UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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08/17, CHG 2: 11/18

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USACE / NAVFAC / AFCEC / NASA	**UFGS-09 24 23 (August 2017)**
	Change 2 - 11/18

Preparing Activity: USACE	**Superseding**
	UFGS-09 24 23 (May 2009)

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SECTION 09 24 23

CEMENT STUCCO

08/17, CHG 2: 11/18

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NOTE: This section covers requirements for stucco, including associated framing and lathing.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A489	(2018; E 2018) Standard Specification for Carbon Steel Eyebolts
ASTM A580/A580M	(2023) Standard Specification for Stainless Steel Wire
ASTM A641/A641M	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2023) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A1008/A1008M	(2021a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1064/A1064M	(2022) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM B633	(2023) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C206	(2014; R 2022) Standard Specification for Finishing Hydrated Lime
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C841	(2023) Installation of Interior Lathing and Furring
ASTM C847	(2014a) Standard Specification for Metal Lath
ASTM C897	(2015; R 2020) Aggregate for Job-Mixed

	Portland Cement-Based Plasters
ASTM C926	(2023) Standard Specification for Application of Portland Cement-Based Plaster
ASTM C933	(2014) Welded Wire Lath
ASTM C1032	(2014) Standard Specification for Woven Wire Plaster Base
ASTM C1063	(2022) Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
ASTM D1784	(2020) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Lath

SD-03 Product Data

Proportions and Mixing

[Recycled percentage of fly ash in Portland cement; S]

[Recycled Content for steel framing; S]

[Recycled Content for metal lath; S]

SD-04 Samples

Colored Stucco Finish Coat

Sample Panel; G[, [_____]]

1.3 QUALITY ASSURANCE

Submit a SAMPLE PANEL as follows: [One 300 mm 12 inch square stucco panel showing finish texture and color and exposed reinforcement at the edges, one 300 mm 12 inch square of reinforcement, and a 300 mm 12 inch length of each accessory proposed, prior to proceeding with stucco work.] [A sample panel of stucco, constructed at the jobsite, and located as directed, to demonstrate installation procedures, texture and color, prior to proceeding with any stucco work; panel size must be a minimum of 1200 mm wide x 2400 mm 4 feet wide x 8 feet high; containing each type accessory proposed for use and constructed in the vertical position. Sample panel must have exposed reinforcement at the edges. Each phase of installation such as framing, scratch coat, brown coat, finish coat and curing procedures must be demonstrated in the construction of the panel. Submit one 300 mm 12 inch square of reinforcement and one 300 mm 12 inch length of each accessory proposed for use, prior to constructing the sample panel.]

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver packaged materials to the site in the original packages and containers with labels intact and seals unbroken. Keep cementitious materials dry and stored off the ground, under cover and away from damp surfaces until ready to be used. Aggregate must be covered to prevent the absorption or loss of moisture.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not apply stucco when the ambient temperature is 4 degrees C 40 degrees F or lower, or when a drop in temperature below 4 degrees C 40 degrees F is expected within 48 hours after application.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

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NOTE: Where colored or white stucco finish is required, the gray Portland cement will be omitted. Select type of cement to provide the required characteristics. Type I cement should normally be specified when stucco requires no special characteristics. Type II cement should be specified when stucco will be exposed to moderate sulphate (alkali) action. Type III cement should be specified when high early strength is needed.

Use materials with recycled content where appropriate for use. Verify sustainability, availability within the region, cost effectiveness and adequate competition before specifying product recycled content requirements.

Consider specifying fly ash as recycled materials; however, where white stucco finish is required, the requirement for fly ash will be omitted. In no case should the installation contractor use more than 40% fly ash as strength will be compromised. Research shows fly ash is commonly available from recycling operations. The designer of record needs to confirm local/regional availability and cost effectiveness.

Research shows there are other recycled materials that may be considered in lieu of, or in addition to, fly ash. According to ASTM C 595, ground granulated blast furnace slag (GGBF slag) may replace up to 50 percent of the cementitious material on a dry weight basis. Cenospheres may replace up to 10 percent of the cementitious material by volume. And silica fume may replace up to 10 percent of the cementitious material on a dry weight basis.

