

SECTION 03 54 00

FORMATTED PERFORMANCE SPECIFICATION FOR CALCIUM ALUMINATE BASED CEMENT SELF-LEVELING CAST UNDERLAYMENT TOPPING

PART I – GENERAL

1.01 SUMMARY

- A. This is the recommended guide specification for Calcium Aluminate Based, Self-Leveling, Cement Underlayment, a pumpable and/or pourable, low-alkali, premium self-leveling underlayment used to finish concrete slabs and/or level uneven floor surfaces. Apply it over concrete, wood and other types of sound flooring before installing wood, resilient, cork, sports, ceramic, stone, carpet or other flooring systems. Floor covering adhesives that are suitable for concrete can be used on Calcium Aluminate Based Underlayment.
- B. If necessary, a Moisture Vapor Control Coating can be applied prior to installation of the cement underlayment topping, to help the system achieve Moisture Mitigation requirements needed for finish flooring.

1.02 SECTION INCLUDES

- A. Calcium Aluminate Based Self-Leveling Cement Underlayment
- B. Calcium Aluminate Based Cement Primer
- C. Moisture Vapor Control Coating

1.03 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

- A. Environmental Performance Criteria: The following criteria are required for products included in this section.
Refer to Division 1 for additional requirements:
 - 1. Products manufactured regionally within a 100 mile radius of the Project site;
 - 2. Adhesive products must meet or exceed the VOC limits of South Coast Air Quality Management District Rule (SCAQMD) #1168 and Bay Area Air Quality Management District (BAAQMD) Reg. 8, Rule 51.

1.04 SUBMITTALS

- A. Submittal Requirements: Submit the following “Required LEED Criteria” certification items as listed below. Refer to Division 1 for additional requirements:
 - 1. A completed LEED Environmental Building Materials Certification Form. Information to be supplied generally includes:
 - a. Manufacturing plant locations for tile installation products.
 - b. LEED Credits as listed in Part 1.4B “LEED Credit Submittals”
 - c. Recycled content; pre-consumer or post-consumer; or; Project specific information gathered using the LATICRETE LEED Project Certification Assistant available at www.laticrete.com/green.
 - 2. UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings, UL 2818 or UL GREENGUARD Gold certificates provided by the tile installation materials manufacturer on UL GREENGUARD letterhead stating “This product has been UL GREENGUARD Gold Product Certified

For Low Chemical Emissions by the UL Environment under the UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings” for each tile installation product used to verify Low VOC product information.

3. Contractor’s certification of LEED Compliance: Submit Contractor’s certification verifying the installation of specified LEED Compliant products.
 4. Product Cut Sheets for all materials that meet the LEED performance criteria. Submit Product Cut Sheets with Contractor or Sub-contractor’s stamp, as confirmation that submitted products were installed on Project.
 5. Material Safety Data Sheets for all applicable products.
- B. Submit proof of warranty.
- C. Submit Health Product Declarations (HPD) for each tile installation material.
- D. For alternate materials, at least thirty (30) days before bid date submit independent laboratory test results confirming compliance with specifications listed in Part 2 - Products.

1.05 QUALITY ASSURANCE

- A. The installation of Calcium Aluminate Based Self Leveling Underlayment must be by a qualified applicator using specialized mixing equipment and tools approved by the manufacturer. Contact manufacturer and/or the local representative to identify names of qualified applicators.
- B. Calcium Aluminate Based Cement Underlayment is to be applied at ¼” to 1 ½” average depth (6 – 38mm). Consult manufacturer for average depths over 1 ½”.
- C. Finished floor goods may be installed as soon as 1 day after application, subject to thickness, drying conditions and type of flooring materials. Always refer to finished floor manufacturer’s recommendations regarding installation instructions, restrictions, moisture conditions and compatibility. Always test performance suitability and compatibility of finished floor systems prior to their application. Sample surfaces should be installed as a field test so as to be representative of entire surface and tested for intended use.
- D. As with any cementitious material, slight variations in color can occur as a function of job-site conditions. Some water-marks similar to veins in stone are a natural result of a pour/spread/smooth installation process.
- E. Testing Agency Qualifications: If required, secure an independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- F. Mockups: Place mockups of concrete floor topping (approx. 100 sq. ft.) to demonstrate typical joints, surface finish, bonding, texture, tolerances, and standard of workmanship.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in their unopened packages and protect from moisture. Protect liquids from freezing and from excessive heat. Store off the floor on dry pallets or equivalent. If installation uses bulk sacks, material should be used within 6 months of the date of

manufacture. If installation uses 50 LB plastic bags, material should be used within 1 year of the date of manufacture.

