

'REGISTERED WINDSTORM AND STRUCTURAL ENGINEERS SERVING THE GULF COAST'

February 22, 2013

Installation of Natural Stucco products over Metal Lath

Except for soffits, stucco is usually applied over a combination of moisture barrier and wire lath usually applied over a solid backing made of wood sheathing attached to wood studs. In some instances, namely low budget construction, stucco is applied over a wood frame structure without a solid backing. This is not recommended, and is not acceptable in high wind areas.

Although the majority of the nails should penetrate the studs behind the sheathing, the importance of the nails penetrate a stud is directly related to the thickness and strength of the sheathed backing. The stronger the sheathing, the less important that all of the nails hit studs. Conversely, the weaker the sheathing the more imperative it is to hit the studs.

Accessory Requirements and Installation

Accessories shall be fabricated from galvanized (zinc coated) steel or from Zinc Alloy (99% pure zinc). See table 1 for minimum allowable thicknesses.

TABLE 1 Minimum Thickness of Accessories

Accessory	Base Material, in. (mm)		
	Steel	Zinc Alloy	P.V.C.
Corner Beads	0.0172 (0.44)	0.0207 (0.53)	0.035 (0.89)
Casing Beads	0.0172 (0.44)	0.0207 (0.53)	0.035 (0.89)
Weep Screeds	0.0172 (0.44)	0.0207 (0.53)	0.050 (1.27)
Control Joints	0.0172 (0.44)	0.018 (0.46)	0.050 (1.27)

Channels should be cold-formed from steel with .0538 in. (1.37mm) minimum bare steel thickness. Channel should have a protective coating conforming to A653/A653M-G60, or have a protective coating with an equivalent corrosion resistance for external applications.

Sizes, in. (mm)	Weight, lb/1000 ft (kg/m)	Flange Width, in. (mm)
¾ (19)	277 (0.412)	½ (13)
1½ (38)	414 (0.616)	½ (13)
2 (51)	506 (0.753)	½ (13)
2½ (64)	597 (0.888)	½ (13)

NOTE 3—Channels used in areas subject to corrosive action of salt air shall be hot-dipped galvanized, G60 coating.

Accessories used to terminate Portland cement based stucco at the bottom of exterior walls shall have a sloped, solid, or perforated, ground or screed flange to facilitate the removal of moisture from the wall cavity and a vertical attachment flange of not less than 3 ½ in. long.

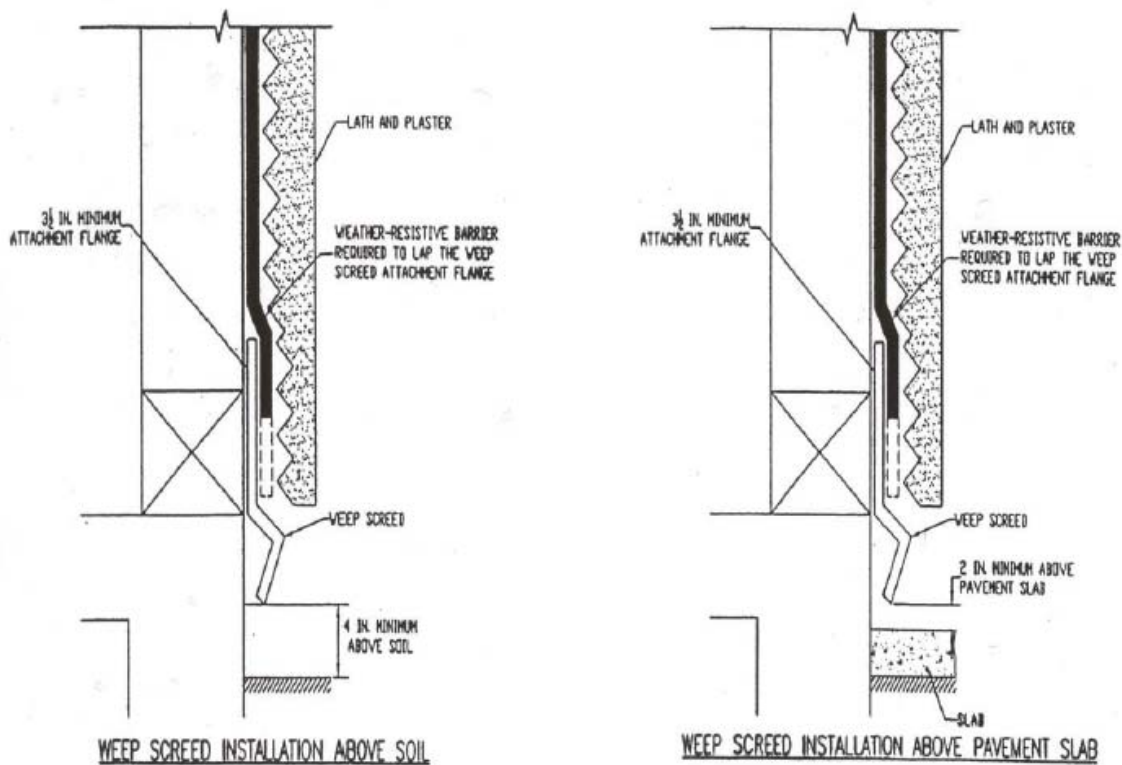
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All accessories shall have perforated or expanded flanges or clips shaped to permit complete embedment in the plaster, to provide means for accurate alignment, and to secure attachment of the accessory to the underlying surface. Accessories shall be designed to receive application of the specified plaster thickness.

