SECTION 03 35 20

POLISHED CONCRETE FINISH SYSTEM

PART 1 GENERAL

1.1 WORK TO INCLUDE:

A. Grinding and Polishing of interior concrete slab.

B. Application of reactive surface densifier.

C. Joint filler and installation

D. Application of stain guard surface treatment.

E. Progressive polishing of slab surface.

F. Protection of polished concrete floors.

1.2 RELATED WORK:

A. Section 03 21 00 – Concrete Reinforcement: Tapered plate dowel system

B. Section 03 30 00 - Cast-in-place Concrete

1.3 PROTECTION:

A. Finished system shall be protected against undue soilage and damage by other trades by the use of reasonable care and precaution during process of installation and after completion of installation, prior to substantial completion of project.

1.4 SUBMITTALS:

A. Color samples shall be submitted for consideration and selection in accordance with Section 01 33 00, Submittals.

B. Provide shop drawings showing pattern layout and locations of selected colors.

C. Letter of Certification: Provide Letter of Certification by the manufacturer that Contractor is a current qualified installer.

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

E. Installer Qualifications: Data for company, principal personnel, experience, and training specified in PART 1 "Quality Control" Article.

F. Maintenance Data: For inclusion in maintenance manual required by Division 01.
   1. Include 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.

1.5 JOB MOCK-UP:

A. Prior to installation of polished concrete finish system, contractor shall provide minimum 12' x 12' mock-up at the job site in area where the floor will always be visible such as a storage or mechanical room. Provide larger mock-up area if required to accommodate pattern and number of colors. Architect shall approve color and workmanship of the mock-up, then retain as a standard for judging completed work. This shall not become part of the finished work. Mock-up to be polished for approval.

1.6 QUALITY CONTROL

A. Installer Qualifications:
   1. Provide list of a minimum of 5 projects performed within last three years of similar type, size, and complexity. Submit project names, addresses, contacts, and phone numbers for each project. This is to be provided with data submittal.
   2. Company experienced in performing specified work similar in design, products, and extent to scope of this Project; with a five-year record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.
   3. Submit letter of certification from manufacturers of all products and equipment specified herein, stating that the applicator is a certified applicator of the system and is familiar with proper procedures and installation methods as required by the manufacturer. All certifications must accompany the bid.
   4. Polished concrete contractor has to have been regularly performing Polished Dyed Concrete work for at least 3 years prior to bid with manufacturer certifications or job history verifying this point. This is to be provided with data submittal.
   5. **INSTALLERS NOT MEETING THE AFORE-MENTIONED QUALIFICATION REQUIREMENTS WILL NOT BE APPROVED TO INSTALL POLISHED CONCRETE SYSTEM.**

B. All components of the polished concrete finish system shall be provided by one single system supplier / installer.

C. Do not apply polished concrete finish system when temperature is at or below 32 degrees Fahrenheit or temperatures are projected to go below freezing before dye can have time to cure.

D. Curing agents may only be used at elevated slabs where polished concrete system is to be installed. Test sample required per specification 03 30 00.

E. Power and water to be available prior to beginning of work.

1.8 PRE-INSTALLATION MEETING

A. The Contractor will schedule and conduct a pre-installation meeting **prior to pouring of concrete floors** where polished concrete is scheduled to be installed. Those attending are to include Contractor, Architect, Owner, Owner's floor maintenance representative, concrete finisher including supervisor, mason, concrete ready-mix plant representative, polished concrete installer and foreman, and other trades affected by the polished concrete system. Items to be discussed are as follows but are not limited to these:
   1. Schedule
   2. Concrete slab preparation and pouring.
   3. Required concrete mix design strength
   4. Initial grinding and polishing procedures
   5. Speed of operations for correct refinement of polished concrete
   6. Protection of floors and damage prevention during construction
   7. Project phasing and scheduling for each step of grinding, honing and polishing operations including, but not limited to:
      a. Quality of qualified personnel committed to project.
      b. Quality and size of grinders committed to project.
      c. Proper disposal of concrete slurry and/or concrete dust.
   8. Control joint cutting
   9. Control joint filler
   10. Maintenance
   11. Other items associated with polished concrete system.

1.9 WARRANTY

A. Furnish a written warranty covering both material and workmanship for period of ten (10) years from Date Of Substantial Completion.

