

# ICC-ES Evaluation Report

**ESR-1194**

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**DIVISION: 09 00 00—FINISHES**  
**Section: 09 24 00—Portland Cement Plastering**

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**EVALUATION SUBJECT:**

**OMEGA DIAMOND WALL AND DIAMOND WALL PM  
 INSULATING EXTERIOR STUCCO SYSTEMS**

**1.0 EVALUATION SCOPE**
**Compliance with the following codes:**

- 2009 and 2006 *International Building Code*® (IBC)
- 2009 and 2006 *International Residential Code*® (IRC)

**Properties evaluated:**

- Structural
- Durability
- Fire-resistance-rated construction
- Types I through IV (noncombustible) construction

**2.0 USES**

The Omega Diamond Wall Insulating Exterior Stucco Systems (Diamond Wall and Diamond Wall PM) are cementitious wall covering systems installed on exterior walls of wood or steel frame, concrete or concrete masonry construction. The systems are alternatives to the exterior wall coverings specified in IBC Chapter 25, and IRC Section R703. The systems may be used to construct one-hour fire-resistance-rated wall assemblies and may be used in Types 1 through IV construction when installed in accordance with Sections 4.4 and 4.5, respectively.

**3.0 DESCRIPTION**
**3.1 General:**

The Omega Diamond Wall and Diamond Wall PM insulating exterior stucco systems are proprietary mixtures of portland cement, sand, fibers, water and proprietary ingredients reinforced with wire fabric or metal lath, and applied to substrates of expanded polystyrene (EPS), extruded polystyrene (XPS) and polyisocyanurate foam plastic insulation boards, Fome-Cor Board, concrete or concrete masonry, wood structural panels, fiberboard, and

gypsum sheathing. The systems may be installed on exterior walls of wood-framed, steel-framed, concrete or concrete masonry construction.

**3.2 Materials:**

**3.2.1 Diamond Wall Stucco:** The stucco is a factory-prepared mixture of Type I or II Portland cement complying with ASTM C 150, chopped glass fibers and proprietary additives. The mixture is packaged in 80-pound (36 kg) bags. Approximately 4½ to 7 gallons (17 to 26.5 L) of water and between 160 to 240 pounds (72 to 109 kg) of sand are added to each bag in the field, and mixing is done in accordance with the manufacturer's recommendations.

As an alternative, the Diamond Wall PM system allows for the substitution of up to one-half the amount of water with equal parts of the Omega Diamond Wall PM Admix, a liquid admixture composed of acrylic polymers and modifiers. The PM Admix is packaged in 3½-gallon (13.25 L) pails. The admixture has a shelf life of approximately two years when protected from extreme sunlight and freezing for extended periods. Storage temperatures must be between 40°F and 110°F (4°C and 39°C). The Diamond Wall PM system requires the inspections specified in Section 4.6.1.

**3.2.2 Sand:** Sand must be clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter. Sampling and testing must comply with ASTM C 144 or C 897. Sand must be graded in accordance with ASTM C 144 or C 897 or within the following limits:

RETAINED ON U.S. STANDARD SIEVE	PERCENT RETAINED BY WEIGHT ± 2 PERCENT	
	Natural Sand Min. / Max.	Manufactured Sand Min. / Max.
No. 4	0 / 0	0 / 0
No. 8	0 / 10	0 / 10
No. 16	10 / 40	10 / 40
No. 30	30 / 65	30 / 65
No. 50	70 / 90	60 / 80
No. 100	95 / 100	75 / 90

**3.2.3 Insulation Board:**

**3.2.3.1 EPS Insulation Board:** EPS board must have a nominal density of 1.5 pounds per cubic foot (24 kg/m<sup>3</sup>), a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL723; and must comply with ASTM C 578 as Type II. All boards must be recognized in a current ICC-ES evaluation report. See Section 7.2 for board identification requirements.

Boards installed without sheathing over open framing must be 1 inch to 1½ inches (25.4 to 38 mm) thick and must be provided with ⅜-inch-high (9.5 mm) tongues with compatible grooves for horizontal joints. See Figure 1 for joint details. Over solid substrates, a square-edge foam plastic boards, complying with ASTM C 578 as Type I, with a minimum ½-inch (12.7 mm) thickness and a minimum nominal density of 1 pcf (16 kg/m³) may be used, except when installation of the foam plastic board is as part of the water-resistive barrier over wood-based sheathing as described in Section 3.2.9.1, which requires 1-inch-thick (25.4 mm) EPS boards with tongue-and-groove edges.

When installation is over solid substrates, as described in Section 4.3, the boards must have minimum ¼-inch-wide-by-⅛-inch-deep (6.4 mm by 3.2 mm) vertical grooves spaced at a maximum of 12 inches (305 mm) on the back face of the boards, as shown in Figure 1B. As an alternate to the vertical grooves in the foam plastic board, flat-faced boards may be installed over solid substrates provided the Tyvek StuccoWrap water-resistive barrier recognized in [ESR-2375](#) is installed behind the boards.

**3.2.3.2 XPS Insulation Board:** XPS board must have a nominal density of 1.5 pounds per cubic foot (24 kg/m³), must comply with ASTM C 578 as Type IV or V and must be recognized in a current ICC-ES evaluation report. See Section 3.2.3.1 for other details and requirements.

As an alternative, DOW Styrofoam Stuccomate brand XPS insulation boards, recognized in [ESR-2142](#) and having a 1-inch (25.4 mm) thickness and a nominal density of 1.3 pounds per cubic foot (21 kg/m³), may also be used.

**3.2.3.3 Polyisocyanurate Foam Plastic Board:** Polyisocyanurate foam plastic board must comply with ASTM C 1289 as a Type II. Polyisocyanurate foam plastic boards must have a nominal density of 2 pounds per cubic foot (32 kg/m³) and a maximum flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL723. The foam plastic board must be 1 inch to 1½ inches (25 to 38 mm) thick, have all squared joints installed at horizontal and vertical edges supported by framing or blocking and be limited to nonfire-resistance-rated and combustible construction. All boards must be recognized in a current ICC-ES evaluation report. See Section 7.2 for board identification requirements. Over solid substrates, a square-edge foam plastic boards with a minimum thickness of ½ inch (12.7 mm) may be used, with the same requirements set forth in Section 3.2.3.1.

### 3.2.4 Lath:

**3.2.4.1 Wire Fabric Lath:** Wire fabric lath must comply with the ICC-ES Acceptance Criteria for Metal Plaster Bases (Lath) (AC191) or be recognized in a current ICC-ES evaluation report. Minimum No. 20 gage [0.035 inch (0.89 mm)], 1-inch galvanized steel, woven-wire fabric must be used. Lath must be furred when applied over all substrates except unbacked foam plastic insulation board. Furring must comply with the following requirements:

- When maximum total coating thickness is ½ inch (12.7 mm) or less, the body of the lath must be furred a minimum of ⅛ inch (3.2 mm) from the substrate after installation.
- When total coating thickness is greater than ½ inch (12.7 mm), No. 17 gage [0.058 inch (1.47 mm)] by 1½-inch (38 mm) woven-wire fabric lath must be used. The body of the lath must be furred a minimum of ¼ inch (6.4 mm) from the substrate after lath installation.

