SECTION 03 35 43

POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation of new concrete slabs.
   2. Polished concrete finishing.
   3. Protection of concrete slabs during construction.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. 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.

C. Samples: Submit samples of each type of exposed color.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit data for Installer.

B. Material Certificates: Submit certificates for each of the following, signed by manufacturers:
   1. Repair materials.
   2. Stain materials.
   3. Liquid floor treatments.

C. Test Reports: Submit test reports or certification from NFSI confirming that polished concrete floor finish has been tested in accordance with Method 101A and has passed Phase 2 level of certification.

D. Manufacturer’s Representative written reports for all visits, observations made and determination if installation provided upholds the required warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: Submit manufacturer's recommended cleaning and maintenance instructions for polished concrete floor finish.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer having minimum ten years documented experience in the production of special concrete finishes concrete.

B. Applicator Qualifications: Installer having minimum five years documented experience who is trained and certified as a Craftsman or Master Craftsman by the Concrete Polishing Association of America (CPAA), and an authorized licensee of the system manufacturer with skilled and trained workmen, and who is regularly engaged in the finishing of polished concrete.

C. Single Source Responsibility: Provide necessary materials, chemical compounds including densifiers, hardeners, stains, and sealers by a single manufacturer. Prospective applicators shall submit a statement of certification from the manufacturer.

A. Ensure all slab areas have been preconditioned with hardener / densifier acceptable to the manufacturer and compatible with her Polished Concrete Finishing system to a minimum level of 5 on the Mohs hardness scale prior to any grinding. Refer to Field Quality Control for manufacturer's field services and confirm all substrates are acceptable prior to any Work.

B. 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 inches by 48 inches (1200 mm by 1200 mm) minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or 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.
4. Construct field sample panels prior to preinstallation conference.
5. Accepted sample panels shall remain until authorized to be removed by the Architect.

C. Mockups: Before casting concrete, build mockups to verify selections 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 10 feet by 10 feet (3 m by 3 m) mockups in the location indicated or directed by Architect.
2. Provide mockup area lighting similar in illumination, lumen output, color temperature, and both height and distance from surface as that of final areas to receive polished concrete finishing.
3. Use the same personnel, equipment, tools and methods as will be used for the remaining interior floor slab.
4. Demonstrate each finish type included in the Project for color, pattern, joint treatments, inside wall edge treatments, and protective sealers.
5. Demonstrate curing, finishing, and protecting of polished concrete.

6. Do not begin full scale product applications, floor polishing operations, or deliver major materials until Architect has approved mockup
7. Mockup shall not be a part of finished work.
8. Complete mockup upon initial deployment, prior to color or pattern work is completed.
9. Mockups shall no be part of the completed Work.
10. Mockups may be utilized for sample panels if endorsed in writing by the Architect.
11. Accepted mockups shall remain until authorized to be removed by the Architect.

D. 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. Review cold and hot weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.
3. Review field sample panels with Owner for comments on final finishes intended to be incorporated into the Work.

E. Manufacturer’s Field Services: Engage Manufacturer’s representative to provide technical assistance and guidance for surface preparation and application of floor system and final finish. Manufacturer’s representative shall furnish written reports to the Architect and Owner for all visits, observations made and if installation used upholds the required warranty.

1.6 COORDINATION

A. Coordinate concrete polishing with cast in place concrete work. Coordinate the use of self dissipating chemical curing compounds or moisture curing methods to cure green concrete. Do not apply combinations of curing and hardening compounds.

