

SECTION 09 25 23

LIME BASED PLASTERING – COMPRESSED EARTH BLOCK (CEB)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-metallic lath.
2. Preformulated dry-mix lime plaster.

B. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

1. Section 061000 "Rough Carpentry" for wood framing, grounds, and furring that support plaster bases and lime-based plaster.
2. Section 061600 "Sheathing" for sheathing substrates to receive exterior lime-based plaster.
3. Section 090320 "Historic Treatment of Plaster" for repair and replacement of historic lime plastering.
4. Section 092216 "Non-Structural Metal Framing" for non-load-bearing steel framing and furring that support plaster bases and lime-based plaster.
5. Section 092300 "Gypsum Plastering" for gypsum-based plastering.
6. Section 092400 "Cement Plastering" for portland cement plastering.
7. Section 092613 "Gypsum Veneer Plastering" for gypsum-based veneer plastering.
8. Section 092900 "Gypsum Board" for panels to receive interior lime-based plaster.

Painting lime-based plasters is generally not recommended and is unnecessary because BioLime plasters can be integrally colored using mineral pigments. BioLime offers color matching to various paint brands. If painting is required, we recommend lime-based or other breathable paints.

9. Section 099113 "Exterior Painting" for breathable exterior coatings applied over exterior lime-based plasterwork.
10. Section 099123 "Interior Painting" for breathable interior coatings applied over interior lime-based plasterwork.

1.2 REFERENCES

A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. ASTM Standards

1. ASTM C 78, "Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)"
2. ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials"
3. ASTM C 109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars"
4. ASTM C 1549, "Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer"

5. ASTM C 1583, “Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)”
6. ASTM D 2369, “Standard Test Method for Volatile Content of Coatings”

C. Other Standards

1. CE Fire Classification 1A: Non-combustible

1.3 PREINSTALLATION MEETINGS

Generally, retain "Preinstallation Conference" Paragraph below. The plaster applicator's skill and experience are essential to successful lime-based plasterwork.

- A. Preinstallation Conference: Conduct conference [at Project site] [by web conference] <Insert location>.
 1. Review methods and procedures related to plasterwork including, but not limited to, the following:
 - a. Verify Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, colors, surface textures, and sequencing.

1.4 DEFINITIONS

- A. Base Coat Plaster: The first layer of plaster. (commonly referred to as “Scratch Coat”).
- B. Finish Coat Plaster: The final layer of plaster.

1.5 SYSTEM DESCRIPTION

- A. A materials-compatible highly vapor-permeable lime plaster system.
 1. A two-coat lime plaster system consisting of:
 - a. A 3/8-inch coarse-grain plaster applied as the first layer in a leveled surface plane finish (base coat).
 - b. A minimum 1/4-inch top layer of a coarse or fine-grain plaster layer with or without integral color finished to match surrounding surface texture or as directed by the Architect (finish coat).
 - c. Total overall plaster system thickness will be a minimum of 5/8 inch.

1.6 SUBMITTALS

Action submittals are submittals requiring responsive action and return of reviewed documents to Contractor.

- A. Product Data: Submit product data showing proposed material. Submit sufficient information to determine compliance with the Drawings and Specifications. Provide published documentation describing materials, characteristics, and limitations.
- B. Samples: Submit samples for verification purposes, texture techniques, and workmanship.
 1. Size: [6 by 6 inches (152 by 152 mm)] <Insert size>.
 2. Size: [12 by 12 inches (305 by 305 mm)] <Insert size>.
- C. Manufacturer's Instructions: Submit manufacturer's instructions including application guide, technical data sheets, safety data sheets, mixing instructions, application requirements, special

procedures, and conditions requiring special attention.

Retain "Sustainable Design Submittals" Paragraph below if required to attain sustainability rating or to track sustainability submittals.

Sustainable Design Submittals:

Retain "Health Product Declaration (HPD)" Subparagraph below for LEED v4.1 MRc "Building Product Disclosure and Optimization - Material Ingredients," Option 2 - "Material Ingredient Optimization, Material Ingredient Screening and Optimization Action Plan."

1. Health Product Declaration (HPD): Provide documentation indicating that manufacturer has screened and publicly provided ingredient disclosure to 1000 ppm and has developed an action plan to mitigate known hazards.

1.7 INFORMATIONAL SUBMITTALS

Informational submittals are submittals that require review by Architect, but they do not require Architect's responsive action and return of reviewed documents to Contractor, provided submittals comply with requirements. If rejected, submittals with responsive action must be returned to Contractor.

