

SECTION 033543 - CONCRETE POLISHING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes polished concrete finish for interior concrete floors denoted on Finish Schedule as PSC (Polished Sealed Concrete). Polished concrete finished for pre-cast concrete, vertical cast-in-place concrete, and exterior concrete are specified in the sections for those types of concrete.
 - 1. Furnish all labor, material, equipment and services necessary for the dry diamond grinding and polishing of concrete floors.
 - 2. Applying densifying impregnator/sealer and polishing to specified sheen level and aggregate exposure.
 - 3. Concrete must be cured a minimum of 28 days prior to polishing.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections.
 - 1. Section 099323 "Interior Transparent Finishes" for slab surfaces scheduled to be sealed concrete.

1.3 REFERENCES

- A. American Concrete Institute (ACI):
- B. American Society for Testing and Materials:
 - 1. ASTM C779, Standard Test Method for Abrasion of Horizontal Concrete Surfaces
 - 2. ASTM C805, Impact Strength
 - 3. ASTM G23-81, Ultraviolet Light and Water Spray
 - 4. ASTM 1028, Co-Efficient of Friction
 - 5. ASTM C 150, Type I, II Portland cement conformity, depending on soil conditions
 - 6. ASTM C 33, Aggregate conformity
- C. Other Tests:
 - 1. Reflectivity

1.4 SUBMITTALS

- A. Submit the following in accordance with Submittal Procedures in Division 1 Sections.
- B. Product data for concrete densifying impregnator, penetrating sealer, concrete dyes, joint filler and any other chemicals used in the process.
- C. Applicators qualification data.
- D. Protection Mat System product and installation data.
- E. Polished concrete samples: size 3"x3" for each Polished Concrete finish required.
- F. Maintenance procedures for Polished Concrete using diamond impregnated cleaning pads.

1.5 QUALITY ASSURANCE

- A. Certified Contractors:
 - 1. Pre-qualified contractors meeting ALL requirements set forth within specifications.
 - 2. No substitutions will be allowed or approved.

- B. Pre-Pour Installation Conference: Conduct conference at project site to comply with requirements in Division 1 Sections "Special Conditions" and "Administrative Requirements".
- C. Provide project names, addresses, contact names, phone numbers, of at least three (3) projects of similar scope and size completed by the installer.
- D. Manufacturer's Certification: Provide letter of certification stating that the installer is a certified applicator and is familiar with proper procedures and installation requirements recommended by the manufacturer.
- E. Mock-ups:
 - 1. Mock-ups to be approximately 100 square feet per color and finish in location indicated or if not indicated, as directed by the Architect or Owner Representative.
 - 2. Install mock-ups to verify selections made under sample submittal and to demonstrate methods and workmanship proposed for the project. If mock-up not possible, submitted samples will be accepted as demonstrated methods and workmanship.
 - 3. Control joints should be included in mock-up. Sawing performed by General Contractor can begin as soon as the surface is firm enough not to displace any of the aggregate.
 - 4. Edges should be included in mock-up.
- F. Protection: General Contractor shall protect areas to receive polished concrete finish at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured:
 - 1. All hydraulic powered equipment shall be diapered to avoid staining of the concrete.
 - 2. All vehicle parking shall be prohibited on the finish slab area. If necessary to complete their scope of work, drop clothes shall be placed under vehicles at all times.
 - 3. No pipe cutting machine shall be used on the finish floor slab.
 - 4. Steel shall not be placed on the finish slab to avoid rusting.
 - 5. Acids and acidic detergents will not come in contact with slab.
 - 6. All painters will use drop cloths on the concrete. If paint gets on the concrete, it must be removed immediately.
 - 7. All trades will be informed that the slab must be protected at all times.
- G. Environmental Limitations
 - 1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.
 - 2. Flatness and Levelness
 - a. Finished concrete shall have a minimum Floor Flatness rating of at least 40
 - b. Finished concrete shall have a minimum floor levelness rating of at least 30
 - c. Finished concrete shall be cured a minimum of 28 days or at which point equipment can be put on the slab and does not displace aggregate.
 - 3. Application of finish system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.
 - 4. Finished concrete area shall be closed to traffic during finish floor application and after application, for the time as recommended by manufacturer.
- H. Concrete Mix Design
 - 1. Concrete Mixture shall be 3000 PSI or higher, non-air entrained.
 - a. Any admixtures, plasticizers, slag, fly ash or anything taking the place of Portland based cement shall be kept to a minimum.
 - b. The cement shall be Portland Cement Type I, conforming to ASTM C150.
 - c. Maintain concrete temperature below 85 degrees. Keep concrete cool and moist for as long as possible. In essence, decrease rate of hydration and drying to minimize cracking.
 - d. A dissipating cure and seal may be used, if required.
 - e. All mix designs must be approved by the Architect. Send all approved mix designs to Installer/Applicator.