**3.2.5 Metal Lath:** Metal lath must comply with AC191. Furring requirements are as set forth in Section 3.2.4.1.

**3.2.6 Fiberboard:** Minimum ½-inch-thick (12.7 mm), asphalt-impregnated fiberboard must comply with ASTM C 208 as Type IV, Grade 1 wall sheathing.

**3.2.7 Wood Structural Panel Sheathing:** Wood structural panel sheathing must be minimum ⅝-inch-thick (7.9 mm) plywood or OSB for studs spaced 16 inches (406 mm) on center, and must be a minimum ⅜-inch-thick (9.5 mm) plywood or OSB for studs spaced 24 inches (610 mm) on center. Plywood must be exterior-grade or Exposure 1 and comply with U.S. DOC PS-1; and OSB must be Exposure 1 and comply with U.S. DOC PS-2.

**3.2.8 Gypsum Board:** Water-resistant core-treated gypsum sheathing must comply with ASTM C 79 or ASTM C 1396. Gypsum wallboard must comply with ASTM C 36 or ASTM C 1396. Glass mat faced, water-resistant core-treated gypsum sheathing must comply with ASTM C 1177 and be recognized in a current ICC-ES evaluation report. Water-resistant exterior fiber-reinforced gypsum sheathing must comply with ASTM C 1278 and be recognized in a current ICC-ES evaluation report.

**3.2.9 Caulking:** Caulking materials must be either acrylic latex complying with ASTM C 834, or polyurethane, polyurethane modified, polysulfide, or silyl-terminated polyether elastomeric sealant complying with ASTM C 920.

### 3.2.10 Weather Protection:

**3.2.10.1 Water-resistive Barrier:** A water-resistive barrier is required and must comply with IBC Section 1404.2, or IRC Section R703.2, as applicable. Minimum No. 15 asphalt nonperforated felt complying as Type I in accordance with ASTM D 226 (IBC or IRC); minimum Grade D kraft building paper complying with UBC Standard 14-1; or material recognized in a current ICC-ES evaluation report as equivalent to ASTM D 226, Type I, is required.

When applied over any wood-based sheathing, the barrier must be either: (a) minimum of two layers of Grade D kraft building paper as set forth in IBC Section 2510.6, or IRC Section R703.6.3, as applicable, or an equivalent recognized in a current ICC-ES evaluation report; or (b) one layer of EPS or XPS insulation board, having horizontal tongue-and-groove edges as described in Section 3.2.3.1, over one layer of Grade D kraft building paper having a minimum water-resistance rating of 60 minutes, or an equivalent recognized in a current ICC-ES evaluation report.

When application is over gypsum sheathing, Fome-Cor Board, recognized as complying with ICC-ES AC38 and installed in accordance with evaluation report [ESR-1614](#), may be used as the water-resistive barrier.

When Tyvek StuccoWrap is used as the water-resistive barrier, the grooves in the insulation board described in Section 3.2.3.1 are not required. The Tyvek StuccoWrap must be installed in accordance with [ESR-2375](#).

**3.2.10.2 Vapor Retarder:** Protection against condensation must be provided in accordance with 2009 IBC Section 1405.3 or 2006 IBC Section 1403.2, as applicable. Under the 2009 IRC, a vapor retarder must be provided in accordance with IRC Section R601.3, unless its omission is permitted under the exceptions in IRC Section R601.3. Under the 2006 IRC, a vapor retarder complying with IRC Section R318.1 must be provided, unless its omission is permitted under the exceptions in IRC Section R318.1.

**3.2.11 Flashing:** Flashing complying with 2009 IBC Section 1405.4, 2006 IBC Section 1405.3, or 2009 or 2006 IRC Section R703.8, as applicable, must be provided. Where flexible flashing is used, it must be a self-adhering, flexible rubberized asphalt and polyethylene material, a minimum of 0.020 inch (0.51 mm) thick, shingle-lapped with the water-resistive barrier. Rigid flashings must be sloped towards the exterior, with an upturned leg on the interior side and at the ends, and must extend beyond the surface of the exterior wall.

**3.2.12 Trim and Accessories:** All trim, weep screeds and corner reinforcement must be corrosion-resistant.

## 4.0 INSTALLATION

### 4.1 General:

The exterior cementitious coating must be applied by hand-troweling or machine-spraying, in one coat or two coats, to a minimum  $\frac{3}{8}$ -inch (9.5 mm) thickness, unless noted otherwise. Nominal thickness around penetrations is  $\frac{3}{8}$  inch (9.5 mm), backed by framing or blocking. The lath must be embedded in the minimum coating thickness and therefore cannot be exposed. The finish coat must be applied in accordance with Omega Products International, Inc. instructions. Flashing, corner reinforcement, metal trim and weep screeds must be installed as shown in Figure 2.

The coating must be applied at ambient air temperatures of 40°F to 120°F (4°C to 49°C) by applicators approved by Omega Products International, Inc. The water-resistive barrier must be applied as set forth in Section 3.2.9.1. An installation card, such as that shown in Figure 3, must be on the jobsite, with the name of the applicator and the product to be used, before any water-resistive barrier or exterior sheathing is installed. See Section 5.6.

### 4.2 Application over Open Framing:

**4.2.1 Foam Plastic Insulation Boards:** The water-resistive barrier must be placed over open wood studs spaced a maximum of 24 inches (610 mm) on center. The EPS, XPS, or polyisocyanurate board, as described, respectively, in Section 3.2.3.1, 3.2.3.2, or 3.2.3.3, must be attached using galvanized staples, roofing nails, or screws. Vertical butt joints must be staggered at least one stud space from adjacent courses, and must occur directly over studs. DOW Styrofoam Stuccomate brand XPS, 1-inch-thick (25.4 mm) insulation boards, recognized in [ESR-2142](#) may be installed with vertical edges located between framing members, provided the vertical edges are tongue-and-groove and provided the joints between adjacent courses are staggered a minimum of one stud space.

The lath must then be applied tightly over the foam plastic insulation board, with  $1\frac{1}{2}$ -inch (38 mm) end and side laps, and fastened through the insulation board and water-resistive barrier to wood studs, sills and plates using No. 11 gage galvanized roofing nails or No. 16 gage corrosion-resistant staples spaced a maximum of 6 inches (152 mm) on center with a minimum 1-inch (25 mm) penetration into the studs. Staples must have a minimum crown width of  $\frac{7}{16}$  inch (11.1 mm). The wood species must have a minimum specific gravity of 0.42. Care must be taken to avoid overdriving fasteners.

The Omega Diamond Wall coating system may also be applied to minimum No. 20 gage [0.0359 inch (0.91mm)] steel studs spaced a maximum of 24 inches (610 mm) on center. Lath must be applied tightly over the foam plastic board and must be fastened through the board and water-resistive barrier to the metal studs, using minimum No. 8, Type S, corrosion-resistant, drywall screws with 1-inch-diameter (25 mm) washers or No. 8 corrosion-resistant screws having  $\frac{3}{8}$ -inch-diameter (9.5 mm) pan heads, at

7 inches (178 mm) on center to all studs and track. Screws must penetrate the studs a minimum of  $\frac{1}{2}$  inch (12.7 mm).