B. The concrete slab is the finished floor. Do not allow marking of the floor in finished areas other than with chalk. Do not apply chemical products other than those approved by polishing system manufacturer.
1. Petroleum Based Stains and Residue: Prevent the spill of petroleum based chemicals and compounds. No chemical process or cleaning system is known that will remove petroleum stains, hydraulic fluid and other similar penetrating chemicals from concrete surfaces. The prevention of spills is essential.
   a. Parking of vehicles or equipment on the slab without protection, such as plastic or nonabsorbent drop clothes under the vehicles, is not permitted.
   b. Diaper hydraulic equipment used on concrete floor during the work.

c. Do not fit or cut pipe on the concrete slab.
d. Do not place steel on the concrete slab without protection beneath.
e. Check tires on equipment for screws and nails that cause chips or mar the surface.
f. Do not install bolts, expansion anchors, pins, nails, or fasteners penetrating the floor slab unless part of a permanent structure or concealed from view in the final layout of the space.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in original, factory sealed, unopened, new containers bearing manufacturer's name and label intact and legible, with the following information:
1. Name or title of material.
2. Manufacturer's standard container drum numbers.
3. Thinning instructions.
4. Application instructions.

B. Maintain record of container drum numbers received and used during floor treatment.

C. Storage: Store materials in protected and well ventilated area at temperatures between 40 degrees F. and 90 degrees F unless otherwise required by manufacturer.
1. Keep containers sealed until ready for use.
2. Do not use materials beyond manufacturer's shelf life limits.

D. Handling: Protect materials during handling and application to prevent damage or contamination.

E. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

1.8 FIELD CONDITIONS

A. Traffic Control: Close areas to traffic during and after floor application. Reroute vehicular and pedestrian traffic necessary for other construction activities.

B. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with hardener/densifier manufacturer's instructions.
1. Surface Temperature: Minimum 5 degrees F above dew point.
2. Relative Humidity: Maximum 85%.

C. Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and conditions affecting polishing application and performance.
1. Concrete Flatness: 30 days after placement.
a. Floor Flatness Rating: Minimum FF40 (3/16 inch in 10 feet).
b. Floor Levelness Rating: Minimum FL 40 (3/16 inch in 10 feet).

2. Concrete Curing: White curing or white, light reflective blanket per ASTM C 171; minimum of 28 days or as directed by the manufacturer before application.
3. Application: Apply system minimum 10 days prior to installation of equipment and substantial completion, ensuring uninhibited concrete slab.

1.9 WARRANTY

A. Written warranty signed by equipment manufacturer, chemical manufacturer, and polished concrete applicator in which the manufacturers and applicator agree to repair or refinish work that fail in materials or workmanship within the specified warranty.
1. Warranty Period: 10 years for the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE POLISHING

A. Concrete Polishing System: Complete polishing system having chemical compounds compatible with each other, warranted by manufacturer.
1. Basis of Design: Provide the Retro-Plate Polished Concrete System by Advanced Floor Products, also known as Ashford. Provide a Complete polishing system having chemical compounds compatible with each other, warranted by manufacturer. Subject to compliance with requirements and a determination of aesthetic equivalent by the Architect, products by one of the following may also be acceptable:
a. Ameripolish.
b. Bomanite Co.
c. Brickform; Solomon Colors.
d. H&C Decorative Concrete Products; Sherwin-Williams Co.
e. Laticrete International, Inc.
f. Scofield, Sika Corporation.
2. Equipment:
a. HTC Systems, Inc.
b. SASE Company, Inc.

B. Concrete: Refer to Section 03 30 00 or governing Specifications of the Project.
1. Strength: Minimum 3000 psi at 30 days; minimum 4000 psi at 60 days.

C. Hardener/Densifier: Clear liquid silicate capable of permanently sealing, dustproofing, and hardening concrete surfaces and of providing abrasion resistance by chemically reacting with concrete to penetrate concrete pores, leaving no surface film or residue. Products containing silicanates are not permitted.
1. Manufacturer: Hardener/densifier manufactured or recommended by polished concrete system manufacturer to uphold the warranty.
2. Performance Criteria:
a. Abrasion Resistance: ASTM C 779; up to 400% increase in abrasion resistance.

b. Impact Strength: ASTM C 805, 21% increase impact strength.
c. Reflectivity: 30% increase in reflectivity determined using Model IG-310 Gloss Checker.
d. Densification: Achieve waterproofing, hardening, dustproofing, and abrasion resistance of the concrete surfaces while imparting specified level of sheen.

D. Joint Filler: Epoxy filler and polyurea sealant, nonstaining compatible with floor finish and recommended by floor finish manufacturer.