Stucco bead includes such components as stucco stop, flashing, expansion bead, and corner bead. They are used to define the perimeters and profile, as well as to increase the structural integrity of the stucco membrane. Stucco beads are usually formed from 0.45 mm (~1/64 inch) thick galvanized steel with perforated or expanded flanges. All stucco bead must be corrosion resistant.

Foundation weep screed shall be installed at the bottom of all steel or wood framed exterior walls to receive lath and plaster. Place the bottom edge of the foundation weep screed not less than 1in. below the joint formed by the foundation and framing. The nose of the screed shall be placed not less than 4 in. above raw earth or 2 in. above paved surfaces. The weather resistive barrier and lath shall entirely cover the vertical attachment flange and terminate at the top edge of the nose or ground flange. See Diagram 1.

Diagram 1



Moisture Barrier Installation

A Moisture Barrier is required on top of moisture sensitive substrates such as wood, gypsum, etc. Two layers of Grade D, asphalt saturated, building paper, not less the 14 lb. per hundred sq. ft., or equivalent material would be an acceptable moisture barrier. Stucco wraps and other equivalent products can be installed under lath, but a separate moisture barrier must be applied to wood sheathing.

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Except for soffits, moisture barrier must cover the entire wood sheathed backing surface. Moisture barrier over sheathed walls must have no holes; should be water repellent. The installation of the moisture barrier usually begins after the stucco stop installation, before control joint installation, and simultaneously with flashing installation.

Note: A control joint is a pre-formed break in the stucco membrane, used for both structural and esthetic purposes. Since the moisture barrier is installed first, completely sealing the sheathing, the proper location of the expansion bead must be pre marked before moisture barrier installation.

The moisture barrier is installed by rolling it out horizontally against the sheathed surface and fastening it with nails or staples. The moisture barrier must sit flat against the sheathing, with minimal wrinkles.

All joints of separate pieces of moisture barrier must overlap a minimum of 6 inches, and all lower pieces must be overlapped by higher pieces, forming a shingle effect. Installing the moisture barrier from bottom to top facilitates the overlapping of a lower piece by a higher piece.

Where lath with backing is used, the vertical and horizontal lap joints should be backing on backing and metal on metal. On walls, the backing paper shall be lapped so water will flow to the exterior. Backing paper should not be placed between plaster base (lath) and flanges of accessories. Metal lath to metal flange contact should be required to ensure that flanges are mechanically locked together.

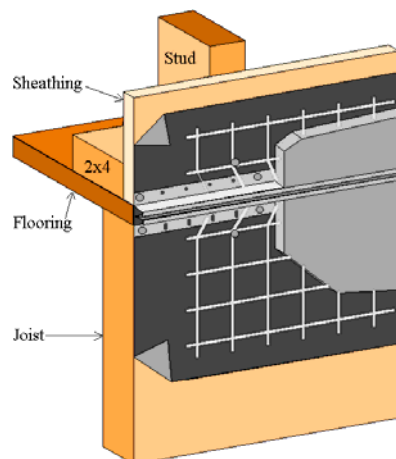
Structural Accessory Installation

Metal Accessories - Casing Beads or Stops or Grounds, Weep Screeds, Corner Aids, and Control Joints or Expansion joints at no length greater than 18 ft. in either direction, no panel should exceed 144 sq. ft. for vertical applications or 100 sq. ft. for horizontal, curved, or angular sections, no length-to-width ratio should exceed 2 ½ to 1 in any given panel, window and door corners and per architectural details.

