SECTION 03 3543
POLISHED CONCRETE FINISHING

SPEC WRITER NOTE
This specification is provided by Mid-Atlantic Coatings, Inc. as a service, and is intended to be used as a guideline for preparing a project specific specification section. Every heading may not be needed. Delete headings not used and renumber remaining used headings to be numerically correct.

PART 1 GENERAL

1. 1 SUMMARY

A. Concrete processing/polishing using a multi-step wet/dry process of the concrete surface through means of a mechanical process that uses an abrasive medium where each step is refined to its purest possible form on a microscopic level from one progressively finer abrasive to the next until the desired level of finish or polish is achieved. The process includes the use of a hardener or densifier and is for new or existing concrete floors.

B. This section includes the following.

1. Applying concrete silicate curing agent.
2. Applying Retro Plate sealer and hardener, grind and polish concrete to specified finish level.
3. Impregnating Micro Filming Stain Inhibitor.

1.2 Related Work:

A. Section 030130 – Maintenance of Cast-in-place Concrete.

B. Section 03300 - Cast in Place Concrete.

C. Section 03330 - Architectural Concrete.

D. Section 03390 - Concrete Curing.

E. Section 07900 - Joint Sealers.

F. Section 09639 – Concrete Hardening /Sealing

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
2. ASTM C805, Impact Strength.
3. ASTM E 430 – Standard Test Methods for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.
4. ASTM E 1155 – Standard Test Method for Determining Floor Flatness and of Levelness Using the F number system.
5. ASTM C 805 – Standard Test Method for Rebound Number of Hardened Concrete.

6. ASTM G23-81, Ultraviolet Light & Water Spray.
7. ASTM 1028, Co-Efficient of Friction.
8. ASTM C 150 Type I, II or V- Portland cement conformity, depending on soil conditions.
9. ASTM C 33 - Aggregate conformity.

B. American Concrete Institute

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

C. Other Test:

1. Reflectivity

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 60 00- Product Requirements.

1. Provide submittal information within 35 calendar days after the contractor has received the owner's notice to proceed.

B. Product Data:

1. Submit special concrete finishes manufacturer's specifications, test data and other data required for each type of manufactured material and product indicated.
2. Submit special concrete finishes describing products to be provided, giving manufacturer’s name, product name, and product line number for the specified material proposed to be provided under this section.
3. Submit special concrete finishes manufacturer's recommended installation procedures; which when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
4. Submit special concrete finishes technical data sheet giving descriptive data, curing time, and application requirements.

    a. Provide material analysis and generic type.

5. Submit special concrete finishes manufacturer’s Material Safety Data Sheet (MSDS) and other safety requirements.
6. Submit manufacturer and model of all abrasives.
7. Submit manufacturer and model of equipment that mechanically rotate abrasives.
8. Submit manufacturer, product and technical data sheet of Stain /Dye.
9. Submit Impregnating Micro Filming Stain Inhibitor.
10. Follow all special concrete finishes published manufacturer’s installation instructions.

C. Test Reports:

1. Provide certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.

D. Installer's Accreditation and Certification:

1. Provide a letter from the Technical Institute for Polished Concrete stating Installer holds a valid and current Master Craftsman Accreditation. Levels of accreditation can be found at www.polishinginstitute.org, 410-626-7471 or info@polishinginstitute.org.
2. If the polished concrete installer must also submit a letter stating that the installer has been certified by the manufacturer of the Hardener/Densifier specified herein the specification.

E. Installer's Job References:

1. Submit a listing of five Master Craftsman projects that are more than one year old. Provide physical address and contact information for each. Include the manufacturer and product-make-model of the hardner / densifier used, equipment used to drive the abrasives and abrasives steps completed.

F. Maintenance:

1. Submit installers cleaning and maintenance recommendations for finished surface.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer shall have a minimum of 1 year(s) experience and hold a Master Craftsman accreditation from the Technical Institute for Polished Concrete, and shall provide trained laborers with prior experience in the type of construction involved as well as experience installing the specified process. www.polishinginstitute.org, 410-626-7471 or info@polishinginstitute.org
2. Installer shall hold a Master Craftsman accreditation from the Technical Institute for Polished Concrete, ensuring the minimum amount of training and experience required to apply the specified hardener / densifier, with no less than 3 similar projects product was used and shall provide trained laborers with prior experience in the type of construction involved.
3. The special concrete finish manufacturer for each specified material and process shall certify applicator.
4. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

B. Manufacturer's Certification:

1. The installer shall also be certified by AFP Retro Plate Systems.

2. Provide letter of certification from concrete finish manufacturer or specialized applicator stating that installer is certified applicator of special concrete finishes, specified herein, and is familiar with proper procedures and installation requirements required by the manufacturer.

