SECTION 03 35 17 – DENSIFIED CONCRETE FINISHING – DURABLE FLOOR SYSTEM™

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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.*

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

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This Section specifies lithium silicate-based liquid densifiers; Durable Floor System™. For sodium silicate-based densifiers, refer to Dayton Superior Guide Specification # 03 35 17 – Densified Concrete Finishing – J17. 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 Durable Floor System™, consisting of:

Chemically reactive, lithium silicate penetrating liquid hardener/densifier applied to new concrete slabs.

Slab curing.

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.

* + - 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 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 501 – Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

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

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

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.

Include the following Subparagraph for tilt-up projects:

Tilt-up 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.

Sequence 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.

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.

Curing material.

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 lithium silicate-based concrete densifiers.
			2. DELIVERY, STORAGE, AND HANDLING
				1. Deliver products in original factory packaging, bearing identification of product, manufacturer, batch number or similar 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 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 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 protection products.
1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Acceptable Manufacturer:

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

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 lithium silicates, 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 "Pentra-Hard Densifier":

Specific Gravity: 1.05

Flash Point: None

pH: 11

One component; no diluting required.

VOC Limit: < 50 g/L

Properties of Densified Concrete:

Abrasion Resistance, Improvement over Untreated: + 50%, per ASTM C 501.

Coefficient of Friction Compared to Untreated Concrete: No change.

On tilt-up projects, contractors often elect to use a bond breaker as a curing material, due to compatibility issues. It is important to use the same bond breaker material for curing as will later be used for bond breaker. All bond breakers manufactured by Dayton Superior are designed to cure concrete (when properly applied), as well as to part tilt-up panels. The applicator should consult the bond breaker Technical Data Sheets for application details.

Retain first of the two Paragraphs below if conventional curing compound will be used, or second Paragraph if bond breaker will be used to cure slab on tilt-up projects.

* + - * 1. Concrete Curing Compound:

Product: Dayton Superior "Clear Cure VOC J7WB":

Description: All-resin, dissipating, water-based concrete curing compound.

Compliance:

ASTM C 309, Type 1, Classes A and B.

AASHTO M 148, Type 1, Classes A and B.

Moisture Loss: Meets ASTM C 309. Less than 0.55 kg per sq. m.

Dry Time: Approximately 2 hours at 70 degrees F (21 degrees C).

VOC Content: < 100 g/L.

Or:

* + - * 1. Bond Breaker (for Use as Curing Compound): Furnished under Section 03 47 13 – Tilt-up Concrete. Bond breaker material used for curing must be identical to that used as bond breaker during tilt-up operations, and shall comply with the following:

Compliance:

ASTM C 309, Type 1, Classes A and B.

AASHTO M 148, Type 1, Classes A and B.

Moisture Loss: Meets ASTM C 309. Less than 0.55 kg per sq. m.

Select appropriate VOC limit in Subparagraph below. 600 g/L limit is default in the U. S., unless stricter limit of 350 g/L is required by regional governing authority (and in all of Canada); limit of 100 g/L is required for LEED projects and areas under SCAQMD jurisdiction.

VOC Content: [**< 600 g/L, unless exempted by EPA**] [**< 350 g/L**] [**<** **100 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.

Product: Dayton Superior "Pentra-Hard Guard":

Specific Gravity: 1.017

pH: 11

Flash Point: None

VOC Limit: <50 g/L

1. EXECUTION
	* + 1. EXAMINATION
				1. Inspect surfaces to receive densifier; ensure that substrate is clean, sound, properly cured, free of standing water, 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 and finishing 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 air, densifier material, and surface temperature are at least 40 degrees F (5 degrees C) and rising prior to beginning application.
				2. Clean dirt, debris, and other contaminants from slab surfaces, including dust and debris resulting from saw cutting operations, if applicable.
			1. APPLICATION
				1. General: Follow all manufacturer's recommendations and written instructions when applying densifier and finish and protector materials.

Follow manufacturer's safety and personal protective equipment recommendations.

* + - * 1. Sequence:

Apply lithium silicate densifier immediately after final finishing operations, and prior to curing.

Saw cutting may be performed before or after densifier application, at Contractor's option.

Apply curing material after densifier application.

Apply finish and protector after all [**tilt-up operations and similar**] top-of-slab construction work is complete.

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

Apply densifier material using HVLP sprayer, or hand pump-up sprayer for small applications. Spread evenly with flat microfiber pad.

Application Rate (steel troweled surfaces): 500 - 750 sq. ft. per gallon (12.3 – 18.4 sq. m per liter).

If material pools, spread out using soft bristle brushes or microfiber pads.

If some areas begin to surface dry before 20 minutes, reapply material to those areas.

* + - * 1. Curing Concrete: Apply [**curing compound**] [**first coat of bond breaker**] immediately after densifier has soaked into the slab and slab is surface dry.

Retain the following Subparagraph only if bond breaker is to be used for curing:

Apply bond breaker material at rate specifically recommended by manufacturer to comply with moisture loss requirements specified herein.

* + - * 1. Prior to application of finish and protector, completely remove all residue of [**curing**] [**and**] [**bond breaker**] material. Thoroughly clean slab, removing surface discoloration and stains.
				2. Finish and Protector Application: Apply 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 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 hog's hair 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 and been buffed.

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 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. At the end of construction, thoroughly clean and buff floors.

END OF SECTION 03 35 17