The control joint must be applied after and over top of moisture barrier. When installed horizontally for structural purposes, the expansion bead must be positioned as shown in diagram 16. The top flange has round holes and the bottom flange has oblong holes. The oblong holes allow the bottom flange to move according to stress forces acting on the stucco membrane

Control joint applied for esthetics can be installed anywhere, however all structural applications require the flanges of the expansion bead to span the structural joint.

Control joint installation over floor joists



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Diagram 16 Wall section cut out showing the correct position to install expansion bead.

The top flange is applied to the horizontal 2x4 of the wall, located just above the flooring. The bottom flange is applied to the joist. The top flange should be nailed flush every 15 cm (6 inches), while the bottom flange should be nailed non-flush every 60 cm (2 ft.). This application allows the bottom flange to ride on the joist.

Corner beads shall be installed to protect all external corners and establish grounds. The first step of its installation is measuring and cutting the corner bead to length. The corner bead although not forced to fit, must span the entire length of the projected corner less approximately ¼ inch. This gap, small enough to be unnoticed by a stucco mortar applicator, is an insurance in case the structure settles before mortar application.

External corner reinforcement shall be installed to reinforce all external corners where a corner bead is not used. An external corner reinforcement fashioned from expanded lath, welded wire, or woven wire mesh bent to approximately 90° should be used to reinforce Portland cement stucco at external corners. This accessory should be fully embedded in the stucco.

Where no external corner reinforcement or corner bead is used, extra support for the mortar can be achieved by double wrapping the corner with two separate overlapping pieces of wire lath. Local building codes requires that all projecting corners be 'double wrapped' with two pieces of wire lath. Lath shall be furred out and carried around corners not less than one support on frame construction. Lath should not be continuous through control joints but should be stopped and tied at each side.

The installation of wire lath

Metal lath is applied over the moisture barrier and sheathing and attached with fasteners that will penetrate the structural members no less than ¾ in. Where moisture barrier (backing paper) has been damaged during installation of attachments, it should be repaired with the same material before proceeding with installation of furring or lath.

Metal furring and lathing should be erected so that the finished surfaces are true to line (allowable tolerance of ¼ in. /10 ft.), level, plumb, square, or curved as required to receive the specified plaster thickness.

All fasteners must be corrosion resistant and shall be no less than ¾ in. long, with heads no less than 3/8 in. wide.

Diamond mesh expanded metal lath, flat rib expanded metal lath, and wire lath should be attached to horizontal wood framing members with 1½ in. roofing nails driven flush with lath and attached to vertical wood framing members with 6d common nails, or 1 in. roofing nails driven to a penetration of not less than ¾ in.

Screws are normally used for securing components to metal studs. Screws used for attachment to metal framing members should be self-tapping and self-drilling. Screws for attaching lath should be fabricated in accordance with either Specification C 954 or C 1002 and have 7/16 in. diameter pan wafer head and a .120 in. (3mm) diameter shank. Screws used for attachment to wood framing should be sharp-point.

Nails are used for almost every other installation. Nails for attaching lath to wood supports should be .1205-in. 11 gauge (3.06mm) diameter, 7/16 in. head, barbed, galvanized roofing nails or galvanized common nails. Nails for attaching metal plaster bases to solid substrates shall be not less than ¾ in. long.

Staples may be used on Inland applications only, or to temporarily hold lath or moisture barrier in place.

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The maximum distance between nails used to support wire lath should be 40 cm (16 inches) horizontally and 15 cm (6 inches) vertically. The distance between studs used in the construction of exterior walls is usually 40 cm (16 inches). This translates to approximately 8 squares of wire lath. The basic patterned formed by nails supporting wire lath is a rectangle 8 squares wide by 4 squares high. Of course, this is only when the wire is applied horizontally or vertically. When applying wire lath on any other angle it is difficult to harmonize the basic nailing pattern with the placement of studs. Therefore, to provide extra support when applying wire lath on an angle, nail in distances of 4 squares, forming boxes 4 squares by 4 squares.