C. Mockups:

1. Shall be used by the architect as a reference and general guide as to the appearance of the finished product.
2. The mock-up shall be 7' x 7' in size and in an area directed by architect.
3. Mock-up shall be produced using specifications specified for areas to receive concrete processing or polishing.
4. Mock-up shall be placed and finished by the same concrete flat work contractor responsible for pouring and placing permanent flatwork using the same finishing procedures as specified in section 03 33 00 "Cast-In-Place Concrete".
5. Mock-up shall be used to show Level of cut / aggregate exposure based on the following criteria:

    a. Level 1- Cream - polishing only the Portland paste at the surface of the substrate without exposing small, medium or large aggregate. (Note* this particular level will require additional coordination with the section 03 3300 Cast in Place concrete; concrete mix design; concrete finishing procedures.)
    b. Level 2- Salt/Pepper - exposing the fine aggregate such as sand and small aggregate within the substrate. The depth of grind will depend greatly on placement and finishing procedures. Generally, this level of grind can be achieved within 1/16th inch of the surface.
    c. Level 3- Medium Aggregate- exposing more of the overall girth of the aggregate within the substrate. The depth of grind will depend greatly on placement and finishing procedures. Generally, this level of grind can be achieved within 1/8th inch of the surface.
    d. Level 4- Large Aggregate-exposing the overall girth of the aggregate within the substrate. The depth of grind will depend greatly on placement and finishing procedures. Generally, this level of grind can be achieved within 1/4 inch of the surface.

SPEC WRITER NOTE
Select appropriate finish level and delete all others not pertaining to a specific project.

6. Mock-up shall be used to show level of sheen when the concrete surfaced is mechanically processed as specified in 3.03 INSTALLATION:

    a. Level A sheen (satin) as determined by gloss reading of 45-60.
    b. Level B sheen (semi-gloss) as determined by gloss reading of 60-70.
    c. Level C sheen (high gloss) as determined by gloss reading of 70 or higher.

SPEC WRITER NOTE
1. Select appropriate sheen level and delete all others not pertaining to a specific project.
2. Gloss readings are not to be obtained through the use of any microfilming products, sealers, coating enhancers or the result of resin transfer from resin bond abrasives.

7. Mock-up shall be used to show clarity the cut surface, color, natural variations, Decorative applications such as saw cut or engraving and quality of workmanship.
8. Concrete processing to be performed with the same abrasives, equipment, hardeners /densifiers and dye to be used in processing permanent flatwork.
9. If determined mockups do not meet architect's specifications General Contractor will remove and replace mockups until architect approval is given.
10. General Contractor to notify architect 14 days prior to mockup construction and finishing.
11. General Contractor is to maintain mockups during construction and will be used as a general reference to the finished product.
12. Mockups may be incorporated into finished work.
13. General Contractor will be responsible for removal and disposal of mockups.

D. Pre-Installation Meeting:

1. Conduct conference at project site to comply with requirements in Division 1 Section " Project" Management and Coordination."
2. New / Existing Flat Work:

a. New: All parties that influence the results of the polishing process must attend including Polishing/Processing Installer, Flat Work Contractor, Architect, General Contractor and Parties responsible for assuring concrete mix design.
b. Existing: All parties that influence the results of the polishing process must attend including Polishing/Processing Installer, Architect and General Contractor.

E. Protection

1. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.

a. All hydraulic powered equipment must be diapered to avoid staining of the concrete.
b. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
c. No pipe cutting machine will be used on the inside floor slab.
d. Steel will not be placed on interior slab to avoid rust staining.

F. Cast-In-Place Concrete Requirements:

SPEC WRITER NOTE
Coordinate with Section 03 30 00 Cast-In-Place Concrete

1. Concrete must have a minimum Floor Flatness rating of 40-50.
2. Concrete must have a minimum Floor Levelness rating of 40-50.
3. Concrete must be cured a minimum of 45 days or as directed by the manufacturer before application of Retro Plate can begin.
4. Application of Retro-Plate shall take place 10 days prior to installation of equipment and substantial completion, thus providing a complete, uninhibited concrete slab for application.
5. 4 to 5 inch slump is recommended. Maintain the same water/cement ratio throughout the job. Required higher slumps should be achieved by using water reducing or plasticizing admixtures and not by adding water because this will adversely affect the color.