- B. Use all means necessary to protect the materials of the section before, during and after installation and to protect the installed work and materials of all other trades.

1.07 SITE CONDITIONS

- A. Observe the basic rules of concrete work. Substrate temperature should be a minimum of 40° F (4° C) during the application and the ambient temperature maintained at 50°–90° F (10°–32° C).
- B. Install quickly if floor is warm and follow hot weather precautions as supplied by the manufacturer. Never mix with cement or additives other than those approved by the manufacturer.
- C. During application and curing, Calcium Aluminate Based Underlayments should not be exposed to rapid air movement, especially if area is heated or cooled. Air flow from HVAC systems in areas of application should be directed away from the floor during application of Underlayment and at least 24 hours after work is completed.
- D. No other trades and no foot traffic of any kind are to be allowed in the work area from commencement of substrate preparation until minimum 24 hours after completion of finishing.

1.08 PRE-INSTALLATION CONSIDERATIONS

- A. Applicator/Contractor must review all manufacturer-supplied Substrate Preparation and Primer instructions prior to commencing work.
- B. Calcium Aluminate Based Self-Leveling Underlayment may be used for both new and renovation projects. When specifying or planning a new concrete slab, the following items should be considered.
 - 1. Slab Finishing Method: Two course monolithic bonded underlayment topping applied per manufacturer's recommendations over base concrete slab with bull float trowel finish to minimum FF 15. Just prior to installation survey base slab following a 4' grid depending on tolerances, install level pegs to required heights, and then install Calcium Aluminate Based topping slab over entire concrete base slab to meet levelness and flatness requirements without final finishing in conformance to ACI 318. Install on open floor plates 28 days after base slab placement or prior to starting interior framing work or prior to finish paint and other finish work. For installation over concrete earlier than 28 days after placement, Calcium Aluminate Based Underlayments may be installed when the substrate concrete has reached 70% of its 28-day design compressive strength. For further information, contact manufacturer for more specific details or requirements.
 - 2. Use of curing compounds on new concrete slabs is not recommended. If a curing compound is used on new concrete, the curing compound (including "self-dissipating" curing compounds) must be removed by shot blasting, scarifying or other mechanical means to a minimum CSP of 3 per ICRI Guideline No. 03732 then vacuumed clean.
- C. Review finished floor goods recommendations for substrate moisture limitations. Flooring adhesive and floor goods manufacturers may separately specify maximum allowable moisture vapor emission rates or concrete relative humidity. If the concrete slab

measures above these limits than a moisture vapor control system is required. If a moisture mitigation system is required, contact manufacturer for recommended products. Moisture mitigation must be installed on the concrete slab prior to installation of underlayment.

1.09 WARRANTY

- A. The Contractor warrants the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials and workmanship for a period of 10 years. The underlayment manufacturer shall provide a written ten (10) year warranty, which covers materials and labor - reference LATICRETE Warranty Data Sheet LSC-DS030.10S for complete details and requirements.
- B. For installations under Premium LATICRETE Tile & Stone Installation Systems, as manufactured by LATICRETE INTERNATIONAL, Inc., the underlayment manufacturer shall provide a written twenty-five (25) year warranty, which covers materials and labor - reference LATICRETE Warranty Data Sheet LSC-DS230.25S for complete details and requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Calcium Aluminate Based Self-Leveling Cement Underlayment shall conform to the following performance characteristics:
 - 1. Compressive Strength: 4200 PSI (28.9 MPa) after 28 days, tested to ASTM C1708.
 - 2. Flexural Strength: 900 PSI (6.2 MPa) in 28 days, tested to ASTM C1708.
 - 3. Tensile Bond Strength: 300 PSI (2.1 MPa), tested to ASTM C1583.
 - 4. Installed Dry Weight: 2.6 lbs/sq ft (6.3 kg/sq m) at 1/4 inch (6mm) installed thickness (standard mix). 125 lbs/CF.
 - 5. Walkable: 2 to 4 hours at 70 degrees F (21 degrees C). Wheeled traffic after 72 hours following installation.
 - 6. Pour Depth: Average ¼ - 1 ½ inches (6-38 mm). Pour depth can be extended with pea gravel. Consult Technical Services for depths over 1 ½ inches (38 mm). Product can be troweled at edges to meet adjacent flooring and elevations.