Wall bracing in accordance with IBC Section 2308.9.3 or 2308.12, IRC Section 2308.9.3 or 2308.12, IRC Section R602.10 or R602.11, as applicable, or an acceptable alternate, must be provided. Square wall corners and parapet corners must be covered with corner reinforcement. For round wall, bull nose and parapet corners, metal reinforcement is optional when construction is in accordance with Figure 2. Weep screeds must comply with, and be installed at the bottom of the wall in accordance with, IBC Section 2512.1.2, or IRC Section R703.6.2.1, as applicable. Galvanized steel, J-shaped trim pieces must be installed at other areas where insulation board is exposed. See Figure 2 for typical installation details. At windows and doors, flashing as described in Section 3.2.10 is required. Butting J-trim and approved metal edges, when installed, must be flashed as described in Section 3.2.10. Holes for hose bibs, electrical panels and other penetrations of substrate surfaces, except those caused by fasteners, must also be flashed as described in Section 3.2.10. The coating must then be applied as described in Section 4.1.

**4.2.2 Fome-Cor Board:** Fome-Cor Board, applied in accordance with evaluation report [ESR-1614](#), is permitted to be applied to wood studs having a minimum specific gravity of 0.50 spaced a maximum of 16 inches (406 mm) on center, followed by  $1\frac{1}{2}$ -inch (38.1 mm) by No. 17 gage woven wire lath lapped 2 inches (51 mm). The lath must be secured through the Fome-Cor Board to the studs using 1-inch-crown (25 mm), No. 16 gage staples of sufficient leg length to penetrate studs a minimum of 1 inch (25 mm). The coating must be applied as described in Section 4.1 to a minimum  $\frac{5}{8}$ -inch (15.9 mm) thickness. Alternately, the base coat must be a minimum of  $\frac{1}{2}$  inch (12.7 mm) thick and must be cured in accordance with Section 4.6.3. The finish coat must then be applied over the cured base coat. Additional installation requirements are as noted in Section 4.2.1.

### 4.3 Application over Solid Substrates:

**4.3.1 Fiberboard:** Minimum  $\frac{1}{2}$ -inch-thick (12.7 mm) fiberboard, as described in Section 3.2.5, must be installed directly to wood studs or minimum No. 20 gage [0.0359 inch (0.91 mm)] steel studs spaced a maximum of 24 inches (610 mm) on center. The fiberboard must be temporarily held in place using corrosion-resistant staples or roofing nails for wood studs or self-drilling tapping screws for steel studs. A water-resistive barrier must be applied over the fiberboard under the conditions set forth in Section 3.2.9.1 prior to installation of the lath or optional foam board. When the optional insulation boards are used, the foam plastic boards must have vertical grooves as described in Section 3.2.3, or flat-faced foam plastic boards may be used provided the water-resistive barrier is Tyvek StuccoWrap, as described in Section 3.2.9.1. When grooved foam plastic boards are used, the grooves must face the water-resistive barrier and must be aligned vertically, but may be offset a maximum of 6 inches (152 mm) from adjacent boards. The lath must then be attached to the studs through the sheathing, with fasteners and spacing as described in Section 4.2.1 or as described for fiberboard in IBC Table 2304.9.1, or IRC Table R602.3(1), as applicable.

Wall bracing in accordance with IBC Section 2308.9.3 or 2308.12, or IRC Section R602.10 or R602.11, as applicable, or an acceptable alternate, must be provided. Square wall corners and parapet corners must be covered with metal corner reinforcement. For round wall, bull nose and parapet corners, metal reinforcement is optional when

construction is in accordance with Figure 2. Weep screeds must comply with, and be installed at the bottom of the wall in accordance with, IBC Section 2512.1.2 or IRC Section R703.6.2.1, as applicable. Galvanized steel, J-shaped trim pieces must be installed at other areas where insulation board is exposed. See Figure 2 for typical installation details. At windows and doors, flashing as described in Section 3.2.10 is required. Butting J-trim and approved metal edges, when installed, must be flashed as described in Section 3.2.10. Holes for hose bibbs, electrical panels and other penetrations of substrate surfaces, except those caused by fasteners, must also be flashed as described in Section 3.2.10. The coating must then be applied as described in Section 4.1.

The fiberboard, optional foam plastic insulation board, lath and coating may be applied to minimum No. 20 gage [0.0359 inch (0.91 mm)] steel studs spaced a maximum of 24 inches (610 mm) on center, provided the fasteners and their placement are as set forth in Section 4.2.1 for steel studs.

**4.3.2 Wood Structural Panel Sheathing:** Wood structural panel sheathing must be applied directly to wood studs under the conditions set forth in Section 3.2.6 and IBC Table 2308.9.3(3), or IRC Table 602.3(3), as applicable. The sheathing must be attached in accordance with IBC Table 2304.9.1 or IRC Table 602.3(1), as applicable. The water-resistive barrier, optional insulation board, wire fabric lath, and coating must be applied as described in Section 4.3.1 for fiberboard. Installation to minimum No. 20 gage [0.0359 inch (0.91 mm)] steel studs spaced a maximum of 24 inches (610 mm) on center, is also as described in Section 4.3.1 for fiberboard. For fastener spacing and gages for lath attachment to wood studs of various species, with wood structural panel sheathing and nominal  $1/2$ -inch-thick (12.7 mm) insulation board, see Table 1. For fastener spacing and gages for lath attachment to wood structural panel sheathing and wood studs of various species, having a nominal 1-inch-thick (25 mm) insulation board, see Table 2.

**4.3.3 Gypsum Sheathing:** Minimum  $1/2$ -inch-thick (12.7 mm), water-resistant core-treated gypsum sheathing, described in Section 3.2.5, must be installed directly over wood studs spaced a maximum of 24 inches (610 mm) on center. Gypsum sheathing must be fastened in accordance with IBC Table 2508.1 or IRC Table R702.3.5, as applicable. Glass mat-faced, water-resistant core-treated gypsum sheathing or water-resistant exterior fiber-reinforced gypsum sheathing, described in Section 3.2.5, must be fastened in accordance with their ICC-ES evaluation report. The gypsum sheathing may also be applied to minimum No. 20 gage [0.0359 inch (0.91 mm)] steel studs spaced a maximum of 24 inches (610 mm) on center, provided the fasteners and their placement are as set forth in Section 4.2.1 for steel studs.

A water-resistive barrier, as described in Section 3.2.9.1, must be applied over the gypsum sheathing before application of lath or optional insulation board. The water-resistive barrier, optional insulation board, wire fabric lath and coating must be applied as described in Section 4.3.1 for fiberboard.

**4.3.4 Concrete and Masonry:** Surface preparation must be in accordance with IBC Section 2510.7. Surface must be clean, free of dust and other particles, and sufficiently damp to ensure proper bonding. The Diamond Wall coating is applied directly to the prepared surface at a minimum thickness of  $3/8$  inch (9.5 mm), in accordance with applicable provisions of Section 4.1.

#### 4.4 One-hour Fire-resistance-rated Assemblies:

The assemblies described in this section are rated for exposure to fire from both sides, unless otherwise noted.

