SECTION 03 35 43

POLISHED CONCRETE FINISHING

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\*\* NOTE TO SPECIFIER \*\* Lythic Solutions, Incorporated. Concrete polishing.
This section is based on the products of Lythic Solutions, Incorporated which is located at:
11304-102 N.E. 66th St.
Vancouver, WA 98662
Tel: 360-694-5347
Fax: 360-571-0848
Email: \_\_\_\_\_\_
Web:[www.lythic.net](http://www.lythic.net)
[HYPERLINK "http://www.arcat.com/arcatcos/cos9546/arc46881.html"Click Here ] for additional information.
Lythic began with the discovery of reactive Colloidal Silica as a new way to add strength and durability to concrete floors, by two veterans of concrete polishing in 2004. Intimately familiar with the advantages of exposed concrete floors, both polished and unpolished, they were also acutely aware of the drawbacks of the existing chemistry available. They recognized the benefits of this advance in concrete densification chemistry as they used it for their own projects. From this direct experience new products and processes were developed and have expanded possibilities for concrete floor finishes. Lythic is unique in providing expertise in product and processes that are advancing concrete flooring beyond the costs, risks, and limitations of polished concrete floors.

1. GENERAL
	1. SECTION INCLUDES
		1. Concrete polishing including the following:
			1. Grinding and honing concrete surface to receive pure reactive colloidal silica concrete densifier.
			2. Application of pure reactive colloidal silica concrete densifier.
			3. Progressively refining, polishing of the densified concrete surface.
			4. Application of polished concrete protective treatment.
	2. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 01 26 00 - Contract Modification Procedures.
		2. Section 01 33 13 - Certificates.
		3. Section 01 45 16.13 - Contractor Quality Control.
		4. Section 01 60 00 - Product Requirements.
		5. Section 01 74 16 - Site Maintenance.
		6. Section 03 30 00 - Cast-in-Place Concrete.
		7. Section 07 91 23 - Backer Rods.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Society of Concrete Contractors (ASCC) Subgroup - Concrete Polishing Council (CPC) Polished Concrete Definition: D 100.1.
		2. American National Standard Institute National Floor Safety Institute (ANSI/NSF):
			1. ANSI/NSFI B101.1 - Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.
		3. ASTM International (ASTM):
			1. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
			2. ASTM C1353 - Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser.
			3. ASTM D523 - Standard Test Method for Specular Gloss.
			4. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
			5. ASTM E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.
			6. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
	1. ADMINISTRATIVE REQUIREMENTS
		1. Pre-Installation Meeting: Convene before the start of work on new concrete slabs, patching of existing concrete slabs, and start of application of concrete finish system.
			1. Require attendance of parties directly affecting work of this section, including the Owner's Representative, Contractor, Architect, concrete installer, and surface treatment/polishing contractor. Meeting should only convene when required parties are present.
			2. Review the Following:
				1. Physical requirements of completed concrete slab and slab finish.
				2. Locations and time of test areas.
				3. Protection of surfaces not scheduled for finish application.
				4. Surface preparation.
				5. Application procedure.
				6. Quality control.
				7. Cleaning.
				8. Protection of finish system.
				9. Coordination with other ongoing work.
	2. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Shop Drawings: Indicate information on shop drawings as follows:
			1. Layout including dimensions and floor grinding schedule.
			2. Plan view of floor and joint pattern layout.
			3. Areas to receive colored surface treatment.
			4. Hardener, sealer, densifier identified in notes.
		3. Product Data: Submit product data, including manufacturer's product data sheets, for specified products.
			1. Safety Data Sheets (SDS).
			2. Preparation and concrete grinding procedures.
			3. Colored Concrete Surface, Dye Selection Guides.
		4. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
		5. Certificates:
			1. Letter by manufacturer stating that installer is listed applicator of specified products, and has completed the necessary training programs.
		6. Floor protection plan.
		7. Warranty: Submit warranty documents specified.
		8. Operation and Maintenance Data: Submit operation and maintenance data for installed products.
			1. Manufacturer's instructions on maintenance renewal of applied treatments.
			2. Protocols and product specifications for joint filing, crack repair and/or surface repair.
	3. QUALITY ASSURANCE
		1. Installer Qualifications:
			1. Applicator to be familiar with specified requirements and methods needed for proper performance of work of this section. Must have available proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 4 projects of similar scope and complexity.
		2. Concrete finishing components and materials shall be from single manufacturer.
		3. Manufacturer Qualifications:
			1. Manufacturer capable of providing field service representation during construction and approving application method.
			2. Manufacturer shall have a minimum 5 years of experience in manufacturing components similar to or exceeding requirements of project.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if there are a large quantity of automatic doors or the interface with adjacent construction is complex or varies from the manufacturer's standard details. Delete if not required.