Retain "Research Reports" Paragraph below if non-metallic lath is required and revise to suit Project.

- A. Research Reports: For self-furring fiberglass lath, from **[an agency acceptable to authorities having jurisdiction]** <Insert evaluation agency> indicating code compliance.

Coordinate "Qualification Statements" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article. If inserting additional entities or specialists, add qualifications to "Quality Assurance" Article.

- B. Quality Statements: For Installer

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For lime-based plaster finishing systems

1.9 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Provide evidence that manufacturer is a firm engaged in the manufacture of lime plasters, and whose products have been in satisfactory use in similar service for a minimum of ten years.

2. Applicator/Installer Qualifications:

Provide evidence Applicator is a firm having a minimum of three years of successful application and craftsmanship experience of project types required. Entity that employs plaster applicators and supervisors with expertise in applying lime-based plasterwork. **Experience in only applying cement stucco, gypsum-based or cement plasterwork, veneer plaster, or installing gypsum board is insufficient experience.**

Generally, retain "Mockups" Article. Surface textures and finishes of lime plaster systems vary based on aggregates and finishing method used, and textures and finishes are difficult to describe in writing and evaluate from Samples.

1.10 MOCKUPS

1. Prior to application of the work, fabricate and erect mockups for each type of finish and application to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.
2. Build mockups to comply with the following requirements using materials indicated for final unit of work. **[as indicated on Drawings] <Insert mockup requirements>**.
3. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work.
4. Simulate finished lighting conditions for review of mockups.
5. Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed unit of work.
6. Obtain the Architect's acceptance of mockups before start of final unit of work.
7. Maintain a record of approved mock up's product mixing and application steps to incorporate into final unit of work to ensure color consistency and textural aesthetics.
8. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 014000 "Quality Requirements" for demolishing and removing mockups.

9. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of substantial completion.

A. Tracking Job Progress with Daily Logs

1. Maintain a daily record of the weather conditions, of material ordered and delivered, material used, inspections, areas of work that began, areas of work that were completed, and questions raised, and answers received.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with manufacturer's name, material and product brand name, and manufacturing date and lot number.
- B. Store materials on elevated platforms in their original undamaged packages and containers inside a sheltered area protected from weather, moisture, and soiling, with air temperatures between 45°F and 95°F and humidity index not exceeding 60 percent.

1.12 PROJECT CONDITIONS

A. Environmental Requirements:

1. Substrate temperature before, during, after installation, and curing must be between 41°F and 86°F.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design:

1. Items specified are to establish a standard of quality for design, function, materials, compatibility, performance, and appearance.

2. Equivalent products by other manufacturers are acceptable with the exception of lime plaster products.
3. The Architect is the sole judge of the basis of what is equivalent.

B. Listed Manufacturer:

1. BioLime LLC, 5427 N State Hwy 6, Suite 7, Waco, Texas. Telephone: 254-730-7130. Fax: 254-730-7133. Email: contact@biolime.com. Website: <https://biolime.com>.

2.2 MATERIALS

A. Base Coat: Provide pure lime plaster meeting or conforming to:

1. Premium quality lime, limestone and select natural pozzolans in a blended composition with specification-grade white quartz sand.
2. Natural white color may be tinted with iron oxide pigments.
3. pH Balance: Alkaline, greater than 12 pH.
4. Compressive Strength: 452 PSI
5. Flexural Strength: 193 PSI
6. Bonding Strength: CMU block – 102 PSI
7. Density: 107 pounds per cubic foot
8. Solar Reflectance: 0.83
9. Vapor Permeability: 109 perms at 1/16-inch layer thickness.
10. Fire Rating: Incombustible, Class 1A
11. No VOC.
12. Manufactured as bagged, ready-to-use dry aggregate; add only clean water.

Basis of Design: “BioLime One-Coat”, BioLime LLC.

B. Finish Coat: Provide pure lime plaster meeting or conforming to:

1. Premium quality lime, limestone, select natural pozzolans and biopolymers in a blended composition in a choice of grains: from 0 to 0.3 mm (Extra Fine) or 0 to 1 mm (Fine) or 0 to 2.5 mm (Coarse).
2. Natural white color may be tinted with iron oxide pigments.
3. pH Balance: Alkaline, greater than 12 pH
4. Compressive Strength: 452 PSI
5. Flexural Strength: 189 PSI
6. Bonding Strength: CMU block – 83 PSI, Porcelain – 71 PSI
7. Density: 105 pounds per cubic foot
8. Solar Reflectance: 0.88
9. Vapor Permeability: 122 perms at 1/16-inch layer thickness.
10. Fire Rating: Incombustible, Class 1A
11. No VOC.
12. Manufactured as bagged, ready-to-use dry aggregate; add only clean water.

