SECTION 03 35 43 – POLISHED CONCRETE FINISHING

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*This document is intended as a stand-alone specification in CSI 3-Part format ("MasterFormat") or as a resource for supplementing a broader-scope specification.*

*Specifier should* *[enable](#Hidden_On" \o "File>Options>Display>Always Show On Screen (check \"Hidden Text\")) "Hidden Text" feature while editing and* *[disable](#Hidden_Off" \o "File>Options>Display>Printing Options (uncheck \"Hidden Text\")) feature before printing. Hidden text displays in* blue *and gives guidance to the specifier ("Editor's Notes").*

*Bold text in brackets* [**sample**] *indicates a choice to be made; refer to editor's notes for guidance.*

*Metric units are in red font and in parentheses* (sample)*; these may be retained or deleted.*

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This Section specifies polished densified concrete, using either a lithium silicate-based liquid densifier ("Pentra-Hard") or a sodium silicate/siliconate densifier (Sure Hard Densifier J17"). Refer to Dayton Superior *Guide to Liquid Densifiers* and product *Technical Data Sheets* (double-click icons below to open) for more information

   

This Section includes the option of dying or staining as a means to color the polished concrete. Integral coloring of the concrete mix is another method to produce colored concrete, but is best specified in the Cast-in-Place Concrete (or similar) Section.

Much of this Guide Spec assumes application to new construction; if this specification is to be used for existing construction, edit accordingly; most of Parts 2 and 3 will remain applicable.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Edit below to suit project (see discussion of lithium- vs. sodium-based densifiers in Part 2):

Multi-step mechanical polishing and finishing of new [**existing**] concrete floor slabs.

[**Dyeing**] [**Staining**] of concrete floor slabs.

Chemically reactive, [**lithium silicate**] [**or**] [**sodium silicate/siliconate**] penetrating liquid hardener/densifier.

Lithium-fortified liquid sealer/guard applied to densified concrete.

* + - 1. RELATED SECTIONS

Edit Paragraph below to include only Sections that contain work related to work of this Section. Delete reference or revise number/title to reflect Sections actually included in Project. Coordinate aspects of other Sections that affect work of this Section, i.e., special materials and procedures for slabs to be polished.

* + - * 1. The following Section(s) contain work related to the work of this Section:

Section 03 30 00 – Cast-in-Place Concrete: General requirements for mixing, placing, [**and finishing**] cast-in-place concrete floor slabs[**,** **including** ][**special aggregates for concrete to receive polished finish**][ **and**][ **integral coloring of the concrete mix**].

Section 03 35 00 – Concrete Finishing: General requirements for finishing concrete slabs prior to densifying.

Section 03 39 00 – Concrete Curing: Curing products and procedures for slabs to receive polished finish.

03 53 00 – Concrete Topping: [**Shake-on**] [**Troweled-on**] cementitious floor topping to receive polished finish.

* + - 1. REFERENCES
				1. American National Standards Institute (ANSI):

ANSI B101.1 Test Method for Measuring Wet Static Coefficient of Friction of Common Hard-Surface Floor Materials.

* + - * 1. American Society for Testing and Materials (ASTM):

ASTM C 140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

ASTM C 642 – Standard Test Method for Density, Absorption, and Voids in Hardened Concrete

ASTM C 779 – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces

ASTM D 523 – Standard Test Method for Specular Gloss

ASTM D 2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

ASTM D 5767 – Standard Test Methods for Instrumental Measurement of Distinctness-of-Image Gloss of Coating Surfaces

ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials

ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

* + - * 1. Concrete Polishing Association of America (CPAA):

CPAA Definitions: Terminology used herein.

Include USGBC only for LEED projects.

* + - * 1. U.S. Green Building Council (USGBC):

Leadership in Energy & Environmental Design (LEED) v4.

* + - 1. PREINSTALLATION MEETINGS
				1. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

Edit list of conference participants, if necessary.

* + - * 1. Review scope of Work expected. Require representatives of each entity directly concerned with concrete slab work to attend, including the following:

Contractor’s superintendent.