* + 1. Mock-Ups: On site, prior to the start of the polished concrete finishing process.
			1. Require attendance of parties directly affecting work of this Section, including the Contractor, Architect, applicator, and Owner's Representative.
			2. Notify the above parties one week in advance of date and time when mock-up will be completed.
			3. Demonstrate the materials, equipment and application methods to be used for work specified herein in pre-approved location approximately 50 sq ft (4.645 sq m) in area or as directed by Architect.
			4. Retain approved mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.
	1. DELIVERY, STORAGE AND HANDLING
		1. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.
		2. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.
			1. Store containers upright in a cool, dry, well-ventilated place, out of the sun with temperature between 40 and 100 degrees F (4 and 38 degrees C).
			2. Protect from freezing.
			3. Store away from other chemicals and potential sources of contamination.
			4. Keep lights, fire, sparks and heat away from containers.
			5. Do not drop containers or slide across sharp objects.
			6. Do not stack pallets more than three high.
			7. Keep containers tightly closed when not in use.
	2. PROJECT CONDITIONS
		1. Environmental limitations:
			1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.
		2. Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.
		3. Protect the completed slab to prevent damage by the other trades during floor completion.
		4. Temperature Limitations:
			1. Apply when surface and air temperature are between 40 degrees F (4 degrees C) and 95 degrees F (35 degrees C) unless otherwise indicated by manufacturer's written instructions.
			2. Apply when surface and air temperatures are expected to remain above 40 degrees F (4 degrees C) for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
		5. Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.
		6. Do not apply to frozen substrate. Allow adequate time for substrate to thaw if freezing conditions exist before application.
		7. Apply a minimum of 24 hours after rain event. Suspend application when rain is anticipated for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
		8. Temporary Heat: Ambient temperature of 50 degrees F (10 degrees C) minimum.
		9. Ventilation: Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.
	3. SEQUENCING
		1. Sequence with Other Work: Comply with manufacturer's written recommendations for sequencing construction operations.

\*\* NOTE TO SPECIFIER \*\* Delete warranty if not required.

* 1. WARRANTY
		1. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Solomon Colors, which is located at: 4050 Color Plant Rd.; Springfield, IL 62702-1060; Toll Free Tel: 800-624-0261; Tel: 217-522-3112; Fax: 800-624-3147; Email: [request info (sgs@solomoncolors.com)](https://admin.arcat.com/users.pl?action=UserEmail&company=Solomon+Colors&coid=35596&rep=&fax=800-624-3147&message=RE:%20Spec%20Question%20(03360lyt):%20%20&mf=); Web: <http://www.brickform.com> | <https://www.day1finishingaid.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" or "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

* 1. MATERIALS

Retain paragraph below if wet grinding process is approved.

* + 1. Water-based, Colloidal silica blended surfactant used for cutting aid: Product used to extend the life of diamond tooling and minimize concrete surface scratches during the wet-grinding process if requires to cut the concrete cap.
			1. Basis of Design: Lythic Cleaner manufactured by Solomon Colors, Incorporated.
			2. Subject to compliance with the following requirements:
				1. Comply with national, state and district AIM VOC regulations and contains 0.067 oz per gal (0.5 g per L)or less.
				2. Formulated with colloidal silica and cleaning surfactants
		2. Penetrating Concrete Densifier: Colloidal silica concrete densifier.
			1. Basis of Design: Lythic Densifier or Lythic Densifier XL manufactured by Solomon Colors, Incorporated.
			2. Subject to compliance with the following requirements:
				1. Abrasion Resistance: Greater than 60 percent improvement over untreated samples when tested in accordance with ASTM C1353 or ASTM C779
				2. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
				3. Adhesion: Greater than10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
				4. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
				5. Colloidal silica particles size ranging from 3 to 60 nanometers
				6. Chemical pH no greater than pH10

Retain paragraph below if a general purpose, high gloss protective treatment is required. Use to improve surface sheen, and surface hardness.

* + 1. Polished Concrete Protective Treatments:
			1. Polished concrete film forming concrete protector, colloidal silica sealer.
				1. Basis of Design: Lythic Protector manufactured by Solomon Colors, Incorporated.
				2. Subject to compliance with the following requirements:

Contain reactive colloidal silica

Comply with national, state and district AIM VOC regulations.