1.10 MAINTENANCE

A. Provide owner and owners cleaning company with on site training. Instructional training video to also be provided.

B. Coordinate with owner a cleaning schedule.

C. Provide owner with a 2-month starter kit of cleaning products and pads. Cleaning products to be Amerpolish brand.

PART 2 PRODUCTS

2.1 MATERIALS/MANUFACTURERS

A. Subject to compliance with project requirements, provide products and equipment by the following:
   1. Ameripolish (479) 725-0033 www.ameripolish.com

B. Penetrating Hardener/Densifier: (Clear liquid reactive lithium-silicate based.)
   1. 3D HSL, by Ameripolish

C. Protective Surface Treatment (Stain Guard):
   1. 3D SP, by Ameripolish

D. Joint Filler:
   1. 2-part polyurea, Spal-Pro RS 88 manufactured by Metzger/McGuire, 807 Route 3-A Bow, NH 03304, 1-800-223-6680
   2. 2-part polyurea, Versaflex SL/85, rapid curing, manufactured by Versaflex, Inc., 87 Shawnee Avenue, Kansas City, KS 66105 (913) 321-9000.
   3. 2-part polyurea, PE85, manufactured by Hi-Tech Systems, 1190 N. Del Rio Place, Onterio, CA 91764 (909)945-5530
   4. Approved alternate

E. Crack Filler:
   1. 2-part polyurea, HT Spall-TX3, manufactured by Hi-Tech Systems, 1190 N. Del Rio Place, Onterio, CA 91764 (909)945-5530
   2. Approved alternate

2.2 EQUIPMENT

A. Contractor is to furnish minimum three grinding/polishing machines (HTC 800, HTC 950, Sase Products or similar) in full operating condition during the duration of work.
   1. Planetary, counter rotating variable speed floor grinder (4 head).
   2. Minimum 700 pounds of downward pressure.

B. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute.

C. Generators are required to provide required power. The Polished Concrete Contractor is to provide a minimum of two, each capable of running two classic (HTC 800 or similar) grinding machines concurrently to expedite work.

D. Allowable Grinding Heads:
   1. Metal Bonded Diamonds:
      a. Grit Size: 16, 30, 70, 100.
      b. Use of metal bonded diamonds shall be for removal of existing epoxy coating only, unless approved in writing prior to alternate use.

2. Hybrid and Resin Bonded, Phenolic Diamonds
   a. Grit Size: 50, 100, 200, 400, 800, 1500
3. Grinding/Polishing Pads:
   a. Grit Size: 60, 100, 120, 200, 400, 800, 1500, 3000.

E. Hand grinder with dust extraction attachment and pads.

F. High speed propane burnisher:
   1. Minimum 27 inch head generating pad speeds of 1,500 RPM or higher, as verified with tachometer

G. Diamond Impregnated Pads
   1. Twister Diamond Cleaning System Pads, by HTC.
   2. Diamond Polishing Pads, by Norton.
   3. SpinFlex Diamond Polishing Pads, by CPS.

H. Applicator pad:
   1. Professional Mighty Mop 077, by Quickie.
   2. 24" Microfiber Wet Room Pad, by Rubbermaid.

PART 3 EXECUTION

3.1 ADDITIONAL CONCRETE SLAB PROCEDURES FOR POLISHED CONCRETE

A. Refer to Specification 03 30 00 Cast-In-Place Concrete for concrete slab requirements

B. Additional Polished Concrete Floor Troweling Requirements:
   1. Final troweling shall be performed with finish blades.
   2. Finish blades shall be new or used steel finish blades that are in good shape.
   3. Finish blades may be steel reinforced plastic for the final pass only.
   4. Trowel as many times as possible.
   5. Lead finisher/foreman who finished the field sample shall be present for entire fresh concrete finishing process until final troweling is completed.