Basis of Design: "BioLime Finish", BioLime LLC.

Retain "Pigments" Subparagraph below if integral colorants are required.

1. Pigments: [**Manufacturer's standard, UV- and alkali-stable mineral pigments**] <Insert requirements>.
2. Color: [**Natural**] [**As selected from manufacturer's full range**] [**Match Architect's sample**] <Insert requirements>.

2.3 MISCELLANEOUS MATERIALS

Water containing salt, alum, or plaster residue accelerates plaster set and may cause efflorescence. Water containing organic or vegetable matter may retard plaster set, cause staining, and interfere with plaster bond.

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster or lath. (see BioLime Application Guide)

Retain "Fiber Reinforcement" Paragraph below if required. Option in paragraph is based on BioLime's written instructions for specialty products that resist cracking in tension. Some applications require mesh reinforcement for adjoining substrates. Consult BioLime and revise "Mesh Reinforcement" Paragraph below to suit Project.

- A. Mesh Reinforcement: [**Glass-fiber mesh**] <Insert requirements> recommended in writing by BioLime for substrate and plaster system indicated.
- B. Sealer: Penetrating protectant type that does not produce a surface film. For additional details, see the BioLime AquaGuard Protectant Technical Data Sheet.

2.4 NON-METALLIC LATH

- A. Self-Furring Fiberglass Lath: ASTM C1788; alkaline-resistant fiberglass lath fabricated with three-dimensional leno weave; recommended in writing by lime-based plaster manufacturer for application indicated.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

2. **Manufacturers:** Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
 - a. Saint-Gobain Adfors America, Inc. (<https://www.adfors.com/customized-industrial-fabrics/knitting>) (716) 775-3900)
 - b. Sika USA "Permalath" (<https://usa.sika.com/en/construction/eifs-stucco/sikawall-products/stucco/sikawall-9000-permalath1000.html>) (201) 933-8800)
 - c. Smarter Building Systems (<https://basalt-mesh.com/>) (401) 481-8422)
 - d. SpiderLath (<https://spiderlath.com/>) (870) 725-3902)
3. Nominal Weight: **8.8 oz./sq. yd. (298 g/sq. m).**
4. Nominal Thickness: [**1/4 inch (6 mm)**] [**3/8 inch (10 mm)**] <Insert thickness>.
5. Minimum Tensile Strength:
 - a. Warp: [**330 lbf/in. (578 N/cm)**] <Insert tensile strength>.

- b. Weft: **[310 lbf/in. (543 N/cm)]** <Insert tensile strength>.

Fiberglass lath can be wrapped around internal and external corners. Saint-Gobain Adfors recommends attaching cornerbead or casing bead at external and internal corners; other lath manufacturers do not.

- A. Cornerbeads: **[PVC with perforated flanges]** <Insert requirements>; small-nose type.
- B. Casing Beads: **[PVC with perforated flanges]** <Insert requirements>; square-edge style in depth and flange length required to suit applications indicated.

Insert requirements for other lath accessories if required.

- C. **Control joints:** Control and expansion joints are typically unnecessary for masonry-based lime-based plasterwork. Control or expansion joints that adjoin non-masonry substrates shall conform to the Stucco Manufacturers Association Technical Bulletin: <https://stuccomfgassoc.com/wp-content/uploads/2020/05/Control-Joints-for-Stucco-1.pdf>
- D. **Window detail:** shall conform to the Stucco Manufacturers Association Technical Bulletin: <https://stuccomfgassoc.com/wp-content/uploads/2020/06/WINDOW-DETAILS-11947.pdf>
- E. Fasteners for Fiberglass Lath: ASTM C1787; corrosion- and alkaline-resistant metal fasteners appropriate for substrate indicated.

Retain one option in "Material" Subparagraph below or revise to suit Project. Coated-steel fasteners are recommended. Stainless steel fasteners can be used where there is no risk of galvanic action with metal studs.

1. Material: **[Stainless steel]** **[Coated steel recommended in writing by lime-based plaster manufacturer for application indicated]** <Insert requirements>.

Anchor Plates: ASTM C1787; alkaline-resistant, perforated plastic washers with minimum diameter, but not less than **1-3/4 inches (44.5 mm)**.