G. Safety

1. The contractor shall conform to regulatory requirements set forth in Section 014100 as well as comply with all applicable EPA, OSHA, State, regional and local codes and regulations.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages and containers, with seal's unbroken, bearing manufacturer labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

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

D. Use one 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.

E. Wash out all drums before loading. Keep slumps consistent. Minimize driver-added water.

F. Store products in unopened packaging until ready for installation with packages clearly labeled with the manufacturer's name, type, and, if applicable, color.

G. Store in a cool place, preferably under cover, at temperatures between 40 and 90 degrees F (4 and 32 degrees).

H. Protect from freezing.

I. Environmental limitations:

1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
2. Store and dispose of solvent-based materials in accordance with requirements of local authorities having jurisdiction.

J. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. General Contractor is to maintain temperature, humidity, and ventilation within limits recommended by manufacturer of any products used for application.

B. General Contractor is to have job site lighting operational and provide sufficient light for the process.

C. General Contractor is to maintain ambient temperature of 55 degrees minimum and 80 degrees maximum to allow for proper curing of hardeners or densifiers.

D. General Contractor is to provide a dumpster within 50 feet of job site to dispose of material produced during concrete processing process one day before work is scheduled to start.

E. General Contractor is to provide water within 50 feet of work area one day before work is scheduled to start.

F. General Contractor is to provide electrician to hook up power requirements for Installer one day before work is scheduled to start.

G. General Contractor is to provide power within 50 feet of work site and able to handle the concrete processing Installer’s power requirements one day before work is scheduled to start.

H. General Contractor is responsible to provide Installer a broom swept floor before work begins.

I. General Contractor is responsible for removing all debris from floor joints before Installer begins work.

J. No other trades allowed in area being work on by Installer and area is to be free and clear of anything that would prevent work from progressing in a timely manner.

K. In the event solvent based stains are used anything that produces sparks or flames must be turned off.

L. Smoking is not permitted.

M. Process is to be performed before framing or after framing but before drywall or after framing and drywall but before door jambs, paint and base molding.

1.7 WARRANTY

A. The hardener or densifier manufacturer shall furnish a minimum 10-year material limited warranty, from the date of installation.

PART 2 – PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

A. Concrete Curing Agent

1. Ashford Formula by Curecrete Distribution, Inc., 1203 West Spring Creek Place, Springville, Utah 84663, 800-998-5664 or equal.

2. Generic Type: Silicate Curing Agent

3. Performance Criteria

a. Curing: Method -moisture loss during the critical initial 24 hour period was determined on treated and untreated samples in a controlled environment cabinet: by a minimum of 90% during initial 24 hours. Requirement- 93% more moisture loss from untreated samples.

4. Manufacturer's Local Representative

a. Mid-Atlantic Coatings, Inc., 343 N Charles Street, Baltimore, MD 21201, 410-576-1010, www.macoatings.com

B. Hardener/Sealer Agent

1. Retro-Plate 99, manufactured by Advanced Floor Products, Inc., P.O. Box 50533, Provo, Utah 84605, 801-812-3420.
2. Performance Criteria:

a. Abrasion Resistance: ASTM C779 – Up to 400% increase in abrasion resistance.
b. Impact Strength: ASTM C805 – 21% increase impact strength.
c. Ultra Violet Light and Water Spray: ASTM G23-81 – No adverse effect to ultra violet and water spray.
d. Co-efficient of Friction: ASTM 1028 – all levels of finish (up to 1500 grit) exceed OSHA and ADA recommendations.
e. Reflectivity: 30% increase in reflectivity.

4. Manufacturer's Local Representative:

    a. Mid-Atlantic Coatings, Inc., Baltimore, MD Tel: 410-576- 1010, www.macoatings.com

C. Impregnating Micro Filming Stain Inhibitor

1. Retro Guard manufactured by Advanced Floor Products, Inc., P.O. Box 50533, Provo, Utah 84605, 801-812-3420.
2. The purpose of Retro Guard is to provide enhanced stain resistance during the Retro Plate cure, and is recommended on each project.
3. Manufacturer's Local Representative

    a. Mid-Atlantic Coatings, Inc., Baltimore, MD Tel: 410-576- 1010, www.macoatings.com

D. Dye Color

1. AmeriPolish by Advanced Floor Products
2. Color chart available at www.retroplatesystem.com
3. Manufacturer's Regional Representative:

    a. Mid-Atlantic Coatings, Inc., Baltimore, MD Tel: 410-576- 1010

SPEC WRITER NOTE
Delete Dye Color if not required for this particular project.