A Portland cement-lime mix is corrosive to metal lath in high humidity/ salt intensive areas. For high humidity areas or project locations with Environmental Severity Classifications (ESC) of C3 thru C5, to reduce plaster and stucco cracking, delete the lime base and substitute a liquid plasticizing agent with a resin compound as the principal ingredient. The result produces a material with greater resistance to most climatic effects and minimizes structure related cracking. Humid project locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified

in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.

If surface is to be painted, do not use coral aggregate in the plaster system. If no option is available, use sodium silicate system for stabilization.

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Portland cement must conform to ASTM C150/C150M, [gray Portland cement Type [I] [II] [III].] [white Portland cement, Type [I] [II] [III].] [Provide system that has a minimum of 15% and maximum 40% fly ash. Provide data from installation contractor identifying recycled percentage of fly ash in Portland cement.]

2.2 COLORED STUCCO FINISH COAT

Colored stucco finish coat must be a mill mixed product using white Portland cement and requiring only the addition of and mixing with water for application. Color must be [in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [_____]. Submit samples including both a fabricated portion of unit of work and color samples.

2.3 LIME

Lime must conform to ASTM C206, Type S.

2.4 SAND

Sand aggregate for job-mixed base coat and job-mixed finish coat stucco must conform to ASTM C897.

2.5 ACCESSORIES

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NOTE: Custom aluminum radiuses, and custom miters and intersections with welded corners or taped backs are available. Aluminum shapes with clear anodized, color anodized, or baked enamel finishes may be used where required for aesthetic purposes. Aluminum shapes are more costly than standard steel or PVC shapes.

In areas of high humidity or project locations with Environmental Severity Classifications (ESC) of C3 thru C5, use PVC or vinyl as galvanized metal will rust over time. Humid project locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.

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Accessories must be [roll formed galvanized steel,][or] [rigid polyvinyl chloride (PVC)] [_____], except that cornerite and striplath must be formed from steel sheets with manufacturer's standard galvanized coating. Vinyl members must be in accordance with ASTM D1784. Welded wire corner reinforcements must be zinc coated, galvanized 1.4 mm 17 gauge steel wire conforming to ASTM A1064/A1064M. Furring must include hangers, bolts, inserts, clips, fastenings, and attachments of number, size, and design to

develop the full strength of the members.

2.6 STEEL FRAMING

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NOTE: Stud sizes and framing dimensions and details will be indicated on the drawings. Framing will be designed for a maximum deflection of L/240 studs only assembly or a maximum deflection of L/360 for completed assembly, based on wind load design requirements in UFC 3-301-01.

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Steel framing must be as shown and must be manufacturer's standard products with shop applied protective coating. Refer to Section 09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD.

Provide steel framing containing a minimum of 20 percent recycled content, as calculated by the sum of the percentage of post-consumer and ½ the percentage of pre-consumer recycled steel content. Provide data identifying percentage of recycled content for steel framing.

2.7 METAL LATH

Metal lath must conform to ASTM C847, types and weights in accordance with the various spacing shown in ASTM C841. Lath for vertical application on steel and wood framing supports must be expanded metal or welded or woven wire and must have paper backing with a minimum vapor permeance of 287.2 ng per Pa per second per square meter 5 perms. Woven wire lath must be a maximum 38 x 38 mm 1-1/2 x 1-1/2 inch mesh wire of not less than 1.37 mm 0.0540 inch nominal diameter and must conform to ASTM C1032. Welded wire lath must conform to ASTM C933, with openings not to exceed 50 x 50 mm 2 x 2 inches. Expanded metal or wire lath must be fabricated in a manner to provide not less than 6 mm 1/4 inch keying between wire and paper backing and keying must be obtained by a uniform series of slots in a perforated face paper woven between the wires.

Provide Metal Lath containing a minimum of 20 percent recycled content, as calculated by the sum of the percentage of post-consumer and ½ the percentage of pre-consumer recycled steel content. Provide data identifying percentage of recycled content for metal lath.

2.8 WATER

Provide clean, fresh, potable water, free from amounts of oils, acids, alkalis and organic matter that would be injurious to the stucco.

2.9 HANGERS

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NOTE: Construction drawings should include a detail drawing showing splayed and countersplayed suspension system hanger wires.