##### 4.4.1 First Assembly:

**4.4.1.1 Interior Face:** One layer of  $5/8$ -inch-thick (15.9 mm), Type X gypsum wallboard, water-resistant backer board or veneer base, complying with ASTM C 36 or ASTM C 1396, must be applied parallel or at right angles to the interior face of 2-by-4 wood studs spaced a maximum of 24 inches (610 mm) on center. The gypsum board must be attached using  $1\frac{1}{8}$ -inch-long (48 mm) 6d coated gypsum wallboard nails, complying with ASTM C 514, having  $1/4$ -inch-diameter (6.4 mm) heads, at 7 inches (178 mm) on center to studs, plates and blocking. All gypsum board joints must be backed with minimum 2-by-4 wood framing and taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Fastener heads must also be treated with joint compound in accordance with ASTM C 840 or GA 216.

**4.4.1.2 Exterior Face:** One layer of minimum  $5/8$ -inch-thick (15.9 mm), Type X, water-resistant core gypsum sheathing, 48 inches (1219 mm) wide, must be applied vertically to studs using No. 11 gage, galvanized roofing nails having  $7/16$ - or  $1/2$ -inch diameter (11.1 or 12.7 mm) heads, at 4 inches (102 mm) on center at board edges and 7 inches (178 mm) on center at intermediate studs. The sheathing must be nailed to top and bottom plates at 7 inches (178 mm) on center. A water-resistive barrier must be provided over the sheathing. The lath and wall coating must then be applied without insulation board as described in Section 4.2.

**4.4.1.3 Axial Design:** The wood stud axial design stress for the wall assembly calculated in accordance with Sections 3.6 and 3.7 of ANSI AF&PA NDS-05 (IBC and IRC) is limited to  $0.78 F'_c$  and the maximum stress must not exceed  $0.78 F'_c$  at a maximum slenderness ratio ( $l_e/d$ ) of 33.

##### 4.4.2 Second Assembly (Limited Load-bearing):

**4.4.2.1 Interior Face:** One layer of  $5/8$ -inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36 or ASTM C 1396, must be applied horizontally to the interior face of 2-by-4 wood studs spaced a maximum of 16 inches (406 mm) on center. The wallboard must be fastened to studs using 5d gypsum wallboard nails complying with ASTM C 514, having minimum  $15/64$ -inch-diameter (6 mm) heads, at 6 inches (152 mm) on center to studs, plates and sills. All vertical wallboard joints must be backed with minimum 2-by-4 wood framing, and taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Fastener heads must also be treated with joint compound in accordance with ASTM C 840 or GA 216. Mineral wool insulation batts, R-13,  $3\frac{5}{8}$  inches (92 mm) thick and having a minimum 1.97 pcf (31.56 kg/m<sup>3</sup>) density, must be placed in the cavities between studs, and secured to studs.

**4.4.2.2 Exterior Face:** A water-resistive barrier must be applied over the exterior face of wood studs in accordance with Section 3.2.9.1. One-inch-thick (25 mm), 1.5 pcf density (24 kg/m<sup>3</sup>) EPS insulation board must be applied in accordance with Section 4.2, followed by 1-inch (25 mm) by No. 20 gage woven-wire lath. The lath must be fastened through the EPS insulation board to studs and plates at 6 inches (152 mm) on center as required by Section 4.2.1. Lath overlaps must be a minimum of 2 inches (51 mm). The Diamond Wall coating must then be applied to the lath in accordance with Section 4.1.

**4.4.2.3 Axial Design:** The allowable axial loading for this system is limited to the least of the following:

1. 1100 pounds (4893 N) per stud.
2. A maximum of 58 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
3. Design stress of  $0.78 F'_c$  calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
4. Design stress of  $0.78 F'_c$  at a maximum slenderness ratio ( $l_e/d$ ) of 33 calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05 (IBC and IRC).

**4.4.3 Third Assembly (Limited Load-bearing):**

**4.4.3.1 Interior Face:** One layer of  $5/8$ -inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36 or ASTM C 1396, must be applied horizontally or vertically to the interior face of 2-by-4 wood studs spaced a maximum of 24 inches (610 mm) on center. The wallboard must be fastened to the studs and perimeter framing using 0.100-inch-diameter (2.54 mm) steel cup head nails or No. 6 bugle head screws,  $1\frac{5}{8}$ -inch-long (41.3 mm), having minimum head diameters of 0.300 inch (7.62 mm), and spaced a maximum of 8 inches (203 mm) on center. All wallboard joints must be taped and treated with joint compound in accordance with ASTM C 840 or GA 216. All vertical wallboard joints must be backed with minimum 2-by-4 wood framing, and taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Insulation batts, R-11, measuring  $3\frac{1}{2}$  inches thick (89 mm), must be placed in the cavities between the framing and fastened to the framing. The insulation may be either fiberglass insulation batts with a minimum density of 0.62 pcf (9.93 kg/m<sup>3</sup>), or kraft-paper-faced fiberglass insulation batts with a minimum density of 0.65 pcf (10.41 kg/m<sup>3</sup>).

**4.4.3.2 Exterior Face:** A water-resistive barrier must be applied over the exterior face of wood framing in accordance with Section 3.2.9.1. One-inch-thick (25 mm), 1.5 pcf density (24 kg/m<sup>3</sup>), tongue-and-groove EPS insulation boards, or DOW Styrofoam Stuccomate brand XPS insulation boards recognized in [ESR-2142](#) and described in Section 3.2.3.2 must be attached to the studs and perimeter framing in accordance with Section 4.2. All vertical joints in the insulation board must occur over studs. The insulation board must be followed by lath, as described in Section 3.2.4, fastened through the insulation boards to the studs and perimeter framing using 2-inch-long (51 mm), No. 16 gage galvanized staples, having  $1\frac{5}{16}$ -inch (23.8 mm) crowns, or minimum  $2\frac{1}{4}$ -inch-long (31.7 mm), 0.125-inch-diameter (3.18 mm) nails having minimum head diameters of 0.355 inch (9.02 mm). Fasteners must be spaced 6 inches (152 mm) on center. The Diamond Wall coating must then be applied to the lath in accordance with Section 4.1, at a minimum thickness of  $3/8$  inch (9.5 mm).

**4.4.3.3 Axial Design:** The allowable axial loading for this system is limited to the least of the following:

1. 1,100 pounds (4893 N) per stud.
2. A maximum of 51.3 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
3. Design stress of  $0.78 F'_c$  calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
4. Design stress of  $0.78 F'_c$  at a maximum slenderness ratio ( $l_e/d$ ) of 33 calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-97 05.

**4.4.4 Fourth Assembly (Limited Load-bearing):**

**4.4.4.1 Interior Face:** One layer of  $5/8$ -inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36 or ASTM C 1396, must be applied horizontally or vertically to the interior face of 2-by-4 wood studs spaced a maximum of 24 inches (610 mm) on center. The wallboard must be fastened to the studs and perimeter framing using 0.100-inch-diameter (2.54 mm) steel cup head nails or No. 6 bugle head screws,  $1\frac{5}{8}$  inches long (41.3 mm), having minimum head diameters of 0.300 inch (7.62 mm) and spaced a maximum of 8 inches (203 mm) on center. All wallboard joints must be taped and treated with joint compound in accordance with ASTM C 840 or GA 216. All vertical wallboard joints must be backed with minimum 2-by-4 wood framing, and taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Insulation batts, R-11 and measuring  $3\frac{1}{2}$  inches (89 mm) thick, must be placed in the cavities between the framing and fastened to the framing. The insulation may be either fiberglass insulation batts with a minimum density of 0.62 pcf (9.93 kg/m<sup>3</sup>) or kraft-paper-faced fiberglass insulation batts with a minimum density of 0.65 pcf (10.41 kg/m<sup>3</sup>).