Concrete slab installer/finisher.

Polishing contractor.

Liquid materials manufacturers' representative(s).

Architect's and/or Owner's representative (at their option).

Edit list of conference topics, if necessary.

* + - * 1. Review the following, at a minimum:

Schedule

Extent of Work.

Curing method and materials.

Polishing steps, including abrasive grit levels, and curing[**, coloring,**]densifying, and sealing sequence.

Materials to be applied.

Material storage and staging.

Project phasing.

Temporary heating (if needed).

Water management procedures.

Cleanup and disposal of waste materials.

* + - 1. ACTION SUBMITTALS
				1. General: Submit the following for approval. Do not proceed with work involving any action submittal until approval is obtained.
				2. Product Data: For each product used. Include material physical characteristics, storage and application instructions, precautions and safety data, cleanup, and maintenance information.

Retain below for projects with colored concrete:

* + - * 1. Samples:

Colored Concrete Samples: Submit samples or accurate photographs of range of colors and effects for selection.

* + - 1. INFORMATIONAL SUBMITTALS
				1. General: Submit the following to the Owner for the Owner's information and records. If acceptable, and unless otherwise indicated, Informational Submittals will not be acted upon or returned.
				2. Safety Data Sheets (SDS) for all products used.

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For polishing subcontractor.
				2. Maintenance Data: For inclusion in Operation and Maintenance Manual required by Division 01.

Include instructions for cleaning and maintenance of polished concrete floor, as well as precautions against cleaning products and other chemicals that may be detrimental to satisfactory appearance of polished floor.

Include LEED submittals Paragraph only for LEED projects; coordinate with requirements selected in Part 2 for VOC limits.

* + - * 1. LEED Submittals:

Product Data for IEQ credit 4.2: For products of this Section containing volatile organic compounds (VOC), including liquid materials with zero VOC content.

* + - 1. QUALITY ASSURANCE
				1. Manufacturer Qualifications: Company regularly engaged in the manufacturing of the products specified in this section, with at least ten (10) years' successful history manufacturing material specified herein.
				2. Polisher Qualifications:

Experience: Company with at least five (5) years' successful experience in performing work similar in design, products, and extent to scope of this Project; with a record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.

Supervision: Maintain competent supervisor who is at Project site during times work is in progress, and is currently certified as Craftsman - Level I or higher by CPAA.

Approved by, or acceptable to manufacturer to apply liquid applied products.

* + - * 1. Field Mock-up: Before performing work of this Section, provide following field mock-up to verify selections made under submittals and to demonstrate aesthetic effects of polishing. Approval does not constitute approval of deviations from Contract Documents, unless Architect specifically approves deviations in writing.

Form, reinforce, cast, cure, and finish concrete slab for field mock-up identical to final floor slab.

Mock-up size: Minimum 10 ft. by 10 ft.

Concrete shall be same mix design as scheduled for Project; provide separate mock-up for each mix design, color, and final appearance, if more than one is indicated.

Placement and finishing work shall be performed by same personnel as will place and finish concrete for Project.

Mock-up shall be representative of work to be expected.

Perform grinding, honing, and polishing work as scheduled for Project using same personnel as will perform work for Project.

Use sequence and coarseness of abrasive pads as will be used for final work, including number of passes for each pad.

Perform curing, [**coloring**,] densifying, and sealing in sequence that will be used for final work.

Approval is for following aesthetic qualities:

Compliance with approved submittals.

Compliance with specified aggregate exposure.

Compliance with specified finished gloss level.

Retain the following sub-subparagraph when specifying colored finish:

Compliance with specified color effects.

Obtain Architect’s approval before starting work on Project.

Protect and maintain approved field mock-ups during construction in an undisturbed condition as a standard for judging completed work.

Retain only one of the two Subparagraphs below:

Approved mock-up(s) may be incorporated into the Work, if undisturbed at completion of Project.