In high humidity areas or project locations with Environmental Severity Classifications (ESC) of C3 thru C5, use corrosion resistant materials (stainless steel or copper-bearing alloys) for suspension components. Humid project locations are

those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.
****

Provide hangers and attachment capable of supporting a minimum 1330 N 300 pound ultimate vertical load without failure of supporting material or attachment.

2.9.1 Wires

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NOTE: Select stainless steel or nickel copper alloy wire for facilities where high humidity can be expected such as large kitchens, dishwashing areas, and indoor swimming pools. Select zinc-coated steel wire for other locations.

When spacing of hanger wires exceeds 1200 mm 4 feet or when heavy loads are supported, specify 3.4 or 4.1 mm 8 or 10 gage wire.

Use stainless steel wires in areas of high humidity.
****

Conform wires to [ASTM A641/A641M, Class 1, [2.0] [_____] mm [0.08 inch (12 gauge)] [[_____] inch] in diameter.][ASTM A580/A580M, composition 302 or 304, condition annealed stainless steel, [2.0] [_____] mm [0.08 inch (12 gauge)] [[_____] inch] in diameter.]

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NOTE: Normally wire hangers should be used, as specified above. If the project is in an area subject to violent storms, specify steel strap or rod hangers as included in the following sub-paragraphs.
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[2.9.2 Straps

Provide straps of 25 by 5 mm 1 by 3/16 inch galvanized steel conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

][2.9.3 Rods

Provide 5 mm 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

]2.9.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A489. Eyebolt size must be a minimum [_____] [7] mm [1/4] inch, [zinc coated][cadmium plated].

2.9.5 Masonry Anchorage Devices

Comply with[ASTM C636/C636M][_____] for anchorage devices for [eyebolts]

[machine screws][wood screws].

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

3.2 FRAMING

Framing must be installed as indicated.

3.3 CONTROL JOINTS

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NOTE: Control joints will be shown on the drawings, dividing the stucco into areas of not more than 13 square meters 144 square feet with no dimension between control joints greater than 5.4 meters 18 feet. The length to width ratio of the area bounded by the control joints will not exceed 25 to 65 mm 1 to 2-1/2 inches.

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Locate control joints [as indicated on the drawings][so that unbroken areas of stucco do not exceed 13 square meters 144 square feet with no dimension between control joints greater than 5.4 m 18 ft.] Install prefabricated control joint members prior to the application of the stucco. Clear control joints of all stucco within the control area after stucco application and prior to final stucco set.

3.4 LATH

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NOTE: Drawings will clearly indicate where metal lath is required. Metal lath will be used over metal supports and wood supports. Metal reinforcement with water-resistant paper is recommended in all steel frame construction and suspended ceilings. The use of metal reinforcement over concrete and masonry will be in accordance with local practice based upon satisfactory experience. Paper backed lath may be applied to interior concrete and masonry when adequate and uniform bond cannot be obtained otherwise, and when the lath will be protected from moisture.

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Install lath in accordance with ASTM C841 or ASTM C1063 except as otherwise specified. Metal and wire lath must be applied straight, without buckles and with joints staggered. End laps of metal lath must be not less than 25 mm 1 inch. When paper-backed lath is used, the paper must be split from the lath at all lap areas to provide a paper to paper and lath to lath lap. Horizontal joints must be shiplapped. Lath must be interrupted at all control joints. Submit drawings showing details of construction for reinforcement, furring, and grounds; including manufacturer's installation instructions for stucco materials, and locations where each mix and coating thickness will be used.

3.4.1 Steel and Wood Supports

Apply metal lath over vertical open or solid wood and steel backing frame construction only after sheathing and air barrier has been applied to the area to receive the stucco. Fasten lath every 200 mm 8 inches vertically and every 400 mm 16 inches horizontally; and where sheets of lath are lapped. Drive fasteners to hold both lapped edges securely in place.

3.4.2 On Concrete and Masonry

Fasten lath every 200 mm 8 inches vertically and every 400 mm 16 inches horizontally. Where wood supports adjoin masonry or concrete in the same direction, provide casing bead, control joints, or reinforcement as indicated.