**4.4.4.2 Exterior Face:** One layer of minimum  $7/16$ -inch-thick (11.1 mm) OSB, one layer of minimum  $1\frac{5}{32}$ -inch-thick (11.9 mm) plywood, or one layer of minimum  $1/2$ -inch-thick, water-resistant core-treated gypsum sheathing complying with ASTM C 79 or ASTM C 1396, must be applied vertically to the wall, and fastened to the wood studs, sill and plates using  $2\frac{3}{8}$ -inch-long (60 mm) 0.113-inch-diameter (2.87 mm), 8d coated sinker nails having minimum head diameters of 0.266 inch (6.76 mm) and spaced a maximum of 8 inches (1219 mm) on center. All vertical joints in the sheathing must occur over studs. The water resistive barrier must be installed as required in Section 3.2.9.1. Lath, as described in Section 3.2.4, must be fastened through the sheathing to the studs with  $1\frac{1}{4}$ -inch-long (31.7 mm), 0.125-inch-diameter (3.18 mm) nails having minimum head diameters of 0.355 inch (9.02 mm), or No. 16 gage, corrosion-resistant staples having  $1\frac{5}{16}$ -inch (23.8 mm) crowns. The fasteners must be spaced 6 inches (152 mm) on center on the studs and perimeter framing. The Diamond Wall coating must then be applied to the lath in accordance with Section 4.1, at a minimum thickness of  $3/8$  inch (9.5 mm).

**4.4.4.3 Axial Design:** The allowable axial loading for this system is limited to the least of the following:

1. 1,100 pounds (4893 N) per stud.
2. A maximum of 51.3 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
3. Design stress of  $0.78 F'_c$  calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
4. Design stress of  $0.78 F'_c$  at a maximum slenderness ratio ( $l_e/d$ ) of 33 calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-97 05.

**4.4.5 Fifth Assembly (Limited Load-bearing):**

**4.4.5.1 Interior Face:** One layer of  $5/8$ -inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36 or ASTM C 1396, must be applied horizontally or vertically to the interior face of 2-by-4 wood studs spaced a maximum of 24 inches (610 mm) on center. The wallboard must be fastened to the studs and perimeter framing using 0.100-inch-diameter (2.54 mm) steel cup head nails or No. 6 bugle head screws,  $1\frac{5}{8}$  inches long (41.3 mm), having minimum head diameters of 0.300 inch

(7.62 mm) and spaced a maximum of 8 inches (203 mm) on center. All wallboard joints must be taped and treated with joint compound in accordance with ASTM C 840 or GA 216. All vertical wallboard joints must be backed with minimum 2-by-4 wood framing, and taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Insulation batts, R-11 and measuring 3<sup>1</sup>/<sub>2</sub> inches (89 mm) thick, are placed in the cavities between the framing and fastened to the framing. The insulation may be either fiberglass insulation batts with a minimum density of 0.62 pcf (9.93 kg/m<sup>3</sup>) or kraft-paper-faced fiberglass insulation batts with a minimum density of 0.65 pcf (10.41 kg/m<sup>3</sup>).

**4.4.5.2 Exterior Face:** One layer of minimum 3<sup>1</sup>/<sub>8</sub>-inch-thick (9.5 mm) OSB, one layer of minimum 1<sup>3</sup>/<sub>32</sub>-inch-thick (10.3 mm) plywood, or one layer of minimum 1<sup>1</sup>/<sub>2</sub>-inch-thick, water-resistant core treated gypsum sheathing complying with ASTM C 79 or ASTM C 1396, must be applied vertically to the wall, and fastened to the wood studs, sill and plates using 2<sup>3</sup>/<sub>8</sub>-inch-long (60 mm) 0.113-inch-diameter (2.87 mm), 8d coated sinker nails having minimum head diameters of 0.266 inch (6.76 mm) and spaced a maximum of 8 inches (1219 mm) on center. The water-resistive barrier must be installed as required in Section 3.2.9.1. A layer of maximum 1-inch-thick (25.4 mm) EPS insulation board, or DOW Styrofoam Stuccomate brand XPS insulation boards recognized in [ESR-2142](#) and described in Section 3.2.3.2, must then be attached using galvanized staples or roofing nails. The insulation board must be followed by lath, as described in Section 3.2.4, fastened through the insulation boards to the studs and perimeter framing with 0.125-inch-diameter (3.18 mm) nails having minimum head diameters of 0.355 inch (9.02 mm), or No. 16-gage corrosion resistant staples having 1<sup>5</sup>/<sub>16</sub>-inch (23.8 mm) crowns. The fasteners must penetrate a minimum of 1 inch (25.4 mm) into wood framing, and are spaced a maximum of 6 inches (152 mm) on center. The Diamond Wall coating must then be applied to the lath in accordance with Section 4.1, at a minimum thickness of 3<sup>1</sup>/<sub>8</sub> inch (9.5 mm).

**4.4.5.3 Axial Design:** The allowable axial loading for this system is limited to the least of the following:

- 1,100 pounds (4893 N) per stud.
- A maximum of 51.3 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
- Design stress of 0.78  $F'_c$  calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.
- Design stress of 0.78  $F'_c$  at a maximum slenderness ratio ( $l_e/d$ ) of 33 calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS-05.

#### 4.5 Noncombustible Construction:

For the purposes of this report, noncombustible construction includes Types I, II, III and IV construction under the IBC.

**4.5.1 With Foam Plastic:** The stucco system with EPS foam plastic must be installed as noted in Sections 4.5.1.1 through 4.5.1.6.

**4.5.1.1 Interior Finish:** One layer of 5<sup>1</sup>/<sub>8</sub>-inch-thick (15.9 mm), Type X gypsum wallboard, complying with ASTM C 36 or ASTM C 1396, must be applied vertically to steel framing with all edges blocked. Fasteners are No. 8 by 1<sup>1</sup>/<sub>4</sub>-inch-long (32 mm) buglehead screws fastened to wallboard joints at 8 inches (203 mm) on center and to intermediate locations at 12 inches (305 mm) on center. All joints must be taped and treated with joint compound in accordance with ASTM C 840 or GA 216. Intermediate

fasteners must be treated with joint compound in accordance with ASTM C 840 or GA 216.

**4.5.1.2 Steel Framing:** The steel framing must be minimum 3<sup>5</sup>/<sub>8</sub>-inch-deep (92 mm), minimum No. 20 gage [0.0359 inch (0.91 mm)] steel studs, spaced a maximum of 16 inches (406 mm) on center.

**4.5.1.3 Openings:** Wall openings must be framed with minimum 0.125-inch-thick (3.2 mm) aluminum or steel framing.

**4.5.1.4 Exterior Finish:** One layer of minimum 1<sup>1</sup>/<sub>2</sub>-inch-thick (12.7 mm), water-resistant core-treated gypsum sheathing, complying with ASTM C 79 or ASTM C 1396, must be applied horizontally or vertically to the steel framing using No. 8 by 1<sup>1</sup>/<sub>4</sub>-inch-long (32 mm) buglehead screws spaced 8 inches (203 mm) on center at all framing locations.