Most of the nails contributing to the wire lath application are installed against the intersection of the horizontal rows and vertical columns, but all nails must be installed so they rub against the wires of the lath.

To gain the maximum benefit of each nail, the nails location relative to the nearest horizontal row and vertical column must correspond to the direction the nail points. See diagram 20.1 for example:

If the nail points up then the nail must be located directly under a row.

If the nail points down then the nail must be located directly above a row.

If the nail points to the left then the nail must be located directly to the right of a column.

If the nail points to the right then the nail must be located directly to the left of a column.

The basic nailing pattern for installing wire lath

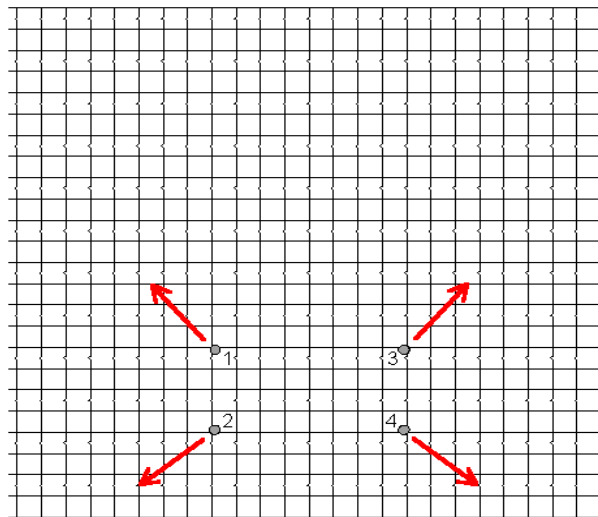


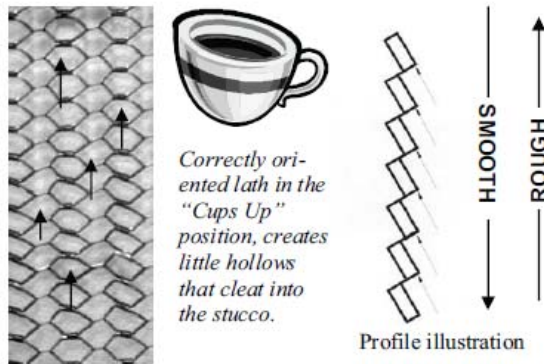
Diagram 20.1

Ends of adjoining lath should be staggered.

The majority of the stress acting on the wire lath is due to the weight of the mortar. To compensate, most of the fasteners should be directly below the horizontal wires and point up.

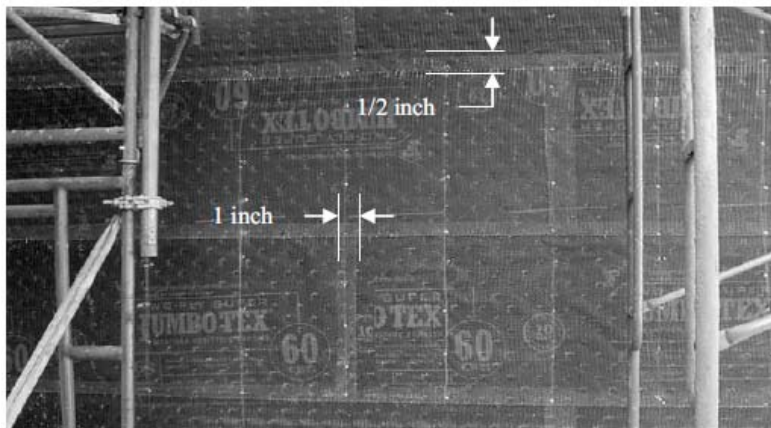
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Diamond Mesh expanded metal lath should be applied "cups up" position.



The best way to know if the lath is installed "cups up" is to run your hand down the lath. If it is installed correctly it should be smooth. Also if installed incorrectly, the lath will be highly reflective, the cups reflect light upward if installed incorrectly.

