SECTION 09 25 23

LIME BASED PLASTERING – INSULATED CONCRETE FORM (ICF)

1. GENERAL
	1. SUMMARY
		1. Section Includes: The work specified in this Section includes a lightweight two-layer application of pure lime plaster supported by a three-dimensional self-furred corrosion-free glass fiber lath mounted over one layer of a vapor permeable air and water barrier with integral drainage over ICF block substrate. Plaster assembly consists of one bond (base) layer and a finish layer of plaster with or without color in a fine or coarse grain, textured as desired. Specification includes limited surface preparation.
		2. Related Sections: Related sections include the following:

*Place related sections below. Examples include:*

* + - 1. Section 09 25 23 – Lime Based Plastering
			2. Section 09 91 00 – Painting
			3. Section 09 96 13 – Abrasion-Resistant Coatings
			4. Section 09 96 14 – Mold-Resistant Coatings
			5. Section 09 96 26 – Marine Coatings
			6. Section 09 96 33 – High-Temperature Resistant Coatings
			7. Section 09 96 35 – Chemical-Resistant Coatings
			8. Section 09 96 43 – Fire-Retardant Coatings
	1. REFERENCES
		1. 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.
		2. 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 D 1475, “Standard Test Method for Density of Liquid Coatings, Inks, and Related Products”
			5. ASTM C 1549, “Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer”
			6. 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)”
			7. ASTM D 1653, “Standard Test Methods for Water Vapor Transmission of Organic Coating Films”
			8. ASTM D 2369, “Standard Test Method for Volatile Content of Coatings”
		3. Other Standards
			1. CE Fire Classification 1A: Non-combustible
	2. DEFINITIONS
		1. Weather Barrier Assembly: A weather-resistant membrane for vertical building envelope protection that will maintain air and moisture resistance while maintaining moisture-vapor permeability.
		2. Glass Fiber Lath: A three-dimensional open weave self-furring glass fiber fabric to provide an anchor for the lime plaster system over a non-absorbent surface.
		3. Bond (Base) Coat Plaster: The first layer of plaster.
		4. Finish Coat Plaster: The second layer of plaster.
	3. SYSTEM DESCRIPTION
		1. A materials-compatible highly vapor permeable lime plaster system.
			1. A two-coat lime plaster system consisting of:
				1. A 3/8-inch-thick plaster applied as the first layer to flush joints to a uniformly smooth surface (base coat).
				2. A 1/8-inch-thick second layer of a fine or coarse-grained plaster with or without integral color applied over the base coat finished as directed by the Architect (finish coat).
				3. Total overall plaster system thickness will be minimum 3/8-inch.
			2. Apply plaster into a 1/4-inch three-dimensional self-furred corrosion-free glass fiber lath secured over one layer of a vapor permeable air and water weather barrier assembly with drainage feature, installed according to manufacturer’s recommendations in compliance with local building codes.
	4. SUBMITTALS
		1. 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.
		2. Samples: Submit samples for verification purposes, fabrication techniques, and workmanship.
		3. Manufacturer's Instructions: Submit manufacturer’s instructions including technical data sheets, safety data sheets, mixing instructions, application requirements, special procedures, and conditions requiring special attention.
		4. LEED Submittals: Submittals that are required to comply with requirements for LEED certification include the following:
			1. Low Emitting Materials: Submit endorsement by the manufacturer confirming that products meet or are below the volatile organic compound (VOC) limits set by specific agencies or other requirements. Clearly state VOC limits in the submittal.
	5. QUALITY ASSURANCE
		1. Qualifications:
			1. Manufacturer Qualifications: Provide evidence that Manufacturer is a firm engaged in the manufacture of lime plasters of types required, and whose products have been in satisfactory use in similar service for a minimum of ten years.
			2. Applicator Qualifications:
				1. Provide evidence Applicator is a firm having a minimum of three years of successful application and craftsmanship experience with projects similar in type and scope to that required for this Project.
		2. 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.
			3. Locate mockups as directed by the Architect.
			4. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work.
			5. Obtain the Architect’s acceptance of mockups before start of final unit of work.
			6. Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed 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.
		3. 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.
	6. DELIVERY, STORAGE, AND HANDLING
		1. 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.