C. Additional Control Joint Requirements:
   1. After saw cutting, immediately vacuum up and clean residues.
   2. Employ sufficient number of saws and workers to complete cutting saw joints before shrinkage produces cracking.
   3. Saw cut to width of 1/8 inch, depth at least 1/3 thickness of the slab.
   4. Use saws, blades, skid plates, and accessories by Soff-Cut International, Inc. or approved alternate.
   5. Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent raveling or dislodging of aggregates. This will typically be from 1 hour in hot weather to 4 hours in cold weather after completing finishing of slab in that joint location.
   6. Provide at least two “Soff-Cut” saws on site with blades capable of achieving the required depth of saw cut.
   7. Extend sawed joint to the slab boundaries and abutments, including columns, drains, and

other penetrations in the path of a defined joint. Implement methods and timing of the saw cut beyond the limits of the Soff-Cut saw reach to provide a consistent depth of cut with minimal raveling of joint edges.
8. Connect a dust collection system directly to each Soff-Cut saw being used.
9. Remove all saw debris, either loose or compacted, from slab surface and joints prior to curing cover installation.

D. Additional Slab on Grade Concrete Curing Requirements
1. Do not use polyethylene sheets on exposed interior floors.

3.2 EXAMINATION

A. Verify preparation conditions before beginning work.

B. After concrete curing period (14 days minimum and 3500 psi cylinder break) has elapsed, surface must be clean and dry, physically sound and free of contamination. Surfaces must be free of holes, voids, or defects. Cracks and abrupt changes in surface profile must be corrected or accepted as is. Fins and projections must be removed.

C. Contractor must report, in writing, surfaces left in improper condition by other trades. Application will constitute acceptance by the applicator.

3.3 PREPARATION

A. Close areas to traffic during and after floor finish application for time period recommended by product manufacturer(s).

B. Clean Substrate: Removal of surface contaminants to ensure penetration of reactive surface densifier. No hazardous, flammable, toxic or solvent based cleaning materials are permitted.
1. Remove dust and loose material by brushing, sweeping, and vacuuming.
2. Remove curing, sealing and coating agents, oil, breaking compound residue, wax, and grease by mechanically scraping off heavy deposits. Remove remaining residues using Wax and Curing Compound Remover.
3. Remove deep-set oil and grease stains.
4. Remove paint residue.
5. Remove grease and general soiling with cleaner/degreaser diluted as recommended by manufacturer in an auto scrubber.
6. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
7. Thoroughly rinse floor surface to remove soap residue and contaminants.
8. Squeegee dry.

C. Repair all slab defects.

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

3.4 NEW CONSTRUCTION INSTALLATION PROCEDURE:

A. System to be installed by approved and licensed applicators from manufacturer. Comply with flooring system manufacturer's recommendations and instructions regarding preparation and mixing of materials and application of each component of floor system. Coordinate with contractor, scheduling for installation of the polished dyed concrete finish system. **Initial grinding of polished floor system to be performed prior to wall installation to assure proper polishing of entire room or area.**

B. For the initial grinding of the concrete slab, use coarse diamond segments bonded in a metallic matrix. These segments should be coarse enough to remove minor pits, blemishes, stains, or light coatings from the floor in preparation for final smoothing. A minimum of **4 passes** with 70 grit metal bonded diamond grinding heads is required. Depending on the condition of the concrete and the specified aggregate exposure additional passes and lower grit metal bonded heads may be required.

C. Protect surrounding and adjacent surfaces in accordance with floor finish manufacturer's written recommendations.

D. **Joint and/or crack filler to be installed in control joints, cracks, pitts, spalls and holes prior to final grinding and polishing.** Joint filler must bond to clean, exposed concrete for the full intended filler depth. Joints must be free of saw laitance, dirt, debris, coatings, sealers, etc. The only effective means of proper joint cleaning is the use of a dry cut saw, vacuum-equipped, with a diamond blade. The blade depth should extend to the intended filler depth. Run blade against each side wall on separate passes. After cleaning joints with saw, vacuum any remaining dust/debris from joint. Joint filler is designed to be placed to the full depth of the joint in saw-cut contraction/control or construction joints or at 2" minimum if joint depth exceeds 2". DO NOT USE COMPRESSIBLE BACKER ROD IN SAWCUT JOINTS. Follow all additional manufacturers installation instructions.

E. Grind slab surface with 150 grit metal-bonded OR 50 grit hybrid resin metal-bonded diamond grinding heads. **2 passes.**

F. Clean slab with wet auto scrubber with PH cleaner between **all** polishing passes.

G. Progressively polish slab surface with 100 and 200 grit resin-bonded, phenolic diamond heads. 2 passes each grit level minimum for a total of **4 passes**.