**4.5.1.5 Stud Cavity:** Where studs continue past floor levels, stud cavities at each floor level must be blocked with Thermafiber insulation. The Thermafiber insulation ([ER-2331](#)) must be fitted into each stud cavity at the floor. The insulation has a minimum 4 pcf (64 kg/m<sup>3</sup>) density, must be 4 inches (102 mm) thick and must be approximately 6 to 8 inches (152 to 203 mm) wide. To fit within a stud cavity, it must be long enough to achieve a friction fit.

**4.5.1.6 Stucco System:** Where a water-resistive barrier is required, the stucco system must include one layer of a water-resistive barrier as described in Section 3.2.9.1, having a flame-spread index of 25 or less and a smoke-developed index of 450 or less. The water-resistive barrier must be installed over the sheathing in accordance with IBC Section 1404.2 EPS insulation board with a nominal 1.5 pcf (24 kg/m<sup>3</sup>) density must be installed at a 1-inch (25 mm) thickness horizontally in running bond to the sheathing. The lath, insulation board, and water-resistive barrier must be positively fastened to the steel framing using No. 8 by 2<sup>1</sup>/<sub>2</sub>-inch-long (63.5 mm), waferhead, self-drilling screws spaced 8 inches (203 mm) on center to all framing members. The Diamond Wall stucco system must be applied at a 3<sup>1</sup>/<sub>8</sub>-inch (9.5 mm) minimum thickness in accordance with Section 4.0.

**4.5.2 Without Foam Plastic:** The Diamond Wall stucco system must be applied over gypsum sheathing and steel studs in accordance with Section 4.3.3 without the foam plastic.

#### 4.6 Miscellaneous:

**4.6.1 Inspection Requirements:** Building department inspection is required of lath installation prior to application of the coating, as required by the applicable code. The Diamond Wall PM System requires special inspections, in accordance with IBC Section 1704, for field-batching and mixing of components. As an alternative, when approved by the code official, continuous field inspection of all batching and mixing operations, by an authorized inspector, trained and approved by Omega Products International, Inc., may be used. The authorized inspector must be independent of the plastering contractor. A declaration, such as that shown in Figure 4, must be completed and signed in duplicate, for presentation to the building owner and the code official with the plastering contractor's installation card.

**4.6.2 Control Joints:** Control joints must be installed as specified by the architect or designer.

**4.6.3 Curing:** Moist curing must be provided for a minimum 24 hours after coating applications. The length of time and most effective procedure for moist curing will depend on climatic and job conditions.

**4.6.4 Soffits:** The system may be applied to soffits, provided the coating is applied over metal lath complying with Section 3.2.4.2 in lieu of wire fabric lath. Metal lath fastening must comply with ASTM C 926 or C 1063 (IBC), or IRC Section R703.6.1, as applicable except the fastener length must be increased by the thickness of any substrate.

**4.6.5 Sills:** The system may be applied to sills at locations such as windows and other similar areas. Sills with depths of 6 inches (152 mm) or less may have the coating and lath applied to any substrate permitted in this report, provided the coating, lath, water-resistive barrier and substrate are installed in accordance with the appropriate sections of this report. Sills with depths exceeding 6 inches (152 mm) must have substrates of solid wood or plywood. The substrate must be fastened in accordance with IBC Table 2304.9.1, or IRC Table R602.3(1), as applicable and a double layer of a complying water-resistive barrier must be applied over the substrate. The coating, lath, and optional insulation board are applied in accordance with Section 4.2.

## 5.0 CONDITIONS OF USE

The Omega Diamond Wall and Diamond Wall PM Insulating Exterior Stucco Systems described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The materials and methods of installation must comply with this report and the manufacturer's published instructions. In the event of conflict between the manufacturer's published installation instructions and this report, this report governs.
- 5.2 Installation must be by contractors approved by Omega Products International, Inc.
- 5.3 The system is recognized for use in noncombustible construction when installation is in accordance with Section 4.5.
- 5.4 The system is recognized as a one-hour fire-resistance-rated assembly when installation complies with Section 4.4 of this report.
- 5.5 The interior of the building must be separated from the foam plastic insulation board with a thermal barrier complying with the applicable code, such as  $\frac{1}{2}$ -inch (12.7 mm) regular gypsum wallboard mechanically attached in accordance with the code.
- 5.6 A completed installation card, such as that shown in Figure 3, must be left at the jobsite for the owner, and a copy must be filed with the building department.
- 5.7 For the Diamond Wall PM System, inspections are required in accordance with Section 4.6.1. A declaration, such as that shown in Figure 4, must be left with the building owner, and a copy must be filed with the code official.
- 5.8 The allowable wind load on the systems are as follows:

**5.8.1** For wood studs having a minimum specific gravity of 0.50 (Douglas fir-larch) or steel studs at a maximum of 24 inches (610 mm) on center, allowable wind load is 35 psf (1676 Pa) positive or negative when installation is over open framing in

accordance with Section 4.2.1. For installations over wood structural panel sheathing using alternate fastener spacing and various wood species, see Tables 1 and 2.

**5.8.2** For wood studs having a minimum specific gravity of 0.42 (spruce-pine-fir) at a maximum spacing of 24 inches (610 mm) on center, allowable wind load is 29 psf (1388 Pa) positive or negative when installation is over open framing in accordance with Section 4.2.1.

Support framing must be adequate to resist the required wind load, with a maximum allowable deflection of  $\frac{1}{240}$  of the span.

- 5.9 Foam plastic insulation boards on exterior walls of wood construction must be located at least 6 inches (152 mm) from the ground in areas where hazard of termite damage is very heavy in accordance with IBC Section 2603.8, 2009 IRC Section R318.4, or 2006 IRC Section R320.5, as applicable.

## 6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Cementitious Exterior Wall Coatings (AC11), dated March 2010.
- 6.2 Data in accordance with ASTM E 119.
- 6.3 Data in accordance with NFPA 285.

## 7.0 IDENTIFICATION

- 7.1 The Diamond Wall stucco is delivered to the jobsite in labeled, 80-pound (36 kg), water-resistive bags bearing labels with the following information:
  - a. Name and address of manufacturer (Omega Products International, Inc.) and the evaluation report number (ESR-1194).
  - b. Identification of components.
  - c. Weight of packaged mix.
  - d. Storage instructions.
  - e. Maximum amount of water and other components that may be added, and conditions that must be considered in determining actual amounts added.
  - f. Curing instructions.
- 7.2 Foam plastic insulation boards must be identified in accordance with their respective ICC-ES evaluation reports. Additionally, the board density must be noted. When applied to walls required to be of noncombustible construction, along one edge of each board, and on both faces of one board in each package, the foam plastic must be labeled with the name "Omega Diamond Wall" and the evaluation report number (ESR-1194); and the information required by the insulation board's ICC-ES evaluation report.
- 7.3 Fome-Cor Board must be identified in accordance with evaluation report [ESR-1614](#).
- 7.4 DOW Styrofoam Stuccomate brand XPS insulation boards must be identified in accordance with [ESR-2142](#).