(Basis of Design: LATICRETE SUPERCAP SC500)

- B. Calcium Aluminate Based Self-Leveling Cement Underlayment – LIGHT WEIGHT - shall conform to the following performance characteristics:
 - 1. Compressive Strength: 3000 PSI (20.3 MPa) after 28 days, tested to ASTM C1708.
 - 2. Flexural Strength: 500 PSI (3.4 MPa) in 28 days, tested to ASTM C1708.
 - 3. Tensile Bond Strength: 250 PSI (1.7 MPa), tested to ASTM C1583.
 - 4. Installed Dry Weight: 7.1 lbs/sq ft (35 kg/sq m) at 1 inch (25mm) installed thickness (standard mix). 85 lbs/CF.

5. Walkable: 2 to 4 hours at 70 degrees F (21 degrees C). Wheeled traffic after 72 hours following installation.
6. Pour Depth: Average ¼ - 4 inches (6-102 mm). Consult Technical Services for depths over 4 inches (102 mm). Product can be troweled at edges to meet adjacent flooring and elevations.

(Basis of Design: LATICRETE SUPERCAP SC500-LW)

- C. Calcium Aluminate Based Self-Leveling Cement Underlayment – HIGH STRENGTH - shall conform to the following performance characteristics:

1. Compressive Strength: 5400 PSI (37.2 MPa) after 28 days, tested to ASTM C1708.
2. Tensile Bond Strength: 325 PSI (2/07 MPa), tested to ASTM C1583.
3. Installed Dry Weight: 2.7 lbs/sq ft (13.2 kg/sq m) at 1/4 inch (6mm) installed thickness (standard mix). 125 lbs/CF.
4. Walkable: 2 to 4 hours at 70 degrees F (21 degrees C). Wheeled traffic after 72 hours following installation.
5. Pour Depth: Average ¼ - 1 ½ inches (6-38 mm). Pour depth can be extended with pea gravel. Consult Technical Services for depths over 1 ½ inches (38 mm). Product can be troweled at edges to meet adjacent flooring and elevations.

(Basis of Design: LATICRETE SUPERCAP SC500-PLUS)

- D. Acrylic Primer for all underlayments and substrate types shall be as recommended by the Underlayment manufacturer.

(Basis of Design: LATICRETE SUPERCAP Primer Plus)

- E. Moisture vapor control (moisture mitigation), if required, shall be a single-coat 100% solids, liquid applied 2-part epoxy coating specifically designed for controlling the moisture emission rate from new or existing concrete slabs, installed prior to underlayment installation.

1. Applicable Standard ASTM F3010: If required to meet this standard, minimum thickness of moisture vapor control must be 16 mils.
2. Moisture Vapor Emission Rate (MVER) Reduction: from ≤ 25 lbs/1000-ft²/24hr (1415 $\mu\text{g}/(\text{s} \cdot \text{m})$) to below 3 lbs/1000-ft²/24hr (170 $\mu\text{g}/(\text{s} \cdot \text{m})$) per ASTM F1869, at 12 mils minimum thickness.
 3. Concrete Substrate Humidity: up to 100% RH / 14 pH, per ASTM F2170.
 4. VOC Content: <10 g/L, UL GREENGUARD Gold Certified.
5. Tensile Bond Strength (to concrete substrate): 410 PSI (2.8 MPa) minimum in 7 days per ASTM C1583.

(Basis of Design: LATICRETE SUPERCAP Moisture Vapor Control)

- F. Water shall be clean, potable, and cool.

2.02 MIX DESIGNS

- A. Underlayment materials may be supplied in bulk supersacks and/or 50 lb bags. Check with manufacturer for available size options.
- B. Super Sacks – Pre-condition underlayment materials to approved application temperature, typically between 50–90°F (10–32°C). Materials are to be blended by qualified Applicators with a high-volume mobile blending unit that mixes the underlayment materials onsite at street level to exact manufacturer specifications.
 - a. Mix bulk sacked, engineered materials and water, utilizing computerized remote-controlled, self-contained mobile blending units, precisely weighing and mixing materials into a uniformly consistent, highly fluid mixture.
 - b. Utilize established recipes (mix designs) programmed into computer controlled batch mixing procedure to achieve the specified fluid consistency for mobile blending unit delivery to placement areas.
- C. 50 lb bags – Pre-condition underlayment materials to approved application temperature, typically between 50–90°F (10–32°C). Combine materials with clean, cool water and mix with a high speed drill according to manufacturer recommendations. Mix thoroughly to obtain a uniform, lump-free consistency; scrape container's sides and remix to incorporate remaining powder. If a multiple bag mix is performed, additional mix time may be required to obtain a lump-free, uniform mix.