E. Neutralizing Agents: Trisodium phosphate or ammonia as necessary for neutralizing acid spills and for cleaning concrete substrate. Provide compatible products recommended by floor finish manufacturer's instructions, including thinners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work.
1. Verify concrete slab complies with finish and surface profile requirements.
2. Prior to application, verify concrete floor surfaces are free of laitance and construction materials.
3. Verify concrete has been in place and cured a minimum of 30 days prior to the commencement of application. Curing time may only be reduced if acceptable documentation is received by the manufacturer clearly indicating the minimum curing time to achieve the desired finish and uphold the warranty.
4. Examine concrete slab; verify slab is free of holes, voids, or defects.
a. Correct cracks and abrupt changes in surface profile.
b. Remove fins and projections.
c. Remove curing compounds and sealers

B. Proceed with installation after correcting unsatisfactory conditions

3.2 PREPARATION

A. Protect surrounding and adjacent surfaces, partitions, and permanent fixtures to prevent damage in accordance with manufacturer's recommendations. Provide dust drapes as necessary. Do not apply tape to the floor.

B. Close areas to traffic during and after floor finish application for time recommended by hardener/densifier manufacturer.

C. Ensure slab has been preconditioned with densifier to a minimum level of 5 on the Mohs hardness scale prior to grinding.

D. Cleaning Substrate: Remove curing, sealing and coating agents, oil, breaking compound residue, wax, and grease by scraping off heavy deposits mechanically or chemically to assure penetration of product into surface.

1. Power sweep floor area with dust free equipment.
2. Treat oil spots with oil emulsifier and oil absorbent materials to remove oils from below concrete surface. Scrub oil spot areas and remove liquids with vacuum.
3. Scrub floor with automatic scrubber capable of a minimum of 80 pounds head pressure, each head equipped with cleaning combo or light grit brushes and a neutral pH cleaning detergent compatible with all components of the finish system and penetrating sealer. Remove liquid as floor is scrubbed. Scrub floor a second and final time with clean water only and remove liquid as floor is scrubbed. Allow slab to air dry.

E. Grind protrusions flush with surface. Patch voids, holes and cracks with recommended cementitious patching compound compatible with floor finish.

F. Substrate Testing:

1. Alkalinity Testing: Perform pH test in each concrete slab areas in accordance with ASTM F710. Proceed with installation after substrate alkalinity falls within range on pH scale of between 7 and 8 or recommended by manufacturer in writing.
   a. pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than recommended, neutralize concrete prior to commencement of installation.
2. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m). Perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
   a. Anhydrous Calcium Chloride Test: ASTM F 1869.
   b. Remediation Measures: Install MVE control system in locations where concrete substrate MVER exceeds 5 lb of water/1000 sq. ft. (228.15 kg of water/(304.8 sq. m) in 24 hours.
      1) Comply with requirements of Section 09 61 05.

G. Existing Concrete: Prepare and clean concrete surfaces.

1. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
2. Remove dust and loose material by brushing, sweeping, vacuuming, and blowing with high pressure air.
3. Remove paint residue with solvent/stripper provided the stripper does not have an acidic pH.
4. Remove tire marks and residue with recommended nonacidic cleaning agents.
   a. Comply with manufacturer’s detailed instructions prior to mixing and removal.
   b. Dilute cleaning agent in recommended proportions to avoid etching concrete and opening of concrete pores.
5. Dense Concrete Slabs: Acid wash with a solution of one part muriatic acid to 20 parts water; sand lightly to open surfaces. Retest and continue surface preparation

until water no longer spots and is immediately and uniformly absorbed by concrete slab.

a. Rinse concrete slab until rinse water is clear and clean and retest for moisture.

H. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and contaminants.

3.3 POLISHING

A. Provide polished concrete floor treatment to entirety of slab area indicated on drawings. Provide consistent finish in contiguous slab areas. Comply with flooring system manufacturer's recommendations and instructions regarding preparation and mixing of materials and application of each component of floor system.