Achieve ' High Traction Range' readings when tested in accordance with ANSI B101.1.

Coefficient of Friction: Greater than 0.60 dry, greater than0.60 wet when tested in accordance with ASTM C1028.

Adhesion: : Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.

UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

Retain paragraph below if a general purpose, high gloss protective treatment is required. Use to improve surface sheen, and surface hardness.

* + 1. Polished Concrete After Treatments:
			1. Polished concrete film forming concrete protector, colloidal silica sealer.
				1. Basis of Design: Lythic Cleaner manufactured by Solomon Colors, Incorporated.
				2. Subject to compliance with the following requirements:
				3. Comply with national, state and district AIM VOC regulations and contains 0.067 oz per gal (0.5 g per L) or less.
	1. EQUIPMENT
		1. Auto Scrubber Machine: For cleaning operations.
		2. Hand Grinder or stand-up edger for edge grinding/polishing.
		3. Grinding/Polishing Equipment:

Retain subparagraph below if dry grinding/polishing process is approved.

* + - 1. Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum.
		1. Diamond Segments:
			1. Use heads from the same manufacturers throughout the entirety of the project.
		2. Diamond Heads Types:
			1. Metal Diamonds: 16 or 200.
			2. Hybrid Style Diamonds: 30 or 100.
			3. Resin, Phenolic or Ceramic Bonded Diamonds: 100, 200, 400, 800, 1500, and 3000 (Grit range will depend on individual tooling manufacturers system).
		3. Burnishing Machine and Burnishing Pads to produce specified results.
			1. Burnishing Machine: High-speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.
			2. Burnishing Pads: as recommended by protective treatment manufacturer.
				1. White Burnishing Pad, non-abrasive.
				2. Abrasive diamond burnishing pads selective grades 200, 400, 600, 800, 1000, 1500, 3000
1. EXECUTION
	1. EXAMINATION
		1. Site Verification of Conditions:
			1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.
		2. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.
		3. Examine surface to determine soundness of concrete for polishing.
		4. Do not begin installation until substrates have been properly prepared. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.
		5. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before carrying out additional work, grinding or product application.
		2. Variations in substrate texture and color will affect final appearance, should be corrected prior to application of colloidal silica concrete densifier, refined polishing stages and protective treatments.
		3. Protect surrounding areas prior to application. If product is accidentally sprayed or spilled to adjacent surfaces, flush with water immediately before material dries.
		4. Seal open joints in accordance with Section 07 90 00.
		5. Apply specified sealants and caulking and allow complete curing before application of penetrating colloidal silica concrete densifier.
	3. CONCRETE GRINDING, HONING, AND POLISHING
		1. Adhere to industry standard grinding, honing, and polishing procedures for dry and wet grinding and honing. (Reference ASCC - Concrete Polishing Council CPC Polished Concrete Definition: D 100.1)
		2. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final passes.
		3. Sequential progression of diamond tooling steps shall be required and limited to no more than double the grit value of the previous diamonds used.
		4. Overlap adjacent passes by 25 percent.
		5. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.
		6. Progressively grind, hone and polish the slab surface utilizing approved diamond segments as necessary to produce finishing requirements.
			1. Grout Coat material to fill gaps, voids and pop-outs during grinding operation per manufacturer's published recommendations.

Retain subparagraph below if wet grinding process is approved.

* + - 1. Apply water-based, Colloidal Silica blended surfactant cutting aid during the initial wet grinding process per manufacturer's published recommendations. (Typically during any metal diamond tooling stages and only if wet grinding is required).
	1. APPLICATION OF COLLOIDAL SILICA CONCRETE DENSIFIER
		1. Apply Colloidal Silica concrete densifier at the rate of 350 to 650 square feet per gallon with a low-pressure sprayer. (Application stage can range from 100-grit metal tooling to 400-grit resin tools depending on the concrete condition).
		2. Apply sufficient material to the point of saturation keeping concrete surface wet for 5 to 15 minute period, without producing puddles.
		3. Allow treated surface to gel and dry. (Do not remove gel during reaction, it will not leave a residue and will not crystalize on the surface)
		4. Continue progressively polishing floor with required resin diamonds as necessary to produce desired final finish.
		5. Repeat step (A) Applying Colloidal Silica concrete densifier as needed to harden excessively soft concrete surfaces.
	2. APPLICATION OF POLISHED CONCRETE PROTECTIVE TREATMENTS:

Retain one or more of the paragraphs below corresponding to each specific interior concrete protective treatment products specified above in Part 2.
Retain paragraph below if a general purpose, high gloss protective treatment is required.

