing, apply one coat of approved grout material to the entirety of the work surface per manufacturer’s installation instructions.
Use grinding equipment and appropriate grit grinding pads to remove all grout from the surface of the concrete.
Grind concrete in direction perpendicular to initial grinding to remove scratches.
Vacuum floor using squeegee vacuum attachment during each pass.

Honing:

Use grinding equipment with resin bonded grinding pads.
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.
Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

Staining: As per mfr recommendations.

Polishing:

Use polishing equipment with resin bonded polishing and burnishing pads.
Begin polishing in one direction starting with 800 grit pad.
Edges shall be polished within 1/8” of wall.
Make sequential passes with each pass perpendicular to previous pass.
Achieve maximum refinement with each pass before proceeding to finer grit pads.
Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.
Continue polishing until gloss appearance, as measured according to ASTM E 430, matches approved field mock-ups.
**Final Polish**: Using burnishing equipment and finest grit burnishing pads, burnish to uniform sheen matching approved mock-up.

**Final Polished Concrete Floor Finish:**

- **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.

- **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.

**Sealer**

- **Apply** “Lythic SPD Protector” by Lythic Solutions, Inc. on the entire floor as a final finish of the polished concrete. Follow application directions and burnish with the recommended pad for final sheen.

**Temperature Range**: 50°F to 100°F.

Mix equal parts of sealer part A and part B. for 1 minute, in a clean pail with mixing paddle or cage mixer.

Using 1/4” to 3/8” nap roller, apply sealer from a roller pan to wet out the floor surface area without puddling.

After 5 minutes, back roll applied area while still wet to remove roller marks.

Working Time: 1 to 2 hours.

Allow 2 to 4 hours to dry before light traffic. After 24 hours sealer can be burnished with a hogs hair pad or fiber polishing pad on floor polishing equipment, to increase shine to match the mockup.

Fully cures in 48 hours.

**CLOSEOUT ACTIVITIES**

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

**PROTECTION**

After completion of polishing, protect polished floors from subsequent construction activities.

Cover surface to protect with breathable product such as kraft paper or thin curing blanket.

**END OF SECTION**