E. Integral Concrete Color

1. QC Construction Products integral concrete color or equal products.
2. Color chart available at www.qcconprod.com
3. Manufacturer's Regional Representative:

    a. Mid-Atlantic Coatings, Inc., Baltimore, 343 North Charles Street, Baltimore, MD., Tel: 410-576-1010

SPEC WRITER NOTE
Delete Dye Color if not required for this particular project.

F. Abrasives

1. Abrasives are to be tried and proven in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their abrasives and pictures of jobs completed by those Installers. Hardness of abrasive must be matched with hardness of concrete. All resin abrasives must be from the same manufacturer, make and model.

G. Equipment

1. Grinding, Honing and Polishing Equipment manufacturer is to be one having tried and proven equipment in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their equipment and pictures of jobs completed by those Installers.

H. Auto Scrubber

1. Manufacturer of the auto scrubber shall be one that is tried and proven equipment in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their equipment. Unit must have adequate downward head pressure to thoroughly clean floor.

I. Vacuum System

1. Dry Dust Vacuum system manufacturer is to be one having tried and proven equipment in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their equipment. System must capture dust and debris to meet OSHA air quality standards.

J. Saw Cutting & Engraving Equipment

1. Saw Cutting and Engraving Equipment manufacturer is to be one having tried and proven equipment in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their equipment and pictures of jobs completed by those Installers.

K. Joint Filler

1. Joint Filler must be VOC compliant and have third party data showing performance results whose product is tried and proven in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their joint filler and pictures of jobs completed by those Installers that are greater than three years old.

L. Crack Repair Material

1. Crack Repair Material must be VOC compliant and have third party data showing performance results whose product is tried and proven in a field setting. If requested the manufacturer must supply 10 references of Installers currently using crack repair material and pictures of jobs completed by those Installers that are greater than one year old.

M. Patching Material

1. Patching Material must be VOC compliant and have third party data showing performance results whose product is tried and proven in a field setting. If

requested the manufacturer must supply 10 references of Installers currently using their patching material and pictures of jobs completed by those Installers that are greater than one year old.

L. Cement Binder Repair Material

1. Cement Binder Repair material must be VOC compliant whose product is tried and proven in a field setting. If requested the manufacturer must supply 10 references of Installers currently using their equipment and pictures of jobs completed by those Installers that are greater than two years old.

2.2 APPLICATOR QUALIFICATIONS

A. Installer must be a Master Craftsman accredited by the Technical Institute for Polished Concrete. www.polishinginstitute.org, 410-626-7471 or info@polishinginstitute.org

B. The installer must also be certified by AFP Retro Plate. www.retroplatesystem.com.

2.3 RELATED MATERIALS

A. Neutralizing Agent:

1. Tri-sodium Phosphate

B. Water:

1. Potable

PART 3- EXECUTION

3.1 SURFACE CONDITIONS:

A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that base slab meet finish and surface profile requirements in Division 3 Section "Cast-In-Place Concrete," and Project Conditions above.

C. Portland cement shall conform to ASTM C 150 Type III or V, depending on soil conditions.

D. Aggregates shall conform to ASTM C 33.

E. Prior to application, verify that floor surfaces are free of construction laitents.

3.2 APPLICATION

A. Concrete finish shall be a hard steel trowel finish and shall be applied in accordance with Section 03 30 00.

B. Start any of the floor finish applications in presence of manufacturer's technical representative.

C. Concrete Curing Agent

SPEC WRITER NOTE
Coordinate with Section 03 30 00 Cast –In-Place Concrete

1. Seal the surface with Ashford Formula, Silicate Curing Agent at a rate of 200 square feet per gallon.
2. Install in accordance with the manufacture printed literature.

D. Retro Plate - Sealing, Hardening and Polishing of Concrete Surface.

1. Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.
2. Application is to take place at least 10 days prior to racking and other in-store accessory installation, thus providing a complete, uninhibited concrete slab for application.
3. Only a certified applicator shall apply Retro-Plate 99. Applicable procedures must be followed as recommended by the product manufacturer and as required to match approved test sample.
4. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface while imparting a sheen.
5. Apply Retro Plate 99 concrete sealer finish in accordance with sealer manufacturer's instructions.
6. Polish to required sheen levels:

SPEC WRITER NOTE
Select one and delete all others

a. Level 1 – Satin (400 to 600 diamond grit finish) as determined by gloss reading of 45-60..
b. Level 2 – Semi-gloss (800 to 1000 diamond grit finish) as determined by gloss reading of 60-70
c. Level 3 – Gloss (1200 to 1500 diamond grit finish) as determined by gloss reading of 70 or higher.