- f. The Engineer/Architect shall determine the sawcut pattern, color and layout.
- g. Color loads for integral color should never be smaller than three (3) cubic yards.
- h. Use one (1) source for cement, aggregates, and pozzolans throughout the job. Monitor and control incoming material consistency. Do not use calcium chloride-based admixtures. Non-chloride admixtures may be used.
- i. Wash out all drums before loading. Keep slumps consistent with a maximum of four (4). Minimize driver added water maintaining a .45 water content ratio.
- j. Place concrete to achieve as true and smooth of a top surface as possible. Mounds or dips are not acceptable. General Contractor shall control overall flatness and levelness, including on sloping areas to within tolerances permitted by specification ASTM E1155.
- k. Slab shall be protected from indentation and footprints during pour and curing.

PART 2 - PRODUCTS

2.1 POLISHING MATERIALS

- A. Three-phase 480 Volt generator
- B. Three (3) head or four (4) head counter rotating, variable speed, electric floor grinding/polishing machines with at least 600 pounds down pressure. For example: HTC 950RX, HTC 800HD, SASE PDG 8000, Husqvarna PG820. No substitutes allowed.
- C. HTC/Pullman Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute such as the HTC 75D, HTC 86D, T8600, T12600, Bull 500, Bull 1250 & T55 or C5500. No substitutes allowed.
- D. Grinding Tools
 - 1. Metal bonded diamonds 16, 25, 40, 80, and 150 grits
 - 2. Resin bonded diamonds 100, 200, 400, 800 and 1500 grits
- E. Grinding Pads for Edges
 - 1. 30, 60 and 120 grits
 - 2. 100, 200, 400 and 800 grits
- F. Hand Grinder with dust extraction attachment and pads.
- G. Densifier: A concrete hardener chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.
 - 1. Ameripolish 3D HS; Lithium Silicate; Ameripolish
 - 2. Consolideck LS; Lithium Silicate; PROSOCO
 - 3. LionHard; Lithium Silicate; L & M Construction Chemicals
 - 4. No substitutions allowed.
- H. Control Joint and Sawcut Filler, two part polyurea.
 - 1. Hi-Tech Polyurea PE-85; Hi-Tech Systems
 - 2. Spal-Pro RS 88 Semi-Rigid Polyurea Joint Filler; Metzger-McGuire
 - 3. Euco QwikJoint 200, The Euclid Chemical Company
 - 4. No substitutions allowed.
- I. Stain Guard: Protect from debris and contaminants.
 - 1. Ameripolish 3D SP Stain Protector; Ameripolish
 - 2. Consolideck LSGuard; PROSOCO
 - 3. Petrotex; L & M Construction Chemicals
 - 4. No substitutions allowed.
- J. Diamond Impregnated Cleaning Pads
 - 1. Consolideck Heat Pad; PROSOCO, Inc.

2. Magic Polishing Pad; SASE Company

2.2 MISCELLANEOUS MATERIALS

- A. Floor Protection Mat System: Provide floor protection consisting of a flexible, peelable concrete base coat and a pre-treated polyester fabric mat, combined to form a temporarily adhered slip-resistant protection mat.
- B. Basis of Design Product: Provide Skudo HT (heavy traffic) Commercial Mat System consisting of proprietary base coat and mat material.
 1. Provide heavy duty spray adhesive as recommended by the mat system for sealing lap joints in the mat material.
 2. Provide all necessary tools and accessories as recommended by the manufacturer for a complete installation.

PART 3 - EXECUTION

3.1 GENERAL

- A. This concrete slab must be treated as a finished floor at all times during construction. The General Contractor is responsible for protecting the slab until the building is signed off by the owner.

3.2 PREPARATION

- A. Installer shall examine and approve concrete substrate for conditions affecting performance of finish. General Contractor shall correct conditions that are found to be out of compliance with the requirements of this section. Repairs are not acceptable unless specifically approved on a case-by-case basis by the Architect.
- B. Verify that base slab meets finish and surface profile requirements listed in Division 3, Section "Cast in Place Concrete".
- C. Provide floor clean of materials and debris.
- D. Protect adjacent surfaces as required to prevent damage by the concrete polishing procedure.
- E. Set up grinding machine, dust extraction system, tooling and generator.
- F. Ensure floor cured to accept polishing application.