Upon completion of work, demolish, remove, and dispose of mock-up panel(s) and restore grade.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver products in original factory packaging, bearing identification of product, manufacturer, batch number (or equivalent code), and expiration date.

Furnish Safety Data Sheets for each product to the project superintendent.

* + - * 1. Store products in a location protected from freezing, damage, construction activity, precipitation and direct sunlight in strict accordance with the manufacturer's recommendations.
				2. Handle all products with appropriate precautions and care as recommended by manufacturer and as stated on the Safety Data Sheet.
			1. PROJECT CONDITIONS
				1. Environmental Limitations: Comply with manufacturer's written instructions for ambient temperature and humidity, slab substrate temperature and moisture content, wind, precipitation, and other conditions affecting densifier performance.
				2. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.

Prohibit use of markers, spray paint, and soapstone.

Prohibit improper application of liquid membrane film-forming curing compounds.

Prohibit vehicle parking over concrete surfaces.

Prohibit pipe-cutting operations over concrete surfaces.

Prohibit storage of any items over concrete surfaces for not less than 28 days after concrete placement.

Prohibit ferrous metals storage over concrete surfaces.

Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.

Protect from acids and acidic detergents contacting concrete surfaces.

Protect from painting activities over concrete surfaces.

* + - * 1. Use appropriate measures for protection and supplementary heating in accordance with manufacturer's recommendations during times of temperature extremes or inclement weather.

Avoid heating methods that may result of carbonation of concrete surface.

* + - * 1. Do not allow liquid materials to freeze.
				2. Protect adjacent work from contamination due to mixing, handling, and application of liquid densifier and finishing products.
1. PRODUCTS
	* + 1. ACCEPTABLE MANUFACTURERS
				1. Provide liquid materials by manufacturer(s) indicated.

Select only one of the following two Paragraphs. If first Paragraph is retained, select appropriate Division 01 Section.

* + - * 1. Requests for substitutions will be considered in accordance with provisions of Section [**01 25 00**] [**01 60 00**].
				2. Substitutions: Not permitted.
			1. AGGREGATES

Coordinate aggregate requirements specified in other Division 03 Section(s); e.g., Cast-in-Place Concrete, Interior Concrete Slabs, etc. Polished concrete does not require special aggregates, but aggregate characteristics will greatly affect the final appearance.

* + - * 1. Special aggregates for concrete to receive polished finish are specified elsewhere in Division 03.
			1. LIQUID MATERIALS

Curing of the slab should begin immediately after finishing and is therefore not considered part of the polishing process. To save time and labor, a highly dissipative type curing compound, such as Dayton Superior Clear Cure VOC J7WB, should be specified.

* + - * 1. Curing Compound: As specified elsewhere in Division 03.

Retain one or both of the densifier options in the first Paragraph and edit the first two Subparagraphs accordingly. Retaining both types increases the Contractor's options and may result in lower cost. Lithium-fortified finish and protector can be used with either type of densifier.

* + - * 1. Liquid Densifier: Water-based, odorless solution of [**lithium silicate**] [**or**] [**sodium silicates and siliconates**], designed to react with materials present in new or old concrete in order to densify, harden, and dustproof the surface of the slab.

Manufacturer: Dayton Superior Corporation; 1125 Byers Road, Miamisburg, Ohio 45342; Tel: (877) 266-7732; Website: www.DaytonSuperior.com

Lithium Silicate Product: Dayton Superior "Pentra-Hard Densifier":

Description: Water-based, penetrating, lithium silicate concrete hardener, dustproofer, and sealer.

Active Ingredients: 100 percent of total solids.

Total Solids: 8.8 percent.

Freeze Point: 32 degrees F (0 degrees C).

VOC Content: Less than 50 g/L.

Sodium Silicate/Siliconate Product: Dayton Superior "Sure Hard Densifier J17":

Description: Water-based, penetrating, sodium silicate/siliconate concrete hardener, dustproofer, and sealer.

Active Ingredients: 100 percent of total solids.

Freeze Point: 32 degrees F (0 degrees C).