3.4.3 Over Metal Lintels and Flashings

Lath over metal lintels must be extended vertically over the angles to a height of not less than 150 mm 6 inches and horizontally across the underside of the lintels and must be secured in an approved manner. Lath over metal flashings must lap the flashings not less than 50 mm 2 inches and must be extended vertically for a height of not less than 150 mm 6 inches.

3.4.4 Special Shapes, Profiles, and Contours

Special shapes, profiles, and contours must be formed with wood, metal or aluminum furring and reinforcing.

3.5 FURRING

Furring must be installed to true lines and surfaces and must be rigidly supported and secured in place.

3.6 PREPARATION OF SURFACES

Preparation of surfaces for application of stucco to solid bases such as stone, masonry or concrete must conform to the applicable requirements of ASTM C926.

3.7 PROPORTIONS AND MIXING

Proportions and mixing for job-mixed base coat and finish coat must conform to the applicable requirements of ASTM C926. Mixing of mill-mixed finish coat must be in accordance with the manufacturer's directions. Submit detailed description of the proposed job-mix proportions for base and finish coats; including identification of thickness of coats.

3.8 STUCCO APPLICATION

Stucco must be applied in three coats to a thickness of not less than 25 mm 1 inch as measured from the back plane of metal reinforcement, exclusive of ribs or dimples or from the face of solid backing or support, with or without metal reinforcement, to the finished stucco surface, including moderate texture variations. Stucco application must conform to the applicable requirements of ASTM C926 and the following:

3.8.1 Workmanship

Items or features of the work in connection with or adjoining the stucco must be in place, plumb, straight, and true prior to beginning the stucco work. Metal and wire lath, where required, must be in place and positioned to provide a good key at back of lath. Where lath is applied over copper, the copper must be given a heavy coat of bituminous paint. Masonry surfaces to receive stucco must be evenly dampened immediately prior to application of stucco. Each stucco coat must be applied continuously in one general direction, without allowing mortar to dry at edges. Where it is impossible to work the full dimension of a wall surface in a continuous operation, jointing must be made at a break, opening, or other natural division of the surface. Edges to be joined must be dampened slightly to produce a smooth confluence. Exterior corners of stucco must be slightly rounded. Stucco on soffit surfaces must be pitched forward to form a drip.

3.8.2 Scratch Coat

Apply scratch coat not less than 10 mm 3/8 inch thick under sufficient pressure to form good keys and to completely embed the reinforcement. Before the scratch coat has set, it must be lightly scratched in one direction and vertical surfaces must be scratched in the horizontal direction only. The scratch coat must be fog cured for a minimum of 72 hours.

3.8.3 Brown Coat

Evenly dampen the scratch coat to obtain uniform suction before the brown coat is applied. There must be no visible water on the surface when the brown coat is applied. The brown coat must be applied to the scratch coat with sufficient pressure to force the stucco into the scratches and must be brought to a plumb, true, even plane with rod or straightedge. When set sufficiently, the brown coat must be uniformly floated with a dry float to promote densification of the coat and to provide a surface receptive to bonding of the finish coat. Brown coat must be fog cured for a minimum of 72 hours.

3.8.4 Finish Coat

Dampen surfaces of the brown coat not more than 1 hour before the finish coat is to be applied to a uniform wetness with no free-standing water on the surface. The finish coat must have a [smooth trowel] [float] [trowel-textured] [rough-textured] [spray-textured] [exposed aggregate] finish and must conform to the approved sample. Fog cure the finish coat for a minimum of 48 hours. Take care to prevent staining.

3.8.5 Surface Tolerance

When a 3 m 10 foot straightedge is placed at any location on the finished surface of the stucco, excluding rough-textured finish, the surface must not vary more than 3 mm 1/8 inch from the straightedge.

3.9 CURING AND PROTECTION

Perform fog curing by applying a fine mist of water to the stucco. Exercise care during fog curing to avoid erosion damage of the stucco surfaces. Do not use a solid stream of water. Fog not less than three times daily. Protect the stucco from the direct rays of the sun during

severe drying conditions using canvas, cloth or other approved sheet material.

3.10 PATCHING AND POINTING

Replace or patch loose, cracked, damaged or defective work as directed. Patching must match existing work in texture and color and must be finished flush.

-- End of Section --