		2. Store materials in their original undamaged packages and containers inside a sheltered area protected from weather, moisture, and soiling, with air temperatures between 45°F and 85°F and maximum 60 percent humidity.
	7. PROJECT CONDITIONS
		1. Environmental Requirements:
			1. Substrate temperature before, during, and after installation must be between 41°F and 86°F.
	8. WARRANTY
		1. Warranty: Product is warranted to be free from manufacturing defects and to meet the technical properties when used as directed within shelf life. See complete warranty statement on product technical data sheet.
1. PRODUCTS
	1. MANUFACTURERS
		1. Basis of Design:
			1. Items specified are to establish a standard of quality for design, function, materials, compatibility, performance, warranty, and appearance.
			2. Equivalent products by listed manufacturers are acceptable with exception of lime plaster products.
			3. The Architect is the sole judge of the basis of what is equivalent.
		2. Listed Manufacturers
			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. DuPont Building Innovations, 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805. Telephone: 1-800-448-9835. Website: <http://www.construction.TYVEK.com>
			3. BASF Corporation – Wall Systems, 3550 St Johns Bluff Rd South, Jacksonville, FL 32224. Telephone: 800-221-9255. Website: [www.wallsystems.basf.com](http://www.wallsystems.basf.com)
			4. Wind-lock Corporation, 1055 Leisz’s Bridge Rd, Leesport, PA 19533. Telephone: 800-872-5625. Website: [www.windlock.com](http://www.windlock.com)
	2. MATERIALS
		1. Weather Barrier Assembly: Provide a warrantable vapor permeable water and air barrier and related assembly components meeting or conforming to:
			1. Textured, spunbonded polyolefin commercial weather barrier wrap.
			2. Single layer with integral drainage as recommended by manufacturer.
			3. Non-woven.
			4. Non-perforated.
			5. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.
			6. Air Permeance, Product: Not more than 0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASTM E 2178.
			7. Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASTM E 2357 and evaluated by ABAA.
			8. Water Penetration Resistance, Product: Hydrostatic head resistance greater than 7.7 feet in accordance with AATTC 127.
			9. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E 2357 to water resistance in accordance with ASTM E 331 to [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)] [10.4 lbf/sq. ft. (500 Pa)] [12.5 lbf/sq. ft. (575 Pa)].
			10. Water-Vapor Permeance: Not less than 23 perms (1300 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 28 perms (1600 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Water Method (Procedure B).
			11. Water-Vapor Permeance: Not less than 30 perms (1700 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 46 perms (2600 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Water Method (Procedure B).
			12. Allowable UV Exposure Time: Not less than nine months when tested in accordance with ASTM G 155 (Accelerated Weathering).
			13. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
			14. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
				1. Peak Heat Release: 13,217 Btu/sq. ft. (150 kW/sq. m).
				2. Total Heat Release: 1762 Btu/sq. ft. (20 MJ/sq. m)
				3. Effective Heat of Combustion: 7744 Btu/lb (18 MJ/kg)
			15. Weather barrier system to have a VOC content of 30 g/L or less.
			16. Basis of Design: “DuPont Tyvek CommercialWrap D”, DuPont Building Innovations.
		2. Glass Fiber Lath: Provide woven glass lath meeting or conforming to:
			1. Open weave three-dimensional self-furred nominal 1/4-inch-thick glass fiber reinforcing lath.
			2. Corrosion-free.
			3. Alkaline resistant.
			4. Maximum allowable weight of plaster assembly: 24 pounds per square foot.
			5. Basis of Design: “BASF PermaLath 1000”, BASF Corporation.
		3. Glass Fiber Lath Fasteners: Provide fasteners and washers meeting or conforming to:
			1. Screws: Wood type bugle head screw with plastic 1-3/4-inch diameter washer and minimum 1-1/4-inch penetration into framing.
			2. Basis of Design: “#ULP-3WLM1 ULP-302 plastic washer with screw”, select wood-light metal or steel framing fastener, Wind-lock Corporation.
		4. Bond (Base) Coat: Provide pure lime plaster meeting or conforming to:
			1. Premium quality lime, ground limestone, select natural pozzolans, fibers, and biopolymers in a blended composition.
			2. Natural white color may be tinted with iron oxide pigments.
			3. pH Balance: Alkaline, greater than 12 pH.
			4. Density: 113 pounds per cubic foot
			5. Solar Reflectance: 0.83
			6. Vapor Permeability: 91 perms at 1/16-inch layer thickness.
			7. Fire Rating: Incombustible, Class 1A
			8. No VOC.
			9. Manufactured as sacked, ready-to-use dry aggregate; add only clean water.
			10. Basis of Design: “BioLime Bond XTRF”, BioLime LLC.
		5. 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 0.1 mm (Ultra Fine) or 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: 411 PSI
			5. Flexural Strength: 156 PSI
