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Standard Practice for Application of Class PB Exterior Insulation and Finish Systems[1]

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1. Scope

1.1 This practice covers the minimum requirements and procedures for field or prefabricated application of Class PB Exterior Insulation and Finish Systems (EIFS). Class PB EIFS are defined as systems applied over various types of insulation board, in which the base coat ranges from not less than 1⁄16 in. (1.6 mm) to 1⁄4 in. (6.4 mm) in dry thickness, depending upon the number of nonmetallic reinforcing mesh layers encapsulated in the base coat. The base coat is then covered with a finish coat of various thickness in a variety of textures and colors.

1.2 The values stated in inch-pound units are to be regarded as the standard. The metric values given in parentheses are approximate and are provided for information purposes only.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 11 Standard Terminology Relating to Gypsum and Related Building Materials and Systems[2]

C 79/C 79M Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board[2]

C 1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster[2]

C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing[2]

C 1186 Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets[3]

3. Terminology

3.1 Definitions used in this standard shall be in accordance with Terminology C 11.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *accessories*, *n*—preformed metal, fiberglass or plastic members for use to form corners, edges, control joints, or decorative effects.

3.2.2 *aesthetic joint*, *n*—a deprecated term. See Aesthetic Reveal.

3.2.3 *aesthetic reveal*, *n*—a groove cut into the insulation board which serves the function of decoration and/or to provide a starting or stopping point for finish coat application.

3.2.4 *back wrapping*, *n*—a deprecated term. See Wrap.

3.2.5 *base coat*, *n*—the initial wet state material, either factory or field-mixed, used to encapsulate the nonmetallic reinforcing mesh or fasten the insulation board to the substrate.

3.2.6 *cold joint*, *n*—the visible junction in a finish coat.

3.2.7 *cure*, *v*—to develop the ultimate properties of a wet state material by a chemical process.

3.2.8 *dry*, *v*—to develop the ultimate properties of a wet state material solely by evaporation of volatile ingredients.

3.2.9 *durability*, *n*—the capability of a building, assembly, component, product, or construction to maintain serviceability over not less than a specified time.

3.2.10 *embed*, *v*—to encapsulate the nonmetallic reinforcing mesh in the base coat.

3.2.11 *expansion joint*, *n*—a structural separation between building elements that allows independent movement without damage to the assembly.

3.2.12 *exterior insulation and finish system*, *n*—(EIFS)—nonload bearing, exterior wall cladding system that consists of an insulation board attached either adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

3.2.13 *factory mix*, *v*—a material that is prepared at the point of manufacture and is ready to use without the addition of other materials, except possibly water to adjust consistency.

3.2.14 *flash set (quick set)*, *n*—the early hardening or stiffness in the working characteristics of a Portland-cement paste, mortar, or concrete, usually with the evolution of considerable heat. Stiffness cannot be dispelled nor the plasticity regained by further mixing without addition of water; also known as "quick set."

3.2.15 *field mix*, *n*—a material that is mixed in the field with other components and/or water.

3.2.16 *finish coat*, *n*—the final wet state material, which

[1] This practice is under the jurisdiction of ASTM Committee C-11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.05 on Application of Exterior Insulating and Finish Systems and Related Products.

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[2] *Annual Book of ASTM Standards*, Vol 04.01.

[3] *Annual Book of ASTM Standards*, Vol 04.05.

provides color and texture, applied over the reinforced base coat.

3.2.17 *framing member*, *n*—studs, joist, runners (tracks), bridging, bracing, and related accessories manufactured or supplied in wood or hot or cold formed steel.

3.2.18 *initial grab*, *n*—the ability of a wet state material to remain in place initially after it has been applied.

3.2.19 *initial set*, *n*—a time related set caused by the hydration process.

3.2.20 *lamina*, *n*—composite of base coat, reinforcement, and finish coat.

3.2.21 *mechanical fastener*, *n*—corrosion resistant component used to attach the insulation board to the substrate or framing member.

3.2.22 *nonmetallic reinforcing mesh*, *n*—a fiberglass component of the EIFS encapsulated in the base coat to strengthen the system.

NOTE 1—Nonmetallic reinforcing mesh is available in various weights to achieve different levels of impact resistance.

3.2.23 *pot life*, *n*—the duration of time that the wet state material remains workable after it has been mixed.

3.2.24 *primers*, *n*—liquid coatings applied to improve the adhesion of the EIFS to the substrate or of the finish to the base coat.