3.3 PROTECTION MAT

- A. Preparation: Follow manufacturers written requirements for substrate and preparation requirements. Before applying the protective mat system:
 1. Ensure the surface pH is below 11.0 and moisture content is below 15%.
 2. Ensure the surface temperature is above 40 and below 105 degrees F.
 3. Do not apply the system externally if rain is likely within 6 hours.
 4. Ensure all densifiers, grouts, sealers, guards, epoxies etc. have been cured to their manufacturer specifications (touch dry is not sufficient).
 5. Ensure the area is clean and free from any prior coatings and any foreign materials that will contaminate or compromise the base coat.
 6. Clear the area of any traffic and cordon off the area for at least 3 hours to allow the protective mat system to fully dry. Allow no machine traffic for 24 hours minimum.
 7. Ensure good ventilation.
- B. Spot Test: Apply base coat with a brush or roller to a sample test area of approximately 12 square inches. Allow to dry thoroughly (dry time will vary between 10 to 30 minutes depending on airflow, temperature, humidity and sunlight exposure). Once the base coat is completely dry, peel it up. Inspect the surface for:
 1. Peel-ability
 2. Discoloration or staining
 3. Unusual residues
- C. Application: Follow manufacturer's recommended application methods and rates.

1. Base Coat Spread Rates: Apply base coat consistently to a thickness of at least 8 mils wet. The spread rates of the base coat will vary due to weather, how porous the substrate is on which it will be applied, and the application method (roller or sprayer).
 2. Top Mat Placement: Follow manufacturer's written requirements for mat application in wet base coat.
 - a. Press mat roll into wet base coat immediately after placement of base coat. Install mat at the same rate as the base coat. Press into base coat with dry roller.
 - b. Overlap subsequent widths of mats in base coat, leaving the overlap clear of base coat.
 - c. After completion of the protective mat system in an area, apply heavy duty spray adhesive to the edge overlaps and press with a dry roller.
 - d. Allow 3 hours minimum drying time before allowing foot traffic, 24 hours for machine traffic.
 3. Avoid dragging or dropping heavy objects onto the protective mat system. Repair all damage to the protective mat system immediately.
- D. Repairs: Remove damaged area of the protective mat system, clean slab and reapply base coat and top mat as described above.
- E. Removal: Peel mat and base coat from concrete slabs in areas to receive polished and stained concrete and discard. Remove only in the area where polishing and staining operations are immediately to follow. After removal allow no further machine traffic or construction activity that could affect the finish of the exposed concrete slabs.

3.4 POLISHED CONCRETE APPLICATION

- A. Applicator shall examine the areas and conditions under which work of this section will be provided and the General Contractor shall correct conditions detrimental to the timely and proper completion of the work and the Applicator shall not proceed until unsatisfactory conditions are resolved.
- B. Fill construction joints and cracks with filler products as specified in accordance with manufacturer's instructions colored to match (or contrast) with concrete color as specified by architect. All control joint and decorative sawcut filling must be performed prior to grinding application.
- C. Grind the concrete floor to within 2-3 inches of walls with 16, 25, 40 and 80 grit removing construction debris, floor slab imperfections and until there is a uniform scratch pattern and desired concrete aggregate exposure is achieved. Vacuum the floor thoroughly using a squeegee vacuum attachment. Utilize the least aggressive diamond tooling necessary to remove all debris and to achieve uniform scratch pattern.
- D. Grind the edges with 30, 60, and 120 grit grinding pads, prior to grinding the floor with each step on the larger diamond grinder, removing all of the scratches from the previous grit. Vacuum the floor thoroughly after each grind using a squeegee vacuum attachment.
- E. Grind the floor to within 2-3 inches of walls with metal bonded diamond grits of 150 and/or 300, grinding 90 degrees from each previous grind and removing all the scratches from the previous grit. Vacuum the floor thoroughly after each grind using a squeegee vacuum attachment.
- F. Polish the floor with resin bonded diamond grits of 100, 200, 400, first polishing the edges (if specified) with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each polish, clean the floor thoroughly using a vacuum with a squeegee attachment. After the 400 grit polishing step thoroughly clean the floor with a mop or auto-scrubber to prepare for dye (if specified).
- G. Apply densifying impregnator undiluted as per manufacturer's specifications and guidelines. Cover the entire work area liberally and allow to sit for ten (10) minutes. Apply again to areas where the densifying impregnator has soaked in and allow to sit for an additional thirty (30) minutes. Squeegee excess material off the floor.
- H. Polish the floor with resin bonded diamond grit of 800, first polishing the edges (if specified) with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After polishing, clean the floor thoroughly using clean water and an auto scrubber or a mop and a wet vacuum.
- I. Apply stain guard with a micro-fiber applicator and burnish with a fine 800 grit, or very fine 1500 grit diamond impregnated cleaning pad.
- J. Upon completion, the work shall be ready for final inspection and acceptance by the customer.

- K. Protect finished flooring from damage until acceptance of the project as final and complete by the Owner.

PART 4 - SCHEDULES

4.1 SHEEN

- A. Polished Concrete Level 2 1500 grit (Medium Gloss Finish):
 - 1. At a distance of 30 to 50 feet the floor will reveal moderate reflection.
 - 2. Yield a 40 to 60 degree sheen, as measured by a Horiba IG-310

END OF SECTION 033543