SECTION 03 35 17 – DENSIFIED CONCRETE FINISHING

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*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.*

*For specification questions, email:* Specifications@DaytonSuperior.com

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This Section specifies sodium silicate/siliconate-based liquid densifiers. For lithium silicate-based densifiers, refer to Dayton Superior Guide Specification # 03\_35\_17 – Densified Concrete Finishing – DFS. For densified slabs that are also to be polished, refer to Dayton Superior Guide Specification # 03\_35\_43 – Polished Concrete Finishing, which includes coloring, densifying, and polishing concrete slabs.

This Section includes specific provisions for tilt-up projects and should be edited accordingly.

Refer to Dayton Superior *Guide to Liquid Densifiers* and product *Technical Data Sheets* (double-click icons below to open) for more information

  

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

Chemically reactive, sodium silicate/siliconate, penetrating liquid hardener/densifier applied to new [**existing**] concrete slabs.

Lithium-fortified liquid finish and protector 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.

* + - * 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.

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 liquid densifiers.

03 53 00 – Concrete Topping: [**Shake-on**][**Self-leveling**][**Troweled-on**] cementitious floor topping to receive liquid hardener/densifier.

* + - 1. REFERENCES
				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 2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

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

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 subcontractor.

Densifier Applicator.

Densifier manufacturer's representative.

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.

Materials to be applied.

Procedures to be used for densifying and protecting the concrete.

Material storage and staging.

Temporary heating.

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 the following; include material physical characteristics, storage and application instructions, precautions and safety data, cleanup, and maintenance information:

Liquid densifier.

Finish and protector.

* + - 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 Installer.

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. Installer Qualifications: Installer who is approved by, or acceptable to manufacturer for application of densifier products required for this Project, with at least five (5) years' experience in application of sodium silicate-based concrete densifiers.
			2. DELIVERY, STORAGE, AND HANDLING
				1. Deliver products in original factory packaging, bearing identification of product, manufacturer, batch number, and expiration date.

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

* + - * 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 stated on the Safety Data Sheets and manufacturers' recommendations.
			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. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.
				3. Do not allow liquid materials to freeze.
				4. Protect adjacent work from contamination due to mixing, handling, and application of liquid densifier and sealer products.
1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Acceptable Manufacturers:

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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. MATERIALS
				1. Liquid Densifier: Water-based, odorless solution of 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.

Product: Dayton Superior "Sure Hard Densifier J17":

Specific Gravity: 1.2

Flash Point: None

One component; no diluting required.

VOC Limit: 0 g/L

Properties of Densified Concrete:

Compressive Strength, Improvement over Untreated Concrete: + 12%, per ASTM C 140.

Abrasion Resistance, Improvement over Untreated: + 80%, per ASTM C 779, Method A.

Water Absorption (24 Hour Immersion): 3.4 percent per ASTM C 642.

Water Vapor Transmission Rate: 217 g/sq. ft., per ASTM E 96.

Coefficient of Friction, Improvement over Untreated Concrete: + 8% wet; + 6% dry, minimum.

* + - * 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.

Product: Dayton Superior "Pentra-Hard Guard":

Specific Gravity: 1.017

pH: 11

Flash Point: None

VOC Limit: 50 g/L

* + - * 1. Water: Potable and at a temperature of not more than 70 degrees F (21 degrees C).
1. EXECUTION
	* + 1. EXAMINATION
				1. Inspect surfaces to receive densifier; 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 densifier materials.
				2. Inspect all areas involved to establish extent of work, access, and need for protection of surrounding construction.
				3. Examine Project conditions, with Installer present, for conditions affecting performance of the Work.
				4. Verify proper placement, finishing, and curing of the concrete floor slab to be densified.
				5. Proceed with concrete slab densifier work only after unsatisfactory conditions have been corrected.
			2. 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.

* + - * 1. Ensure that new concrete has been cured at least seven days prior to densifier application.

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, densifier material, and surface temperature are 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/sealer manufacturer's recommendation for surface preparation.
			1. 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.
				2. Densifier Application:

Apply densifier material using low pressure sprayer, roller, or brush, or squeegee to point of rejection.

Application Rate (steel troweled surface): 200 sq. ft. per gallon (4.9 sq. m per liter).

Immediately scrub into surface, using soft bristle broom or mechanical scrubber.

Continue scrubbing until material begins to thicken.

Rewet with water and work for another 5 to 10 minutes.

Do not allow material to dry; apply additional material, if necessary.

If allowed to dry, remove product by mechanical means.

Immediately rinse, then squeegee or brush liquid off surface.

If a second application is desired or known to be required, edit Paragraph below accordingly.

* + - * 1. Second Application: If a second application is required due to surface porosity, begin application immediately, without allowing slab surface to dry between coats.

Apply second coat using the same application method as the first.

Application Rate: 300 – 400 sq. ft. per gallon (7.4 – 9.8 sq. m per liter).

Retain first Paragraph below for new construction. Delete first Paragraph and retain second Paragraph for densifier application to existing slabs.

* + - * 1. Finish and Protector Application: Apply finish and protector over treated concrete only after all major construction operations in affected areas have been completed.
				2. Finish and Protector Application: Apply finish and protector over treated concrete after surface has dried.

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 using pump sprayer or HVLP sprayer.

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

Limit area applied at one time to maximum area recommended by manufacturer.

Spread with microfiber pad, pre-moistened with water. Do not work material into surface.

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.

Apply second coat of sealer after first coat has dried.

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

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 sealer 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.

END OF SECTION 03 35 17