VOC Content: 0 g/L.

* + - * 1. Finish and Protector: Clear, water-based, lithium-fortified penetrating and micro film-forming liquid compound designed to enhance water resistance, chemical resistance and abrasion resistance of the densified floor.

Manufacturer: Dayton Superior Corporation; 1125 Byers Road, Miamisburg, Ohio 45342; Tel: (877) 266-7732; Website: www.DaytonSuperior.com

Product: Dayton Superior "Pentra-Hard Guard":

Description: Water-based, lithium-fortified, high-gloss, concrete stain- and wear-resistant finish.

Active Ingredients: 100 percent of total solids.

Freeze Point: 32 degrees F (0 degrees C).

Abrasion Resistance: Excellent.

VOC Content: Less than 50 g/L.

Retain one or both of the two Paragraphs below if concrete is to receive an applied color; edit as required. See comments in Part 1 if concrete to be polished is to be integrally colored.

* + - * 1. Dye: Non film-forming soluble colorant dissolved in a carrier designed to penetrate and alter coloration and appearance of a concrete floor surface without a chemical reaction.

Manufacturers:

Brickform; Division of Solomon Colors

Decorative Concrete Institute

H&C Decorative Concrete Products

Innovatech Products

Kemiko Concrete Products

L.M. Scofield Company

* + - * 1. Pigmented Micro Stains: Fine pigment particles (<3.9 x 10-4 inches) (<10.0 microns) suspended in water-based silicate solution that penetrates concrete and reacts with calcium hydroxide to lock in color particles.

Manufacturers:

Brickform; Division of Solomon Colors

Butterfield Color

H&C Decorative Concrete Products

Kemiko Concrete Products

L.M. Scofield Company

* + - * 1. Water: Potable and at a temperature of not more than 70 degrees F (21 degrees C).
			1. POLISHING EQUIPMENT
				1. Field Grinding and Polishing Equipment:

A multiple head, counter rotating, walk-behind or ride-on machine, of various size and weights, with diamond tooling affixed to the head for the purpose of grinding concrete. Excludes janitorial maintenance equipment.

If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.

If wet grinding, honing, or polishing, use slurry extraction equipment suitable for slurry removal and containment prior to proper disposal.

* + - * 1. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machine which produces same results, without noticeable differences, as field grinding and polishing equipment.
				2. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 1,000 to 2,000 revolutions per minute and with sufficient head pressure of not less than 20 lb-f (89 N) to raise floor temperature by 20 degrees F (11 degrees C).
				3. Diamond Tooling: Abrasive tools that contain industrial grade diamonds within a bonded matrix (such as metallic, resinous, ceramic, etc.) that are attached to rotating heads to refine the concrete substrate.

Bonded Abrasive: Abrasive medium that is held within a bonding that erodes away to expose new abrasive medium as it is used.

Metal Bond Tooling: Diamond tooling that contains industrial grade diamonds with a metallic bonded matrix that is attached to rotating heads to refine the concrete substrate.

Resin Bond Tooling: Diamond tooling that contains industrial grade diamonds within a resinous bonded matrix that is attached to rotating heads to refine the concrete substrate.

Hybrid Tooling: Diamond tooling that combines metal bond and resin bond that has the characteristics of both types of tooling.

Transitional Tooling: Diamond tooling that is used to refine the scratch pattern of metal bond tooling prior to the application of resin bond tooling in an effort to extend the life of resin bond tooling and to create a better foundation for the polishing process.

Abrasive Pad: An abrasive pad, resembling a typical floor maintenance burnishing pad, that has the capability of refining the concrete surface on a microscopic level that may or may not contain industrial grade diamonds

1. EXECUTION
	* + 1. EXAMINATION
				1. Acceptance: Obtain written acceptance by Owner of concrete slab for flatness, levelness, and surface characteristics before beginning polishing work.
				2. Inspect surfaces to be polished; ensure that substrate is clean, sound, properly cured, free of standing water, coatings, or curing compounds, foreign particles, oil, dust, grease, or laitance, that will adversely affect the performance of liquid materials.