NOTE 2—Primers are sometimes applied to improve the water resistance of cementitious base coats.

3.2.25 *reinforced base coat*, *n*—base coat that has been reinforced with a nonmetallic reinforcing mesh.

3.2.26 *running bond*, *n*—pattern used when installing the thermal insulation board, to offset the vertical insulation board joints from joints in previous rows of insulation board.

3.2.27 *substrate*, *n*—surface to which the EIFS is applied.

3.2.28 *surface sealer*, *n*—material used to enhance weather resistance.

3.2.29 *temper*, *v*—to bring to a workable state by adding water.

3.2.30 *texture*, *n*—any surface appearance as contrasted to a smooth surface.

3.2.31 *thermal insulation board*, *n*—a system component of a specific type and density that functions to reduce heat flow through the wall and serves as the surface to receive the base coat.

3.2.32 *wet edge*, *n*—the leading edge of a continuously applied wet state material.

3.2.33 *wet state materials*, *n*—the adhesive, base coat and finish coat components applied in liquid or semi-liquid state.

3.2.34 *wrap*, *v*—to protect the exposed edges of thermal insulation board.

4. Significance and Use

4.1 This practice provides minimum requirements for the application of Class PB EIFS. The requirements for materials, mixtures, and details shall be contained in the project plans and specifications.

5. Delivery of Materials

5.1 All materials shall be delivered in packages, containers, or bundles with the identification and markings intact.

6. Inspection

6.1 Inspection of the materials shall be agreed upon between the purchaser and the supplier as part of the purchase agreement.

7. Rejection

7.1 Materials that are damaged, frozen or in any way defective shall not be used. Rejection of materials shall be promptly reported verbally to the producer and immediately reported in writing. The notice of rejection shall contain a statement documenting the basis for material rejection.

8. Certification

8.1 When specified in the contract documents, the producer shall furnish a report certifying that the materials are in conformance with product and material standards and contract documents.

8.2 The insulation boards shall have been subjected to a third party quality control inspection and shall be marked as approved for use within the EIFS and in accordance with applicable building code.

8.3 Prior to installation, the insulation board shall be inspected for conformance with contract documents. Nonconforming insulation board shall not be used.

8.4 The insulation board producer shall furnish, for each shipment, a written certificate of conformance with the EIFS producer's specifications.

9. Storage of Materials

9.1 All materials shall be kept dry by storage under cover and protected from the weather. When outside storage is required, materials shall be stacked off the ground, supported on a level platform and protected from the weather, surface contamination or physical damage in accordance with the EIFS producer's written instructions.

9.2 Materials shall be protected from exposure to direct sunlight and temperatures less than 40°F (4°C).

9.3 Portland Cement shall be kept dry until ready for use. It shall be kept off the ground, under cover and away from damp walls and surfaces.

9.4 Insulation board shall be stacked flat with care taken to avoid damage to edges, ends, or surfaces; or exposure to direct sunlight (ultraviolet radiation).

10. Environmental Conditions

10.1 *Cold Weather Conditions*:

10.1.1 Wet materials shall not be applied when the temperature is less than 40°F (4°C) unless temporary heat and enclosures are provided to maintain minimum 40°F (4°C) for a minimum period of not less than 24 h before, during, and after application (see Appendix X1.9.3).

10.1.2 Materials shall not be applied to a base containing frost. Substrate surface temperature shall be not less than 40°F (4°C). Mixtures for application shall not contain any frozen ingredients.

11. Assessment of Condition of Substrates to Receive Exterior Insulation and Finish Systems

11.1 The substrate shall be as required by the project plans

and specifications and as recommended by the EIFS producer for the particular system specified.

11.2 The substrate shall be inspected by the applicator and general contractor to ensure that it meets the project plans and specifications and the requirements of 11.3-11.8.

11.3 Sheathing materials shall be inspected to ensure that:

11.3.1 The specified sheathing thickness has been installed for the stud spacing used.

11.3.2 Fastener type and fastener spacing are as specified.

11.3.3 All Specification C 79/C 79M gypsum sheathing boards shall have a water-resistant core.

11.3.4 Tongue and groove water-resistant core gypsum sheathing boards conforming to Specification C 79/C 79M shall be installed with the tongue edge oriented to the top.