2.5 EQUIPMENT

A. Tools:

1. Plaster mixing: Handheld two-speed plaster/mortar mixer with attached helical mixing paddle. (for type, see product Technical Data Sheet)
2. Plaster mixing: Onsite mixing station for larger projects.
3. Plaster application by spray equipment or ordinary plastering tools and gauging rods. (contact BioLime for recommended tools and/or equipment).

2.6 FINISHES

- A. Plaster: Finish as directed by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: With Applicator/Installer present, confirm by examination the areas and conditions under which the work is to be applied for compliance with manufacturer's instructions. Do not proceed with the work until unsatisfactory conditions have been addressed or corrected.
1. New concrete, stucco, and masonry must be cured for a minimum of 28 days.

2. Verify substrate is secure, sound, dry, and absorbent, and free of construction dust and debris, grease, salts, oil-based paints, release agents, non-mineral-based curing agents, and similar bond breakers.
3. Obtain manufacturer's approval for application over substrates having other pretreatments or priming materials applied.
4. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Applicator.

3.2 PREPARATION

- A. Protection: Lay ground cloths and take measures as necessary to protect non-applied surfaces subject to contact by products specified by this Section.
- B. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by other on-site activity or trades.

3.3 INSTALLATION OF NON-METALLIC LATH

- A. Self-Furring Fiberglass Lath: Install in accordance with ASTM C1787 and with lath manufacturer's written instructions.
 1. Install flat and free of creases and wrinkles.
 2. Overlap lath seams as recommended in writing by manufacturer.

Retain subparagraph below if corner beads are not required.

3. Do not end lath at corners. Lap internal and external corners with lath to the next framing member, but not less than **16 inches (406 mm)**.

Retain "Corner beads" and "Casing Beads" paragraphs below if required.

- B. Corner beads: Install in accordance with manufacturer's written instructions.
- C. Casing Beads: Install in accordance with manufacturer's written instructions.
 1. Install to separate metal where it abuts plaster and in locations indicated on Drawings.

3.4 APPLICATION

Retain "Application Guide" Paragraph below.

Application procedures noted in this section are a general guideline for outline purposes only.

Download and attach the **BioLime Application Guide for complete application procedures:**
<https://biolime.com/pro/application-guide.com/>.

The plaster applicator's acknowledgement of receipt is essential.

- A. Conform to all procedures listed in the BioLime Application Guide. Review product data sheets, manufacturer's written instructions, and provisions of the Contract Documents.
- B. Plan the work properly.
 1. Ensure entire surfaces are free of dust and debris before application.
 2. Apply to shaded surfaces in a timely manner working ahead and away from direct-facing sun during application.
 3. Avoid direct sun exposure onto wet plaster.

4. Do not apply plaster onto surfaces above 90°F, direct wind above 10 mph, or when temperature fluctuations exceed 50°F differentials from day to night.
5. Protect plaster surfaces from rain during application.
6. In indoor/interior or enclosed areas, provide indirect well-distributed air circulation and ventilation with protective screens to deflect concentrated or forced air onto freshly applied plaster.
7. Moist-cure completely dried plaster by flooding entire surfaces with clean water at 0 PSI (no pressure).
 - a. Begin curing procedure using “appearance-based determination” for each plaster layer.
 - b. As applied plaster dries, the appearance of the plaster changes from dark to light. When dark, it is visibly damp. As water evaporates from the layer, it becomes lighter in contrast to the damp areas. In mid-transition between damp and dry, the surface appears mottled. Once mottling disappears, additional moisture-curing cycles can begin.
 - c. Weather conditions and plaster layer thickness affect how quickly the plaster transitions from damp to dry. In dry weather, moisture-curing cycles might begin the day of application, while in humid weather the cycles might begin the following day. Appearance-based determination ensures proper sequencing of the moisture-curing coats for each applied layer of plaster.
 - d. Ensure complete coverage of all surfaces including terminations at soffits, inside and outside corners, and window/door returns. This constitutes the first (1st) moisture-curing cycle. Additional moisture-curing cycles continue for the stated number of days for each installed layer of plaster – 3 times over a 3 day period.

Retain "Lath Reinforcement" Subparagraph below if required. Not all substrates require lath. Consult Lath manufacturer and revise to suit Project.

C. Plaster on Self-Furring Fiberglass Lath or embedded Fiberglass Mesh: Apply plaster to provide **[smooth troweled finish] [finish to match Architect's sample] <Insert requirements>**.