Metal lath should be lapped 1/2 in. at the sides, or nest the edge ribs. Wire lath should be lapped one mesh at the sides and 1 in. at ends. Side laps of lath should be secured to framing members. Where end laps occur between the framing members, the ends of the sheets of all lath shall be laced or wire tied between supports with .0475 in. galvanized, annealed steel wire at intervals of not more than 9 in.



General

- Installation of lath should conform to ASTM C 1063.
- Lath should lap 1/2 inch at sides and 1 inch at ends.
- Stagger end laps of lath from course to course.
- Lath ends that do not land on a stud should be wire tied.
- Fasteners used in field between framing supports should not penetrate through sheathing.

Attachments for securing lath to framing members should be spaced vertically no more than 7 in. apart for diamond mesh and flat rib laths and at each rib for 3/8 in. rib lath.

Plaster Application Requirements

For exteriors, plaster shall be applied when the ambient temperature is higher than 40 °F (4.4 °C), unless the work area is enclosed and heat is provided. Lath should be covered with three-coat work with or without solid backing. A dash-bond coat shall not replace one of the specified number of coats.

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Surfaces and accessories to receive plaster shall be examined before plastering is applied. The proper authorities shall be notified and unsatisfactory conditions shall be corrected prior to the application of plaster. Unsatisfactory conditions shall be corrected by the party responsible for such conditions.

Form ties or other obstructions shall be removed or trimmed back even with the surface of the solid base. All plaster shall be prepared in a mechanical mixer, using sufficient water and proportioned in accordance with the following tables and accompanying requirements, using measuring devices of known volume with successive batches proportioned alike will produce a workable consistency and uniform color.

While nothing prevents anyone from painting stucco or white-washing it with cement, these materials generally do not adhere to stucco longer than two or three years, requiring constant re-application. Removing these materials in order to re-stucco requires expensive sandblasting. Paint also prevents the concrete from breathing. A stucco home can be re-stuccoed with a plaster that has the desired pigment added. Color material for integral mixing with plaster should not significantly alter the setting, strength development, or durability characteristics of the plaster.

TABLE 2 Plaster Bases—Permissible Mixes

NOTE—See Table 3 for plaster mix symbols.

Property of Base	Mixes for Plaster Coats	
	First (Scratch)	Second (Brown)
Metal plaster base	C CL	C, CL, M, CM, or MS CL

TABLE 3 Base-Coat Proportions,^A Parts by Volume^B

Plaster Mix Symbols	Cementitious Materials					Volume of Aggregate per Sum of Separate Volumes of Cementitious Materials	
	Portland Cement or Blended Cement	Plastic Cement	Masonry Cement		Lime	1st Coat	2nd ^C Coat
			N	M or S			
C	1	...	...	...	0-3/4	2 1/2 -4	3-5
CL	1	...	...	...	3/4 -1 1/2	2 1/2 -4	3-5

^CThe same or greater sand proportion shall be used in the second coat than is used in the first coat.

Note: Measurements in these charts are cement: aggregate.

Aggregate or sand for plastering should be clean and well graded. Aggregate should also be free from organic impurities, clay, loam, and vegetable matter.

TABLE 4 Job-Mixed Finish Coat Proportion Parts by Volume

Plaster Mix Symbols ^A	Cementitious Materials					Volume of Aggregate per Sum of Separate Volumes of Cementitious Materials ^B
	Portland Cement or Blended Cement	Plastic Cement	Masonry Cement ^A		Lime	
			N	M or S		
F	1	...	...	...	3/4 -1 1/2	1 1/2 -3
FL	1	...	...	...	1 1/2 -2	1 1/2 -3

Portland cement plaster shall be applied by hand or machine to the nominal thickness specified in Table 1.

Each plaster coat shall be applied to an entire wall without interruption to avoid cold joints and abrupt changes in the uniform appearance of succeeding coats. Wet plaster should abut set plaster at naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control

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joints where possible. A groove or cut in plaster only shall not be considered a control or expansion joint. Prefabricated control joint members should have been installed prior to the application of plaster; therefore, the decision to use them, the type selected, their location, and method of installation should have been determined and specified in project specification sections other than the section on plastering. Joinings, where necessary, shall be cut square and straight and not less than 6 in. (152 mm) away from a joining in the preceding coat.