Retain the following if coloring concrete:

Test concrete slab for moisture by one or both (as required by colorant manufacturer) of the following tests prior to commencing coloring work. Do not proceed with work if moisture characteristics exceed those recommended by colorant manufacturer:

Moisture Vapor Transmission Rate: ASTM F 1869.

Relative Humidity: ASTM F 2170.

* + - * 1. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction.
				2. Examine Project conditions, with Installer present, for conditions affecting performance of the Work.
				3. Verify proper placement, finishing, and curing of the concrete floor slab to be densified.
				4. Proceed with concrete slab densifier work only after unsatisfactory conditions have been corrected.
			1. PREPARATION
				1. Protect all surroundings from exposure to densifier and sealer materials including, but not limited to, windows, roofs, walkways, drives, and landscaping.

Particularly protect glass, aluminum, and polished metal surfaces. In case of exposure, wash off immediately to avoid etching.

Coordinate with other Division 03 Sections for curing concrete to receive polished finish. Due to the nature of the grinding and polishing operations, surface films and residue will necessarily be removed, but moisture curing or the use of a rapid dissipating curing compound will simplify the process.

* + - * 1. Ensure that new concrete has been cured at least seven days prior to commencing polishing operations.

If slab has been cured with film-forming curing compounds, completely remove residue, using cleaning materials recommended by curing compound manufacturer and/or by mechanical means, if necessary.

* + - * 1. Remove loose material by hand or mechanically, in accordance with standard practice.
				2. Ensure that air, liquid materials, and surface temperature is at least 40 degrees F (5 degrees C) and rising prior to beginning application.
				3. If concrete has been treated with an acid-based stain, follow densifier/finish manufacturer's recommendation for surface preparation.
			1. POLISHING CONCRETE
				1. Perform all polishing procedures to ensure a consistent appearance from wall to wall.
				2. Initial Grinding:

Use grinding equipment with metal or semi-metal bonded tooling.

Begin grinding in one direction using sufficient size equipment and diamond tooling to meet specified aggregate exposure class.

Make sequential passes with each pass perpendicular to previous pass using finer grit tool with each pass, up to 100 grit metal bonded tooling.

Achieve maximum refinement with each pass before proceeding to finer grit tools.

Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.

Continue grinding until aggregate exposure matches approved field mock-ups.

* + - * 1. Treating Surface Imperfections:

Mix patching compound or grout material with dust created by grinding operations, manufacturer’s tint, or sand to match color of adjacent concrete surfaces.

Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids with grout to eliminate micro pitting in finished work.

Work compound and treatment until color differences between concrete surface and filled surface imperfections are not readily noticeable when viewed from 10 feet away under lighting conditions that will be present during final occupancy.

* + - * 1. Grout Grinding:

Use grinding equipment and appropriate grit and bond diamond tooling.

Apply grout, forced into the pore structure of the concrete substrate, to fill surface imperfections.

Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.

* + - * 1. Honing:

Use grinding equipment with hybrid or resin bonded tooling.

At grinding level specified elsewhere, apply [**colorant and**] liquid densifier. Allow liquid products to dry before resuming grinding.

Hone concrete in one direction starting with a 100 grit tooling and make as many sequential passes as required to remove scratches, each pass perpendicular to previous pass, up to 400 grit tooling, reaching maximum refinement with each pass before proceeding to finer grit tooling.

Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.

Retain the following Article, Paragraph, and Subparagraphs when specifying finished gloss levels 3 or 4.

* + - * 1. Polishing:

Use polishing equipment with resin-bonded tooling.

Apply finish and protector at polishing level recommended by manufacturer.

Begin polishing in one direction starting with 800 grit tooling.

Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of gloss has been achieved.

Achieve maximum refinement with each pass before proceeding to finer grit pads.

Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.

Final Polish: Using burnishing equipment and finest grit abrasive pads, burnish to uniform reflective sheen matching approved field mock-up.