H. Apply reactive surface densifier per manufacturer's instructions to rejection.

I. Polish slab with 400 and 800 grit resin-bonded, phenolic diamond heads. 2 passes each grit level minimum for a total of **4 passes**.

J. Polish slab with 1,500 grit resin-bonded, phenolic diamond heads. **2 passes.**

K. Burnish slab with 3,000 grit resin-bonded, phenolic diamond heads. **2 passes.**

L. Gloss and DOI readings are required to be taken prior to the application of surface treatment (stain guard)

M. Apply protective surface treatment (stain guard) per manufacturer's instructions. Draw out material to thin film with applicator pad.

N. Slowly burnish slab with 3,000 grit diamond impregnated pad. **1 pass.**
   1. Burnisher, pad and pace of forward movement shall combine to develop a minimum floor surface temperature of 91º F directly below the burnishing pad, as measured by the operator during installation.

O. A minimum of **19 passes** are required. Additional passes may need to be provided dependent on condition of concrete, specified aggregate exposure and operation of machinery. Slurry being produced should become slightly milky to clear.

P. Progressive edge grinding will be necessary along all vertical abutments.

Q. At installer's option, water polishing can be implemented to aid in achieving specified reflective and finished requirements

3.5 EXISTING CONSTRUCTION INSTALLATION PROCEDURE:

A. **Joint and/or crack filler to be installed in control joints, cracks, pitts, spalls and holes prior to final grinding and polishing.** Joint filler must bond to clean, exposed concrete for the full intended filler depth. Joints must be free of saw laitance, dirt, debris, coatings, sealers, etc. The only effective means of proper joint cleaning is the use of a dry cut saw, vacuum-equipped, with a diamond blade. The blade depth should extend to the intended filler depth. Run blade against each side wall on separate passes. After cleaning joints with saw, vacuum any remaining dust/debris from joint. Joint filler is designed to be placed to the full depth of the joint in saw-cut contraction/control or construction joints or at 2" minimum if joint depth exceeds 2". DO NOT USE COMPRESSIBLE BACKER ROD IN SAWCUT JOINTS. Follow all additional manufacturers installation instructions.

B. Grind slab surface with 13, 60 and 70 grit metal-bonded diamond grinding heads. 2 passes each grit level minimum for a total of **6 passes**.

C. Clean slab with wet auto scrubber with PH cleaner between **all** polishing passes.

D. Progressively polish slab surface with 100 and 200 grit resin-bonded, phenolic diamond. 2 passes each grit level minimum for a total of **4 passes.**

E. Apply reactive surface densifier per manufacturer's instructions to rejection.

F. Polish slab with 400, 800, and 1,500 grit resin-bonded, phenolic diamond heads. 2 passes each grit level minimum for a total of **6 passes.**

G. Burnish slab with 3,000 grit resin-bonded, phenolic diamond heads. **2 passes.**

H. Gloss and DOI readings are required to be taken prior to the application of surface treatment (stain guard)

I. Apply protective surface treatment per manufacturer's instructions. Draw out material to thin film with applicator pad.

J. Slowly burnish slab with 3,000 grit diamond impregnated pad. **2 passes.**
   1. Burnisher, pad and pace of forward movement shall combine to develop a minimum floor surface temperature of 91º F directly below the burnishing pad, as measured by the operator during installation.

K. A minimum of **20 passes** are required. Additional passes may need to be provided dependent on condition of concrete, specified aggregate exposure and operation of machinery. Slurry being produced should become slightly milky to clear.

L. Progressive edge grinding will be necessary along all vertical abutments.

M. At installer's option, water polishing can be implemented to aid in achieving specified reflective and finished requirements

3.6 GRIND ONLY AT SEALED CONCRETE FLOORS

A. At sealed concrete floors
   1. Progressively polish slab surface with 200 grit resin-bonded, phenolic diamond heads. 1 pass.
   2. Seal with DNS-400 Sprayable Acrylic Sealer by Ameripolish.