B. Polish: Level 3: High sheen, 800 grit ; Gloss reading 50-60, minimum 6 abrasive passes.

1. Semi Polished appearance; Objects being reflected are not quite sharp and crisp but can be easily identified.

C. Aggregate Exposure: Provide Aggregate Exposure Class B, Fine Aggregate (salt and pepper finish) as defined in the following table:

CLASS	NAME	APPROXIMATE SURFACE CUT DEPTH	APPEARANCE
A	Cream	Very little	Little aggregate exposure
B	Fine aggregate (salt & pepper finish)	1/16 inch	Fine aggregate exposure with little or no medium aggregate at random locations.
C	Medium aggregate	1/8 inch	Medium aggregate exposure with little or no large aggregate at random locations.
D	Large aggregate	1/4 inch	Large aggregate with little or no fine aggregate exposure

D. 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 the finish in the approved mockup.
2. Continue polishing with progressively finer grit diamond polishing pads to gloss level, to match approved mockup.
3. Control and dispose of waste products produced by grinding and polishing operations.
4. Neutralize and clean polished floor surfaces.

E. Grinding: Machine grind floor surfaces to receive polished finishes level and smooth.

1. Rough Grinding: Mechanically grind floor using the specified grits.
   a. 30/40 grit pad.

b. 80 grit pad.
c. 150 grit pad.

2. Fine Grinding: Mechanically grind floor using the specified grits.
   a. 100 grit.
   b. 400 grit.
   c. 800 grit.
3. Final Polish: Shall meet Owner's current standards by written confirmation for Project Record.

F. Hardener/Densifier:
1. Apply at the recommended rates in accordance with manufacturer's written instructions.
2. First Coat: 200 sf. per gallon.
3. Second Coat: 1,000 s.f. per gallon.
4. Third and Fourth Coats: Spiff coat, applied following Level 3 polishing.
5. Recoat floor where suction spots or unsealed areas occur in first coat to ensure finish coat free of defects due to insufficient sealing or polishing. Apply additional spiff coat application if required by floor finish manufacturer.

G. Refinish concrete slab overall and where suction spots or unsealed areas occur in first coat to ensure a finish coat free of defects due to insufficient sealing or polishing. Apply additional spiff coat application if required by floor finish manufacturer.

H. Continue polishing with progressively finer grit diamond polishing pads to required gloss level.

3.4 FINISHING

A. Penetrating Sealer: Spray apply sealer to comply with manufacturer's instructions.
1. Apply sealer to produce surface without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections. Produce sharp glass lines and color breaks. Do not permit sealer to pond and dry on concrete surface. Squeegee ponding sealer to spread.

B. Control and legally dispose of waste products produced by grinding and polishing operations. Neutralize and clean polished floor surfaces.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Engage Manufacturer's representative to provide technical assistance and guidance for surface preparation and application of floor system and final finish.

B. Inspect floor finish for defective materials and workmanship. Note areas which are stained, are not consistent in finish characteristics with finish of adjacent areas, or areas which have been insufficiently prepared or polished.

C. Repair and replace defective areas.

3.6 REPAIR, CLEANING, AND PROTECTION

A. Refinish or replace damaged finished surfaces. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
   1. Finish edges of floor finish adjoining other materials clean and sharp.

B. Protect polished concrete from stains, laitance, and contamination during remainder of construction period. Maintain polished concrete floors by sweeping. Clean spills immediately upon each occurrence and rinse with water.
   1. Wet clean heavily soiled areas by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and quality commercial detergent.
   2. Buff finished floors complying with floor finish manufacturer's instructions.

C. Protect floor from traffic for at least 72 hours after final application of sealer.

D. Protect all concrete slabs during construction as indicated in ACI 302.1R including but not limited to the following:
   1. Protection shall be provided against:
      a. Heavy construction traffic.
      b. Hard-wheeled traffic
      c. Impact and abrasion
      d. Imposed loads (cranes, concrete trucks)
      e. Stains from grease, oil, chemicals, paints, plaster, clay soil and other sources
      f. Rubber tire marks
      g. Deicers and other chemicals
      h. Freezing and thawing cycles.
      i. Freezing.

END OF SECTION