* + - * 1. Final Polished Concrete Floor Finish:

The final appearance of the polished concrete will be determined by two primary mechanical procedures (in addition to coloring and special aggregate selection, if any): Aggregate exposure level and gloss level. Each must be specified separately.

* Aggregate exposure level determines how deep into the slab the grinding process proceeds. In general, the deeper the grinding, the larger the size of the exposed aggregate.
* Gloss level is determined by the fineness of the ultimate polishing disc used – the finer the disc (higher grit number), the higher the gloss level. Since gloss is achieved by comparatively little actual material removal (the finer the grit, the less material is removed), the final gloss level is more or less independent of aggregate exposure.

Note: Gloss is further enhanced by buffing the finish and protector material.

Retain one of the following four Subparagraphs for class of aggregate exposure.

Aggregate Exposure Class A – Cream Finish: Polish Portland cement paste resulting in little or no aggregate exposure.

Aggregate Exposure Class B – Fine / Sand Aggregate Finish: Remove not more than 1/16 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying fine aggregate with no, or small amount of, medium aggregate at random locations.

Aggregate Exposure Class C – Medium Aggregate Finish: Remove not more than 1/8 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying medium aggregate with no, or small amount of, large aggregate at random locations.

Aggregate Exposure Class D – Large Aggregate Finish: Remove not more than 1/4 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying large aggregate with no, or small amount of, fine aggregate at random locations.

Retain one of the following four Subparagraphs for level of finished gloss.

Finished Gloss Level 1 – Low Gloss Appearance:

Procedure: Recommended not less than 4 step process with full refinement of each diamond tool with one application of densifier.

Gloss Measurement: Determine the specular gloss by incorporating the following:

Reflective Clarity Reading: Not less than 20 according to ASTM D 5767 prior to the application of sealers.

Reflective Sheen Reading: Not less than 15 according to ASTM D 523 prior to the application of sealers.

Finished Gloss Level 2 – Medium Gloss Appearance:

Procedure: Recommended not less than 4 step process with full refinement of each diamond tool with one application of densifier.

Gloss Measurement: Determine the specular gloss by incorporating the following:

Reflective Clarity Reading: Not less than 55 according to ASTM D 5767 prior to the application of sealers.

Reflective Sheen Reading: Not less than 25 according to ASTM D 523 prior to the application of sealers.

Finished Gloss Level 3 – High Gloss Appearance:

Procedure: Recommended not less than 4 step process with full refinement of each diamond tool with one application of densifier.

Gloss Measurement: Determine the specular gloss by incorporating the following:

Reflective Clarity Reading: Not less than 65 according to ASTM D 5767 prior to the application of sealers.

Reflective Sheen Reading: Not less than 35 according to ASTM D 523 prior to the application of sealers.

Finished Gloss Level 4 – Very High Gloss Appearance:

Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.

Gloss Measurement: Determine the specular gloss by incorporating the following:

Reflective Clarity Reading: Not less than 85 according to ASTM D5767 prior to the application of sealers.

Reflective Sheen Reading: Not less than 50 according to ASTM D523 prior to the application of sealers.

* + - 1. LIQUID MATERIALS APPLICATION
				1. General: Follow all manufacturer's recommendations and written instructions when applying densifier and sealer materials.

Follow manufacturer's safety and personal protective equipment recommendations.

* + - * 1. Mixing: Thoroughly mix materials prior to each use.

Mix finish and protector gently to avoid formation of bubbles.

Retain Paragraph below if coloring concrete:

* + - * 1. Dye or Pigmented Micro Stain Application:

Apply coloring materials at grinding/honing level recommended by colorant manufacturer.

Apply solution by methods and techniques required by manufacturer to produce finish matching approved field mock-ups.

Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.

Maintain consistent saturation throughout application.

Avoid splashing, dripping, or puddling of solution on adjacent substrates.

When color matches approved mock-ups, neutralize as required by manufacturer.

If only one type of densifier is included, delete the Paragraph describing the other. If both are included, retain both Paragraphs.