Plaster nominal thickness shall be measured from the back plane of the lath, exclusive of ribs or dimples, or from the face of the solid backing with or without lath, to the outer surface exclusive of texture variations. The combined total nominal thickness should be as shown in **Table 1**.

In multistory construction where lath and Portland cement plaster exterior walls are continuous past a floor slab, tracks or plates and studs should be offset to provide a space not less than $\frac{3}{8}$ in. (9.5 mm) between the inner face of the exterior plaster and the edge of the floor slab.

TABLE 1 Nominal Plaster Thickness^A for Three- and Two-Coat Work, In. (mm)

BASE	Vertical				Horizontal			
	1st Coat	2nd Coat	3rd Coat ^B	Total	1st Coat	2nd Coat	3rd Coat ^B	Total
	Interior/Exterior							
Three-coat work: ^C								
Metal plaster base	$\frac{3}{8}$ (9.5)	$\frac{3}{8}$ (9.5)	$\frac{1}{8}$ (3)	$\frac{7}{8}$ (22)	$\frac{1}{4}$ (6)	$\frac{1}{4}$ (6)	$\frac{1}{8}$ (3)	$\frac{5}{8}$ (16)

^C For exposed aggregate finishes, the second (brown) coat shall become the "bedding" coat and shall be of sufficient thickness to receive and hold the aggregate.

The first (scratch) coat shall be applied with sufficient material and pressure to embed the lath, and with sufficient thickness of material over the metal to allow for scoring the surface.

Sufficient time between coats shall be allowed to permit each coat to cure or develop enough rigidity to resist cracking or other physical damage when the next coat is applied. The timing between coats will vary with climatic conditions and types of lath. Temperature and relative humidity extend or reduce the time between consecutive operations. Cold or wet weather lengthens and hot or dry weather shortens the time period. Moderate changes in temperature and relative humidity can be overcome by providing additional heating materials during cold weather and by reducing the absorption of the base by pre-wetting during hot or dry weather.

Base-coat plasters that have stiffened because of evaporation of water shall be permitted to be tempered one time only to restore the required consistency. Plaster not used within 1½ h from start of initial mixing shall be discarded.

Some moisture must be retained in or added back to freshly applied portland cement-based plaster. If relative humidity is high (above 75 %) then the frequency for rewetting a surface can be reduced. If it is hot, dry, and windy, the frequency of rewetting must be increased.

NOTE 4—Severe hot, dry climate conditions accelerate the stiffening of plaster. The use of cold waters will slow the stiffening process.

As soon as the first (scratch) coat becomes firm, the entire surface shall be scored in one direction only. The vertical surfaces shall be scored horizontally. The first (scratch) coat shall become sufficiently rigid to support the application of the second (brown) coat without damage to the monolithic continuity of the first (scratch) coat.

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In order to provide more intimate contact and bond between coats and to reduce rapid water loss, the second coat should be applied as soon as the first coat is sufficiently rigid to resist cracking, the pressures of the second coat application, and the leveling process.

Plaster coats that have become dry shall be evenly dampened with water prior to applying subsequent coats to obtain uniform suction, although there shall be no visible water on the surface when plaster is applied.

The second (brown) coat shall be applied with sufficient material and pressure to ensure tight contact with the first (scratch) coat and to bring the combined thickness of the base coat to the nominal thickness shown in **Table 1**. The surface of the second (brown) coat shall be brought to a true, even plane with a rod or straightedge, filling surface defects in plane with plaster. Dry rodding the surface of the brown coat shall be permitted. The surface shall be floated uniformly to promote densification of the coat and to provide a surface receptive to bonding of the finish coat.

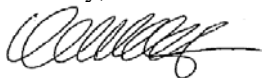
Control joints shall be cleaned and clear of plaster within the control area after plaster application and before final plaster set.

Finish-coat plaster shall not be tempered. The use of excessive water during the application and finishing of finish-coat plaster shall be avoided. The third (finish) coat should be applied with sufficient material and pressure to ensure tight contact with, and complete coverage of the base coat and to the nominal thickness shown in **Table 1**.

After plaster installation is complete, perform routine clean-up of the control areas and of the job site.

This installation has been written in accordance with ASTM C926, ASTM C1063, and Texas Department of Insurance-Windstorm requirements.

Sincerely,



Chandra Franklin Womack, P.E.