**TABLE 1—FASTENER SPACINGS FOR LATH ATTACHMENT TO WOOD STUDS WITH WOOD STRUCTURAL PANEL SHEATHING AND NOMINAL 1/2-INCH-THICK FOAM PLASTIC<sup>1,2</sup> (inches)**

WOOD SPECIES	SPECIFIC GRAVITY	STAPLE GAGE				
		16 <sup>3</sup>	15	14	13	12
Douglas fir—larch	0.50	6	6	6	6	6
Douglas fir—South	0.46	6	6	6	6	6
Western hemlock	0.47	6	6	6	6	6
Western hemlock—South	0.47	6	6	6	6	6
Hem-fir—South	0.46	6	6	6	6	6
Hem-fir	0.43	5	6	6	6	6
Spruce-pine-fir	0.42	4	5	6	6	6
Western woods	0.36	4	4	4	5	5

For **SI**: 1 inch = 25.4 mm.

<sup>1</sup>Wood structural panel sheathing must be fastened in accordance with the applicable code.

<sup>2</sup>For lath attachment, fasteners must have sufficient length to penetrate a minimum of 1 inch into the framing.

<sup>3</sup>As an alternate to the 16 gage staple, 11 gage roofing nails can be used at the tabulated spacing.

**TABLE 2—FASTENER SPACINGS FOR LATH ATTACHMENT TO WOOD STRUCTURAL PANEL SHEATHING AND WOOD STUDS WITH 1-INCH-THICK FOAM PLASTIC<sup>1,2</sup> (inches)**

WOOD SPECIES	SPECIFIC GRAVITY	STAPLE GAGE				
		16 <sup>3</sup>	15	14	13	12
Western hemlock	0.47	4	4	4	5	6
Western hemlock—South	0.47	4	4	5	6	6
Hem-fir—South	0.46	4	4	4	5	6
Hem-fir	0.43	4	4	4	5	6
Spruce-pine-fir	0.42	4	4	5	5	6
Western woods	0.36	3	3	3	3	4

For **SI**: 1 inch = 25.4 mm.

<sup>1</sup>Wood structural panel sheathing must be fastened in accordance with the applicable code, except that the intermediate stud fastener spacing must be 6 inches on center.

<sup>2</sup>For lath attachment, fasteners must have sufficient length to penetrate a minimum of 1 inch into sheathing and framing.

<sup>3</sup>As an alternate to the 16 gage staple, 11 gage roofing nails can be used at the tabulated spacing.

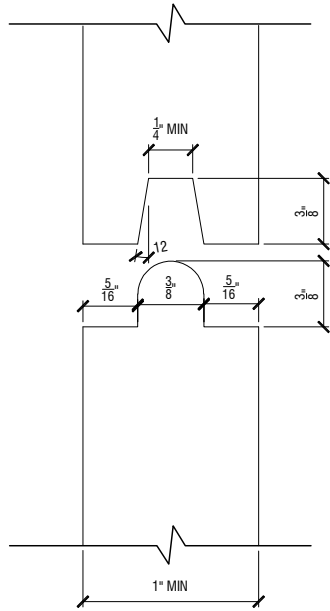
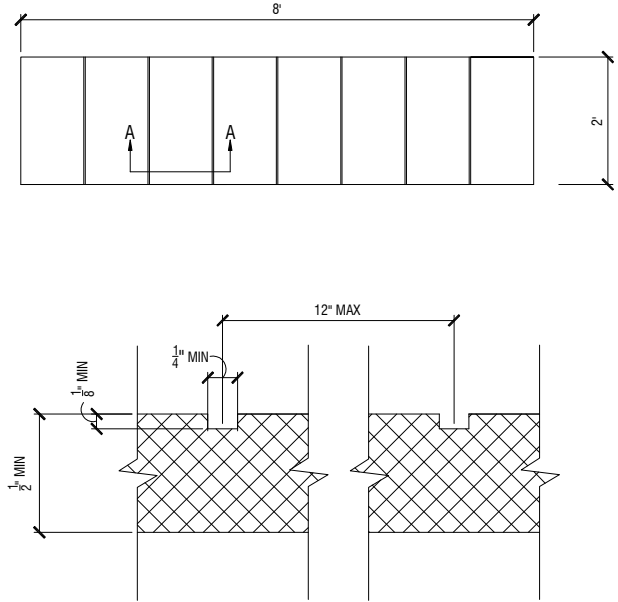


FIGURE 1A- TONGUE AND GROOVE FOAM BOARD



NOTE 1: GROOVE SPACING MAY BE DECREASED. GROOVE DEPTH AND WIDTH MAY BE INCREASED.