			6. Bonding Strength: CMU block – 67 PSI, Porcelain – 56 PSI
			7. Density: 102 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 sacked, ready-to-use dry aggregate; add only clean water.
			13. Basis of Design: “BioLime Finish”, BioLime LLC.
	3. EQUIPMENT
		1. Tools:
			1. Weather Barrier System: As recommended by manufacturer.
			2. Glass Fiber Lath: Typical screw drill.
			3. Plaster mixing: Handheld two-speed plaster/mortar mixer with attached helical mixing paddle.
			4. Plaster mixing: Onsite mixing station for larger projects.
			5. Plaster application by spray equipment or ordinary plastering tools and gauging rods.
	4. FINISHES
		1. Plaster: Finish as directed by Architect.
2. EXECUTION
	1. EXAMINATION
		1. Verification of Conditions: 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 corrected.
			1. New concrete, stucco, and masonry must be cured minimum 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.
	2. PREPARATION
		1. Protection: Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.
	3. APPLICATION
		1. Conform to reviewed product data, manufacturer's written instructions, and provisions of the Contract Documents.
		2. Plan the work properly.
			1. Ensure surface is free of dust and debris before mixing plaster material.
			2. Apply to shaded surfaces in a timely manner working ahead and away from the sun. Avoid direct sun exposure onto wet plaster to ensure proper curing.
			3. Do not apply plaster in direct sun, wind, or rain, or when temperature fluctuations exceed 50°F differentials from day to night.
			4. In enclosures, provide indirect well-distributed air circulation and ventilation with protective screens to deflect concentrated or forced air onto freshly applied plaster.
			5. Moist cure plaster by flooding surfaces with clean water at 0 PSI (no pressure) over the period of days stated for each plaster coat to ensure complete chemical curing. This technique will completely hydrate the pozzolans in the plaster to prevent streaking from rainfall following project completion.
				1. Begin moisture-curing using “appearance-based determination” for each plaster layer.
				2. 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, the moisture-curing cycles can begin.
				3. 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 start the following day. Appearance-based determination ensures proper sequencing of the moisture-curing coats for each applied layer of plaster.
				4. Once moisture-curing begins, flood all surfaces including terminations at soffits, inside and outside corners, and window/door returns with clean water. This constitutes one moisture-curing cycle. Moisture-curing cycles continue for the stated number of days for each installed layer of plaster.
				5. Protect cured plaster surfaces from rain during application.
		3. Weather Barrier System: Install one layer (wrap) according to manufacturer’s technical data sheets, written instructions, and consultation and inspection with manufacturer’s technical representatives.
		4. Glass Fiber Lath: Install according to manufacturer’s written instructions and consultation with manufacturer’s technical data sheet.
		5. Mixing Methods
			1. Bucket Mixing Method: Mix plaster with clean water using helical mixing paddle on a heavy-duty mortar mixing drill motor.
				1. Fill the plaster manufacturer’s measuring bucket with clean water to the referenced product margin line.
				2. In a clean 6-gallon plastic bucket, pour half of the measured water.
				3. 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.
				4. 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.
		6. Bond (Base) Coat Plaster:
			1. Ensure surface is free of construction dust and debris.
			2. Surface Hydration: Do not prewet surface.
			3. Apply plaster in one lift with even distribution to a minimum 1/4-inch layer thickness.
			4. Trowel surface smooth and level to the surface plane.
			5. Moist cure for 3 days to ensure bond and proper chemical curing before applying Finish Coat.
				1. As plaster dries out, its surface develops a mottled appearance.
				2. Before the plaster dries completely out, mist with clean water to re-saturate the surface.
				3. Repeat until 72 hours pass.
		7. Finish Coat Plaster:
			1. Ensure surface is free of construction dust and debris.
			2. Surface Hydration: Do not prewet surface.
			3. Apply plaster to 1/8-inch layer thickness (as one 1/8-inch-thick coat, or two 1/16” thick coats).
			4. Provide finish as directed in Section 2.4 Finishes.
			5. Moist cure for 2 days.
				1. As plaster dries out, its surface develops a mottled appearance.
				2. Before the plaster dries completely out, mist with clean water to re-saturate the surface.
				3. Repeat until 48 hours pass.
	4. CLEANING
		1. Clean tools, spills, and accidental drips immediately with plenty of water.
		2. Leave applications clean and premises free from residue and debris from work of this Section.

END OF SECTION