PART 3 – EXECUTION

3.01 GENERAL

- A. Refer to manufacturer data sheets, or other related guides, for current product installation instructions.
- B. Concrete Slab Finishing in accordance with ACI 117 (Straight Edge Method).
- C. Provide ventilation to promote curing and reduce humidity.
- D. Do NOT install underlayment over moving cracks in substrate.

3.02 INSPECTION

- A. Verify that installed work of other trades is complete to the point where work of this Section may properly commence.
- B. Verify conformance to Field Conditions specified by this Section and to manufacturer instructions.
- C. Examine the areas and conditions where the Underlayment is to be installed and notify the architect of conditions detrimental to the proper and timely completion of the work. Verify that substrate surfaces are protected from weather, wind, water and clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.
- D. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.03 PREPARATION

- A. Substrate finishing or remedial method for cast underlayment:
1. Concrete:
 - a. New Slab: Bull Float to minimum FF15. No finishing or hard trowelling is needed prior to Calcium Aluminate Based Underlayment application.
 - b. Existing Slab: Evaluate and determine whether substrate needs to be mechanically prepared to ICRI CSP-3 by shot-blasting, scarification, or other treatments performed as instructed by manufacturer.
 - c. Weak or Contaminated Surfaces: Mechanically clean to ICRI CSP-3 by shot blasting, scarifying or sanding. If the substrate surface is suspected of having bond breakers core testing of the slab is recommended to confirm depth and type of contamination.
 - d. Do not acid etch or use chemicals to clean the substrates.
 2. Wood:
 - a. Verify the wood substrate is stable and structurally sound enough to support all total anticipated live, dead and impact loads.
 - b. Wood substrates must be clean and free of any contaminants. Substrates can be sanded if necessary, then swept, vacuumed and properly primed.
 - c. If required for leakage control, install 6 mil thick polyethylene sheeting, overlapping by 6" (15 cm) and taping seams. Affix using staple or equivalent mechanical fastener.
 - d. Fasten galvanized diamond metal lath over entire substrate using corrosion resistant fasteners every 6" (15 cm) overlapping lath seams by 1" (2.5 cm).
 3. Existing Finishes:
 - a. Verify the substrate and construction below existing finishes does not exceed industry deflection standards under all live, dead and impact loads for the type of finish flooring being installed.
 - b. Acceptable existing floor finishes include Vinyl Tile, Cement Terrazzo, Ceramic Tile & Stone, and Cement Mortar Beds. Refer to previous section for installation over existing wood.
 - c. Existing vinyl, vinyl asbestos tile, linoleum or ceramic tile must be firmly bonded to a rigid substrate. Note that cushioned vinyl will not properly support tile. Sheet vinyl or linoleum must be fully adhered.
 - d. Surface Prep:
 1. Clean surface to remove grease, wax, oil or other contamination;
 2. Scrub with Tri-sodium Phosphate (TSP) solution or electric dishwasher detergent and hot water;
 3. After scrubbing surface with cleaning solution, rinse with clean water

and allow to dry.