3.7 FINISH REQUIREMENTS:

A. Aggregate Exposure:
   Class B to match existing– Fine Aggregate: Fine aggregate exposure with little or no medium aggregate at random locations. Approximate surface cut of 1/16"

B. Gloss Level: All gloss levels are to be measured using a Rhopoint IQ Gloss & DOI reader. Reader must be factory calibrated yearly.
   Level 3: Polished. Objects being reflected are sharp, crisp and easily identified. Gloss readings should range from 50 to 65 prior to surface treatment (stain guard)

C. DOI Value: All DOI (distinctness of image) values are to be measured using a Rhopoint IQ Gloss & DOI reader. Reader must be factory calibrated yearly.
   DOI, Image Clarity Values should range from 70 to 85 prior to surface treatment (stain guard)

D. Slip Resistance: Measured dynamic coefficient of friction (DCOF) shall be 0.42 or greater as measured in accordance with ANSI A137.1. Testing apparatus shall be the BOT 3000E

E. Leave work complete and ready for final inspection by Architect.

3.8 PROTECTION:

A. Contractors shall be advised that the concrete slab ***is*** the finished floor. Do not allow marking of the floor (even with pencil). Do not apply chemicals of any kind. No chemical process or cleaning system is known that will remove petroleum stains and certain other chemicals from concrete surfaces.

B. Polished floor areas are to be protected by the general contractor/construction manager with taped hardboard or ram board for duration of project until time of final cleaning. Periodically inspect protection board for damage and keep it free from debris.

C. Perform final cleaning of polished floor area after protection is removed.

D. Coordinate with Contractor to protect exposed edges of construction joints immediately following form removal.

E. Coordinate with Contractor to assure smooth, clean sawing of control joints to prevent chipping or aggregate pullout during sawing process.

F. DO NOT allow trades to park vehicles on the slab without protection, such as plastic or non absorbent drop clothes, under the vehicles.

G. ALWAYS DIAPER any hydraulic equipment used on the floor during the construction process. No exceptions.

H. NO PIPE FITTING/cutting will take place on the floor slab.

I. DO NOT place steel on the slab without protection beneath.

J. Protect surfaces to have polished concrete as follows:
   1. Barricade concrete surfaces immediately after finishing
   2. Do not allow light traffic, except for curing purposes, on concrete surfaces until concrete has obtained 1800 psi (approx 3 days).
   3. Do not allow heavy traffic on concrete surface until concrete has obtained, by test, its design strength, but not sooner than 9 days after placement.
   4. Permit concrete to dry minimum of 2 additional days after curing is completed before removing barricades.

K. Provide access ramps of compacted earth or other means along exposed concrete edges of floor slabs to prevent equipment and machinery from impacting edges. Barricade all other exposed edges to vehicular traffic which may damage edges. Broken or chipped edges along construction joints will not be tolerated.

L. When traffic is allowed on the slab tires must be WHITE. Tires shall be inspected to insure no foreign objects are embedded in tires such as rocks, screws, nails, etc., which could damage polished floor finish.

M. DO NOT ALLOW BLACK TIRES on polished concrete slabs. If black tire equipment must access the slab the tires must be fitted with protective tire socks.

N. Do not allow clay gravel, etc. to be tracked onto bare unpolished or polished concrete slab.

O. Do not allow work resulting in oils dripping onto concrete slabs to occur without floor protection.

3.9 TESTING

A. Using a Rhopoint IQ Gloss & DOI reader randomly test the floor with architect and contractor present. Floor polisher to provide instrument and show calibration. Equipment to be calibrated yearly by manufacturer. The minimum number of tests distributed across the polished surface should be three test for areas up to 1000 sf and one additional test for each 1000 sf or fraction thereof. This applies to both Gloss and DOI.

B. Gloss readings at 60 degrees shall average a minimum of 55 with no area measuring less than 45 prior to stain guard application.

C. Gloss readings at 60 degrees shall average a minimum of 70 with no area measuring less than 60 after stain guard application.

D. Minimum DOI reading to be 70 or higher prior to stain guard application

E. Minimum DOI reading to be 85 or higher after stain guard application

F. Slip Resistance: Measured dynamic coefficient of friction (DCOF) shall be 0.42 or greater as measured in accordance with ANSI A137.1. Testing apparatus shall be the BOT 3000E

3.10 CLOSEOUT ACTIVITIES

A. Maintenance Training: Polish concrete company shall train Owner's designated personnel in proper procedures for maintaining polished concrete floor. Training must include hands on demonstrations of all cleaning steps. Contractor must provide 2 months of care and maintenance products to the owner.

END OF SECTION