* + - * 1. Lithium Silicate Densifier Application:

Densifier should be applied at the same grinding step as the dye application, which will be determined by the dye manufacturer. If concrete is not to be colored, apply dye after the 200-grit grinding. Retain first Subparagraph below and delete second, if coloring concrete; delete first Subparagraph and retain second if not.

Apply densifier immediately after coloring, prior to subsequent grinding/honing.

If acid-based stain has been used, neutralize the surface prior to proceeding.

Apply densifier after grinding level that uses a 200-grit tooling.

Apply using HVLP sprayer or hand pump-up sprayer.

Application Rate: 400 – 750 sq. ft. per gallon (9.8 – 18.4 sq. m/l), depending on surface porosity.

Brush out standing pools of material, if formed.

Reapply material to any areas that dry out before 20 minutes

* + - * 1. Sodium Silicate Densifier Application:

Densifier should be applied at the same grinding step as the dye application, which will be determined by the dye manufacturer. If concrete is not to be colored, apply dye after the 200-grit grinding. Retain first Subparagraph below and delete second, if coloring concrete; delete first Subparagraph and retain second if not.

Apply densifier immediately after coloring, prior to subsequent grinding.

If acid-based stain has been used, neutralize the surface prior to proceeding.

Apply densifier after grinding level that uses a 200-grit tooling.

Apply using HVLP, hand pump-up sprayer, brush, or roller.

Application Rate:

First Coat: 200 sq. ft. per gallon (4.9 sq. m/l).

Second Coat (if needed): 300 – 400 sq. ft./gal. (7.3 – 9.8 sq. m/l).

Scrub material into surface using soft bristle brush or mechanical scrubber.

Work into surface for 15 – 30 minutes, depending on drying characteristics, until product begins to thicken.

Rewet with water, then work an additional 5 – 10 minutes.

Do not allow material to dry while working; reapply product, if necessary.

Thoroughly rinse and brush- or squeegee dry after application.

Repeat, if necessary due to surface porosity.

* + - * 1. Finish and Protector Application: Apply liquid surface finish and protector after all construction activity on the slab surface has ceased and immediately after slab cleaning.

Allow new concrete to cure a minimum of 28 days prior to sealer application.

Mix finish and protector gently to avoid formation of bubbles.

Apply finish and protector using pump sprayer or HVLP sprayer. Limit area applied at one time to maximum area recommended by manufacturer. Spread with pre-moistened microfiber pad. Do not work material into surface.

Application Rate: 1,500 – 3,000 sq. ft. per gallon (36.8 – 73.7 sq. m/l), depending on surface porosity.

When dry, buff surface using high-speed burnisher and soft buffing pad.

Two coats are recommended by the manufacturer, for best results. Delete Subparagraph below if only one coat is desired, or edit if more than two coats are desired (maintain second coat application rate for subsequent applications).

Apply second coat of finish and protector after first coat has dried.

Application Rate: 3,000 – 4,000 sq. ft. per gallon (73.7 – 98.2 sq. m/l).

Buff second coat using same technique as first.

* + - 1. CLEANING
				1. Clean overspray, spillage, and accidental exposure of material from adjacent surfaces.
				2. Remove all debris and excess materials from the job site and dispose of in accordance with all applicable regulations for waste disposal.

Do not dispose of liquid materials into sanitary sewers or storm drains.

* + - 1. PROTECTION
				1. Protect densified concrete from spills, stains, and damage during construction, prior to finish and protector application.
				2. Do not clean, scrub, or allow liquids on surface for a minimum of 72 hours following application of finish and protector.
				3. Do not cover surface for a minimum of 7 days following application of finish and protector.
				4. Do not allow standing water on surface for a minimum of 7 days following application of Durable Floor System.
				5. Provide temporary floor protective covering in construction traffic paths and where potentially damaging construction activity will occur.
				6. At the end of construction, thoroughly clean and buff polished floors to gloss level indicated.

END OF SECTION 03 35 43