4. Follow current priming instructions in TDS 230S, available on www.laticretesupercap.com.

4. Cleaning:
 - a. Remove dirt, wax, sealers, curing compounds, efflorescence, and other unsuitable surface conditions not part of concrete matrix that may inhibit the underlayment bond to the surface.
 - b. Broom clean and vacuum surfaces to pick up remaining dust and debris.
 - c. Where removal of existing bond breaking substances is impractical, conform to manufacturer's instructions for application of bonding agent before installation of cementitious underlayment.
 - 1) Do not install cementitious underlayment directly over mastics and other bond breaking substances.
5. All cracks in the subfloor shall be repaired to minimize telegraphing through the Underlayment. See Section 3.02 B.
6. Substrate temperature should be a minimum of 40 degrees F (4 degrees C) during the application and the ambient temperature maintained at 50 degrees – 90 degrees F (10 degrees – 32 degrees C).
7. The relative humidity of the sub-floor should be tested according to ASTM F2170. Relative humidity of the substrate must not exceed 95% to install underlayment. Refer also to section 1.06.C for floor goods considerations. If required, install Moisture Vapor Control to properly prepared concrete substrate prior to priming or LEVEL PEG setting.
8. Surface bond strength of the substrate should be no less than 100 PSI (0.7 MPa) per ASTM C1583 or ICRI Guideline No. 03739 for the application of all underlayment. Weak or contaminated surfaces must be mechanically cleaned by shot blasting, scarifying or sanding. Never use chemicals to clean the substrate. If installing Moisture Vapor Control, per ASTM F3010, concrete slab to receive Moisture Vapor Control must have a tensile pull-off strength of 200 PSI (1.4 MPa) or greater when tested in accordance with ASTM C1583.
9. Moisture vapor control (as required): Apply to concrete substrates using a squeegee and paint roller achieving required thickness as instructed by the manufacturer. If required to meet ASTM F3010, then moisture vapor control MUST be a minimum 16mil thickness.
10. Containment: Close and seal floor openings and install dams at edges of floor area to receive treatment as necessary to contain self-leveling underlayment while in plastic state.
11. Concrete Floor Flatness and Floor Levelness Benchmarks: Use a digital level device to determine elevations on a 4x4 foot grid, depending on tolerances, to establish and set self-adhering LEVEL PEGS at heights to indicate installation depths and top surface of underlayment application or other approved method.
12. Joint Preparation:

- a. Expansion and Isolation Joints: Honor through underlayment by marking with screws or similar and saw cutting after self leveling application..
 - b. Static (Non-Moving) Saw Cuts and Control Joints: Fill with joint sealer under provisions of Section 03 30 00.
 - c. Other Static (Non-Moving) Joints: Patch and repair using cementitious patching product.
 - d. Dynamic (Active) Cracks: Bring to Architects attention for direction.
13. Priming:
- a. Maintain adequate ventilation during and following primer application to promote faster drying.
 - 1) Insufficient drying time, low temperatures, and high humidity may result insufficient drying, poor film formation, and pinholes in surface.
 - 2) Do not apply at surface temperatures below 40 degrees F (4 degrees C).
 - b. Acrylic Primer Installation: Dilute primer concentrate with water according to the ratios given by the manufacturer.
 - 1) Apply to substrates using stiff broom, roller or spray as instructed by manufacturer.
 - 2) Roll, spray, or broom to uniform film thickness over prepared substrate. Avoid puddling and allow surface film to become dry to touch, typically 3 - 5 hours after application. For best results, and while primer is still fresh, it should be lightly brushed to ensure a complete, uniform film has been applied.

3.04 INSTALLATION OF UNDERLAYMENT

- A. Install underlayment in accordance with manufacturer's instructions, and after installation of moisture vapor mitigation (if needed) and underlayment primer.
- B. Mixing: Measure components and mechanically mix, as recommended by the manufacturer.
- C. Substrate temperature must be a minimum 40°F (4°C) during application and air temperature maintained between 50–90°F (10–32°C). Protect areas from direct sunlight and exposure to weather.
- D. Pump or pour blended material onto substrate at an average thickness ranging between 1/4" to 1 1/2" (6–38 mm) for all surfaces. Light Weight underlayment options may allow thicknesses up to 4" (102 mm). Wood substrates require a minimum thickness of 3/4" (19 mm).
- E. Immediately following placement lightly smooth the surface and pour lines. When not using level pegs the use of a gauge rake will assist in controlling material depth.
- F. Adequate ventilation should be provided to ensure uniform drying.

- G. Do not expose Underlayment to rolling dynamic loads, such as forklifts or scissor lifts, for at least 72 hours after installation.
- H. Proper application is the responsibility of the user.
- I. Place underlayment before partition installation if construction schedule allows.
- J. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.05 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.
- C. Provide continuous ventilation and adequate heat until walkable; provide mechanical ventilation if necessary.
- D. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.
- E. Do not install floor coverings over underlayment until all conditions required by the floor covering manufacturer have been met. Floor covering manufacturer's requirements may vary greatly.

3.06 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking during the curing process.
- B. Protect underlayment from traffic as follows:
 - a. Do not permit foot traffic over underlayment surfaces for 2 to 4 hours, 24 hours for trade traffic.
 - b. Do not permit trade vehicle traffic for 48-hours.
 - c. Standing water is to be removed by squeegee or other acceptable method daily.

3.07 FIELD QUALITY CONTROL

- A. Field flow tests should be performed on site periodically to ensure mix is homogeneous and free from separation.
- B. Field visits by manufacturer personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

END OF SECTION