SPEC WRITER NOTE
Select the appropriate non-aggregate or aggregate finish and delete all others

7. Finish: Select the appropriate non-aggregate or aggregate finish and delete all others:

    a. Cream -Non-Aggregate Exposure (100 to 200 Resin)
    b. Fine Aggregate Exposure (120 Metal)
    c. Medium Aggregate Exposure (70 Metal)
    d. Large Aggregate Exposure (30 Metal)

8. The number of abrasives under the equipment will be dictated by the specified head pressure needed for proper abrasion to occur by the abrasive manufacturer.
9. A minimum of two passes in different direction per grit is required.
10. At no time are any consecutive grits to be skipped following the starting grit abrasive.
11. The Installer will drop back one girt resin abrasive from the last metal grit abrasive used. A separation in grit designation size must be a minimum of 50 when transitioning from metal to resin.
12. The Installer will refine the concrete surface with each grit abrasive to its maximum potential before moving on to the next consecutively finer grit. The Installer must refine the concrete surface further than replacing the scratch pattern from the previous grit abrasive with the next grit abrasive.
13. Each wet grit after 100 metal must be refined until the slurry becomes translucent in the middle and clear around the edges.
14. Each dry grit abrasive after 100 resin must be refined until the abrasives flowingly move across the surface.
15. An auto scrubber must be used to clean the floor in between each grit until any particulate grit larger in size then what the next grit cut will produce has been removed from the floor before continuing to the next progressively finer grit.

E. Process

1. Removal of Pre-existing Materials

    a. Remove coatings, sealers, curing agents, bond breakers and glue using an abrasive designed for the particular removal application and one that will cause the least amount of damage to the surface.
    b. Be mindful of the specified aggregate exposure.

2. Grinding

    a. Aggregate Exposure: The Installer is to determine what grit to start the process to reach specified aggregate exposure.
    b. Work too and stay within specified layer of aggregate.

c. Metal abrasive grinding shall not go any higher than 220 unless special circumstances present themselves and approved by architect.

3. Repairs to Pre-existing conditions

a. If existing concrete has excessive pitting, use an approved grouting system or Portland based concrete patch to patch/fill all voids prior to dye, honing, or polishing procedures.

F. Dye Color

1. Install dye color in accordance with the manufacturer's current literature and Recommendations.

SPEC WRITER NOTE
Delete Dye Color if not required for this particular project.

G. Integral Color

1. Install integral color in accordance with the manufacturer's current literature and Recommendations.

SPEC WRITER NOTE
Delete Integral Color if not required for this particular project.

H. Honing

1. Start Honing with 100/120 grit resin.
2. Follow with 100/120 grit resin with 200/220 grit resin.
3. Follow with 200/220 grit resin with 400 grit resin.

I. Polishing

1. Clarity of reflection and durability: End processing at the specified level of clarity of reflection.
2. Start Polishing with 800 grit resin.
3. Follow 800 grit resin with 1500/1800 grit resin.
4. Follow 1500/1800 grit resin with 3000/3500 grit resin.

J Inspection

1. Surface must be free from any random scratch patterns.
2. All edges must be uniformly cut and processed when compared to the rest of the floor.

3. Corrections to be made prior to application of Impregnating Micro Filming Stain Inhibitor.
4. Perform necessary gloss readings to determine specified gloss level prior to application of Impregnating Micro Filming Stain Inhibitor.

K. Impregnating Micro Filming Stain Inhibitor

1. Apply Retro Guard prior to applying acid stain or dye.
2. Apply 2 light applications of Retro Guard in accordance with the manufacturers printed instructions.
3. The floor should be completely dry prior to applying the sealer**.** In areas that are still wet you will not receive the same penetration, and subsequently, lower or no protection from the sealer, and you may promote spotting or a blotchiness on the surface.

3.3 WORKMANSHIP AND CLEANING:

A. The premises shall be kept clean and free of debris at all times.

B. Remove spatter from adjoining surfaces, as necessary.

C. Repair damages to surface caused by cleaning operations.

D. Remove debris from jobsite.

1. Dispose of materials in separate, closed containers in accordance with local regulations.

3.4 PROTECTION:

A. Protect finished work until fully cured in accordance with manufacturer’s recommendations.

END OF SPECIFICATION
SECTION 03 3543