* + 1. Application Polished concrete gloss film forming concrete protector, colloidal silica sealer:
			1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
			2. Lightly wet a clean microfiber mop or cotton pad with protective treatment and wring out excess, leaving the pad damp.
			3. Working from one control joint to another, apply a light, fine spray of protective treatment to a small section of the floor using a clean, pump-up sprayer fitted with a 0.5 gpm spray tip or fog sprayer, at an estimated coverage rate of 1200 to 1800 square feet per gallon.
			4. Using the damp microfiber mop or cotton pad with firm downward pressure, immediately spread the protective treatment to produce an even thin coating. Spread the product as far as possible while maintaining a wet edge. Properly applied, protective treatment dries quickly. Stop spreading once drying begins. Avoid overlapping.
			5. Allow to dry tack free, typically 20 to 60 minutes.
			6. Once dry, high- speed burnish slab surface fitted with manufacturer recommended burnishing pad to increase gloss and to help the treatment fuse and bond with the concrete for increased durability and longevity. (Burnish between coats if multiple applications are required.)
			7. Repeat above steps 1 through 6, as necessary for additional applications of protective treatment, to achieve desired final finish (Not exceeding 4 coats).

Retain paragraph below if a general purpose, medium gloss protective treatment is required.

* + 1. Application of interior high performance sealer high gloss, film forming sealer:
			1. Mix interior high performance sealer per manufacturer's instructions.
			2. Apply to clean, dry slab at the completion of mechanically polishing no higher than 800-grit. (200-grit to 800-grit produces optimum surface preparation for chemical bond. Ensure scratch pattern is not visible before application)
			3. Lightly wet a lint free short nap paint roller with interior high performance sealer and remove excess, leaving primed paint roller.
			4. Roll out interior high performance sealer using minimal downward force. Evenly roll the interior high performance sealer without leaving overlap lines at an estimated coverage rate of 1000 to 1500 square feet per gallon. Working from one control joint to another.
			5. Maintain a thin, even coating and wet edge. Do not over apply.
			6. Allow 4-6 hours before of dry time before a second application is applied (Only re-coat if needed) Repeat steps 1 through 4 for re-coat application.
			7. To increase gloss, wait at least 12 to 24 hours after the final coat is applied, then use a high- speed burnisher fitted with a burnishing pad. Burnish at a slow walking pace.

Retain paragraph below if a modified silane blend, penetrating oil and water protective treatment with a VOC content of 400 g/L or less is required.

* 1. SLAB PROTECTION
		1. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.
		2. Do not drag or drop equipment or material across the slab which will scratch or chip it.
		3. Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.
		4. Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.
		5. Develop a concrete protection procedure which addresses the following procedures:
			1. Communication of protection plan to subcontractors and vendors.
			2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.
		6. Provide a clean slab surface using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's published recommendations.
	2. FINISHING REQUIREMENTS
		1. Appearance:
			1. Interior exposed finished slab areas must consist of the following:
				1. Slab surface must meet the desired sheen, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.
				2. Slab surface must have a consistent look and exhibit a finish that has no evidence of streaking or burnish marks.
				3. White residue or hazy appearance is not acceptable.
				4. Exposure of aggregate beyond Concrete Polishing Council Class is not acceptable.

Delete aggregate exposure classes not required.

Aggregate Exposure Class: A-Cream.

Aggregate Exposure Class: B-Fine Aggregate.

Aggregate Exposure Class: C-Medium Aggregate.

Aggregate Exposure Class: D-Large Aggregate.

* + - 1. Interior exposed finished slab areas must consist of the following Concrete Polishing Council Gloss Level:

Delete gloss levels not required.

* + - * 1. Finished Gloss Level 1: Flat Gloss Appearance.
				2. Finished Gloss Level 2: Satin Gloss Appearance.
				3. Finished Gloss Level 3: Semi-Polished Gloss Appearance.
				4. Finished Gloss Level 4: Highly-Polished Gloss Appearance.
	1. ADJUSTMENTS
		1. Re-finish those areas not meeting specified gloss levels per mock-up.
	2. FINAL CLEANING
		1. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.
	3. PROTECTION
		1. Protect installed product from damage during construction in accordance with manufacturer's recommendations.

END OF SECTION