1. Lath Reinforcement: **[Affix to substrate as provided in writing by lath manufacturer] <Insert requirements>**.
2. First Coat: **[Base coat plaster, 3/8 inch (10 mm) thick] <Insert requirements>**.
3. Second Coat: **[Finish coat plaster, 1/4 inch (6 mm) thick] <Insert requirements>**.

Retain "Fiberglass Mesh Reinforcement" Subparagraph below if required. Not all substrates require fiberglass mesh reinforcement. Consult BioLime and revise to suit Project.

1. Fiberglass Mesh Reinforcement: **[Embed in specific plaster coat recommended in writing by BioLime] <Insert requirements>**.
2. First Coat: **[Base coat plaster, 3/8 inch (10 mm) thick] <Insert requirements>**.
3. Second Coat: **[Finish coat plaster, 1/4 inch (6 mm) thick] <Insert requirements>**.

D. Mixing Methods

1. Bucket Mixing Method: Mix plaster with clean water using helical mixing paddle on a heavy-duty mortar mixing drill motor (see Technical Data Sheet).
 - a. Fill the plaster manufacturer's measuring bucket with clean water to the referenced product margin line.
 - b. In a clean 6-gallon plastic bucket, pour half of the measured water.

- c. While stirring the water at low RPM, add plaster from the bag at a rate to prevent clumping of the material. Continue adding water from the measuring bucket and dry plaster until bag is empty.
 - d. Once the dry powder is wetted, mix for additional 3 minutes maximum. Allow to rest 5 minutes to fully hydrate and then stir to relax the batch. Over-mixing plaster will cause loss of strength. Keep bucket covered to extend working time to about 1 hour.
2. Onsite Plaster Mixing Station Method: Follow equipment manufacturer's recommendations. Do not mix more water than recommended by the plaster product technical data sheet.
 3. Auto-mixing and Spray Application Equipment: Follow equipment manufacturer's recommendations. Do not mix more water than recommended by the plaster product technical data sheet.
- E. One-Coat Coat Plaster:
1. Review the BioLime Application Guide: <https://biolime.com/pro/application-guide.com/>
 2. Ensure surface is free of any dust and debris.
 3. Surface Hydration: Dampen mineral-based surfaces relative to their absorbency—highly absorbent surfaces require more hydration. Once water is absorbed from the surface, application may begin.
 4. Apply plaster in one lift with even distribution to a minimum 3/8-inch layer thickness.
 5. Trowel surface smooth and level to the surface plane. Provide finish as directed in Section 2.6 Finishes.
 6. Moist cure for at least 3 days to ensure bond and proper mineral curing before applying Finish Coat.
 - a. As plaster dries out, its surface develops a mottled appearance.
 - b. Before the plaster dries completely out, mist with clean water to re-saturate the surface.
 - c. Repeat as instructed in Application Guide.
- F. Finish Coat Plaster:
1. Review the BioLime Application Guide: <https://biolime.com/pro/application-guide.com/>
 2. Ensure surface is free of any dust and debris.
 3. Surface Hydration: Do not saturate surface. Dampen the One-Coat relative to its absorbency. Once water is absorbed from the surface, application may begin.
 4. Apply plaster to 1/4-inch layer thickness.
 5. Provide finish as directed in Section 2.6 Finishes.
 6. Moist cure for at least 3 days. (Review Curing Section in Application Guide).
 - a. As plaster dries out, its surface develops a mottled appearance.
 - b. Before the plaster dries completely out, mist with clean water to re-saturate the surface.
 - c. Repeat as instructed in Application Guide.

3.5 CURING

Curing BioLime Lime Plasters is critical to ensure longevity and performance. Review the BioLime Application Guide for detailed instructions.

[Retain "Sealer" Paragraph below if required and revise to suit Project.](#)

3.6 SEALER

- A. Apply to final finish coat in accordance with manufacturer's written instructions. For additional details, see the BioLime Application Guide and the AquaGuard Protectant Technical Data Sheet.

3.7 INSTALLATION TOLERANCES

- A. Do not deviate more than plus or minus **1/4 inch in 10 ft. (6 mm in 3 m)** from a true plane in finished plaster surfaces when measured by a **10-ft. (3-m)** straightedge placed on surface.

3.8 REPAIRS

- A. Repair or replace work with defects to substrate.
- B. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

3.9 CLEANING

- A. Clean tools, spills, and accidental drips immediately with plenty of water.
- B. Leave applications clean and premises free from residue and debris from work in these Sections.
- C. See the BioLime Care & Maintenance document for instructional info at <https://biolime.com/>.

END OF SECTION