FIGURE 1B- GROOVED FOAM BOARD

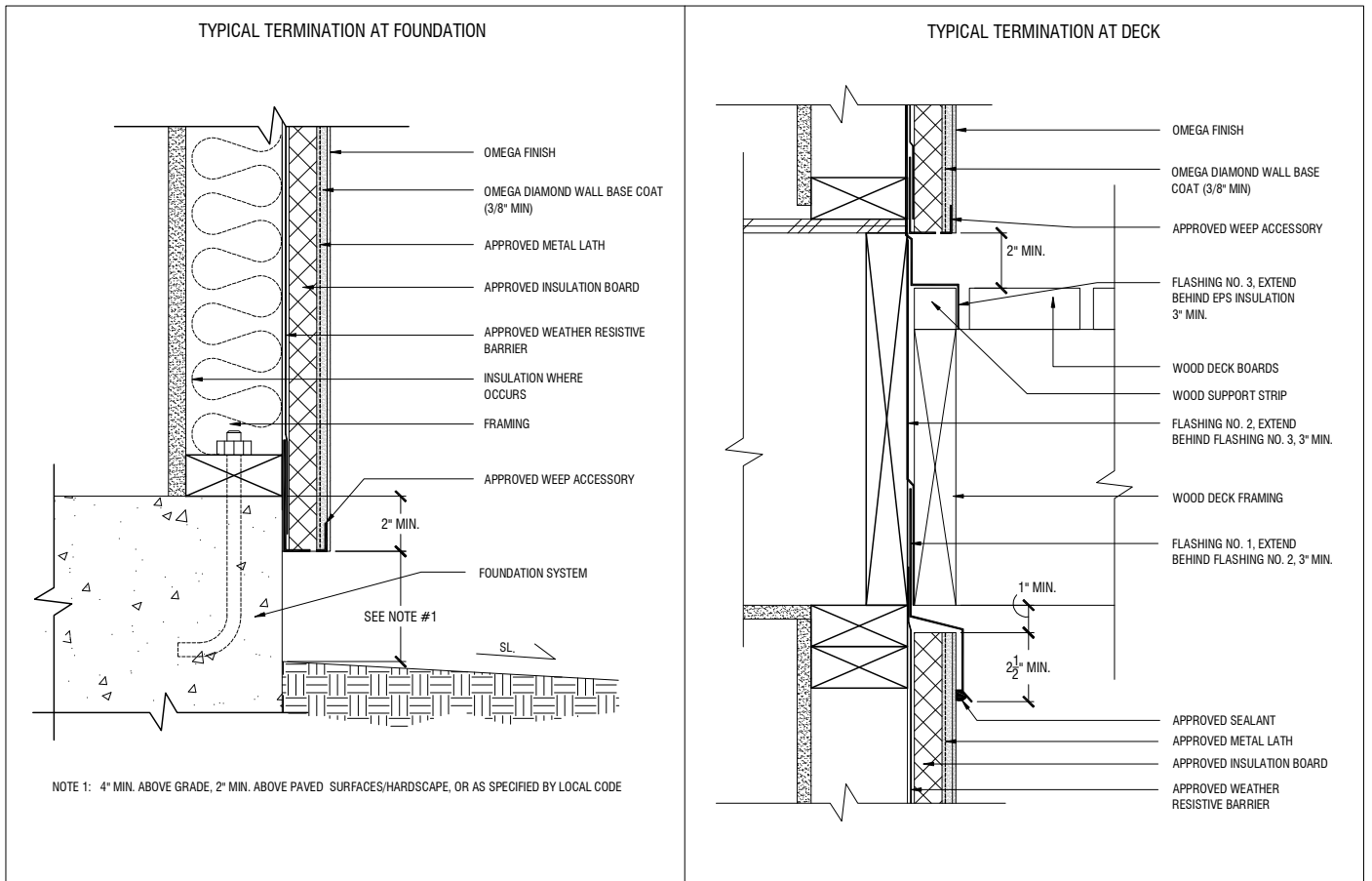


FIGURE 1—TONGUE AND GROOVE FOAM BOARD

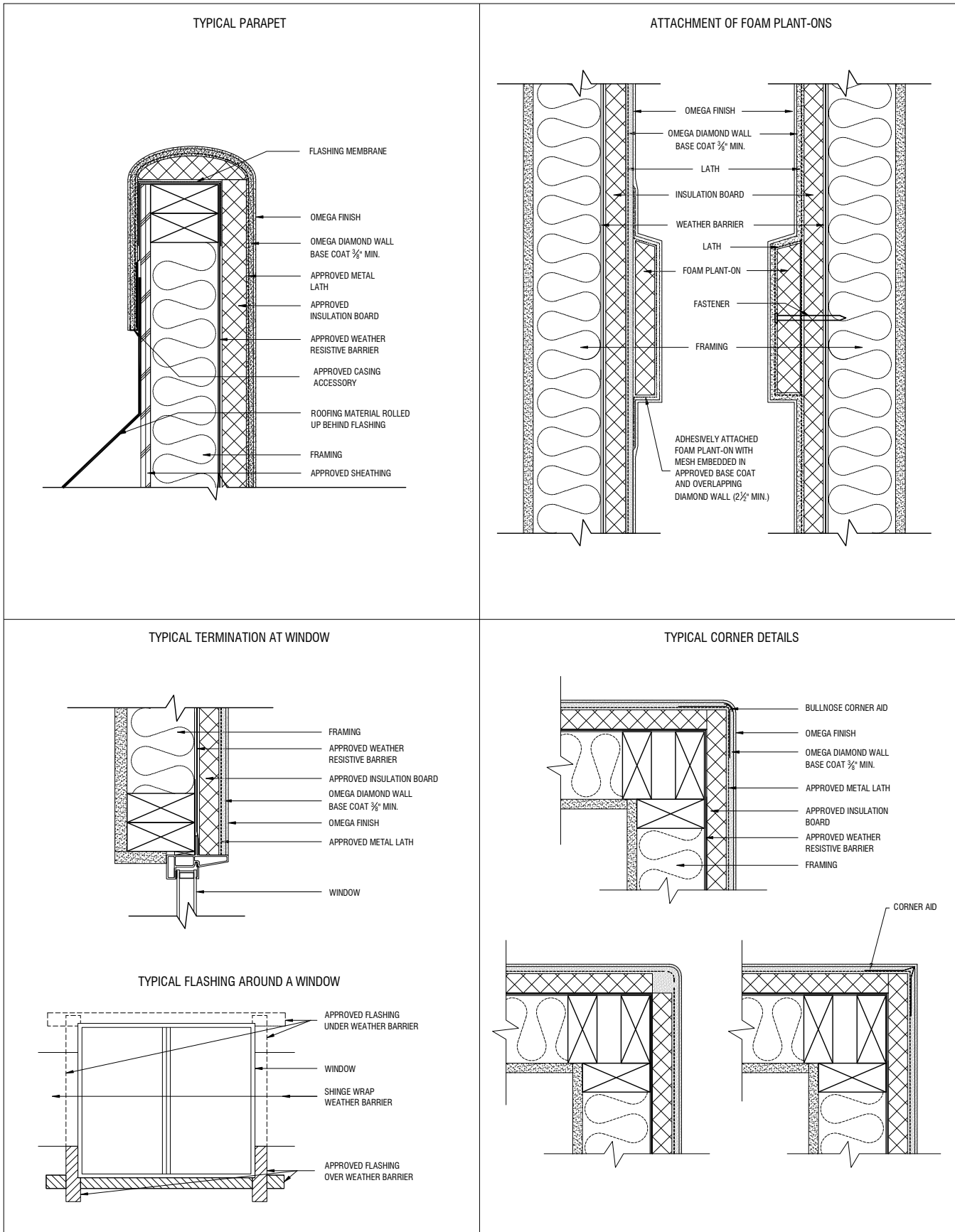


FIGURE 2—TYPICAL DETAILS

**INSTALLATION CARD  
Diamond Wall One Coat System  
Omega Products International, Inc.**

**Project Address**

ICC Evaluation Service, Inc.  
Report ESR-1194

\_\_\_\_\_  
\_\_\_\_\_

Date Completed: \_\_\_\_\_

**Plastering Contractor**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone No. (\_\_\_\_\_) \_\_\_\_\_

Approved contractor number as issued by Omega Products Intl'l, Inc. \_\_\_\_\_

This is to certify that the exterior coating system on the building exterior at the above address has been installed in accordance with the evaluation report and the manufacturer's instructions.

\_\_\_\_\_  
Signature of authorized representative of plastering contractor

\_\_\_\_\_  
Date

This installation card must be presented to the building inspector after completion of work and before final inspection.

**FIGURE 3**

**DECLARATION  
Diamond Wall PM  
Omega Products International, Inc.  
1681 California Drive  
Corona, CA 92881  
Phone: (909) 737-7447 Fax: (909) 737-8636**

**Project Address:**

**Date:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The field batching and mixing of all components of the exterior wall coating at the address noted above have been continuously inspected. The field batching and mixing have been found to comply with current evaluation report ESR-1194 and approved plans.

Authorized Inspector's Signature: \_\_\_\_\_  
Authorized Inspector's Name (print): \_\_\_\_\_  
Employer's Name: \_\_\_\_\_  
Employer's Address: \_\_\_\_\_

Telephone Number: (\_\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_\_) \_\_\_\_\_

\*This is to certify that the above noted inspector, approved by Omega Products International, Inc., was authorized to inspect the project so noted and was trained to properly discharge his duties.

Omega Officer Signature: \_\_\_\_\_

Signer's Name (print:) \_\_\_\_\_

Date: \_\_\_\_\_

\*Signature required only if inspector is not an employee of Omega Products International, Inc.

**FIGURE 4**