11.3.5 Gypsum sheathing is protected from moisture at all penetrations and terminations.

11.3.6 Glass mat gypsum sheathing complying with Specification C 1177 shall be installed in accordance with the sheet producer's written installation instructions, which include details of framing type and spacing, fastener type and spacing, and sheet orientation and spacing.

11.3.7 Plywood shall be not less than ½ in. (12.7 mm) nominal in thickness, exterior or exposure 1 wood-based panel sheathing. The plywood shall be installed with a ⅛ in. (3.2 mm) space between sheets.

11.3.8 Fiber-cement sheets complying with Specification C 1186, Type A, shall be installed in accordance with the sheet producer's written installation instructions, which include details of stud type and spacing, fastener type and spacing, and sheet spacing recommendations.

11.4 *Alignment*—All substrate surfaces shall be straight and true within ¼ in. in 10 ft (2 mm/m). More stringent requirements by the EIFS producer shall supersede the above stated requirements.

11.5 *Suitability for Use*—The substrate surface shall be firm, sound, and undamaged in order to receive the EIFS.

11.5.1 Loose, spalling or crumbling concrete or masonry shall be removed by sandblasting or other appropriate means. If the surface condition of the substrate is at all in doubt, an alternative attachment surface or method shall be provided.

11.5.2 Broken, cracked or delaminated substrate boards shall be replaced or restored to a condition equal to adjacent undamaged boards.

11.5.3 All rotted, decayed, or delaminated wood and plywood sheathing shall be replaced.

11.5.4 Paper-faced gypsum sheathing that has been installed and exposed to the elements for more than 30 days shall be checked at not less than two locations, or every 5000 ft^2 (465 m^2), whichever is greater, for integrity of the surface. The procedures for evaluating the gypsum sheathing are found in Appendix X2.

NOTE 3—Gypsum sheathing conforming to Specification C 79 is sometimes not recommended for adhesive attachment by the gypsum sheathing producer. Consult with the gypsum board producer before use.

11.6 *Cleaning*—The surface of all substrates shall be clean and free from any foreign materials such as form release agents, curing compounds, dust, dirt, frost, oil or grease, efflorescence and laitance.

11.6.1 All sheathing board substrates shall have all loose dirt and dust removed by cleaning methods appropriate for the job and job conditions.

11.6.2 Efflorescence and laitance on concrete, masonry, stucco or clay tile substrates shall be removed prior to EIFS application. Concrete masonry shall be cleaned by light sandblasting, pressure washing or brushing. Heavy deposits shall be removed through use of hand or power impact tools followed by washing with an appropriate cleaner. Light deposits shall be removed by washing with an appropriate cleaner. All loose particles and cleaner residue shall be removed by washing with clean, potable water. The surface shall be allowed to dry.

11.6.3 Existing paint on concrete or masonry surfaces shall be removed by sandblasting or grit blasting. If removal of existing paint is not practical, an alternate attachment surface or method shall be provided.

11.7 *Dryness*—No visible free water.

11.7.1 Newly constructed concrete or masonry surfaces shall be allowed to cure not less than 28 days prior to application of the EIFS. Repaired areas on existing (aged) walls shall meet the same 28-day curing time.

11.7.2 Sheathing must be dry prior to EIFS application.

11.8 *Metal Lath or Furring and Accessories*—If metal lath or furring and accessories are used, they shall be installed in conformance with Specification C 1063, except butt-lapped, or as otherwise noted. Metal lath shall be 3.4 lb/yd^2 (1.3 kg/m^2), self furring, galvanized.

11.8.1 These members shall be properly attached, straight, and true unless required by the system design.

11.8.2 All metal members shall be free of rust, oil, or other foreign matter or contaminants, which cause bond failure or unsightly discoloration.

12. Insulation Board Installation

12.1 Method of attachment shall be approved by the system producer and be in accordance with applicable building codes.

12.2 *Adhesive Attachment Method*—The adhesive shall be applied to the back of the insulation board by one to the following methods:

12.2.1 *Notched Trowel*:

12.2.1.1 When applied, and before the insulation board is placed, the height of the adhesive measured from the surface of the insulation board shall not be less than ¼in. (6.4 mm) for factory mixed adhesive and ⅜ in. (9.5 mm) for field mixed adhesives.

12.2.2 *Ribbon and Dab*:

12.2.2.1 The adhesive shall be applied to the entire perimeter of the insulation board in a ribbon fashion that is not less than 2 in. (51 mm) wide by not less than ⅜ in. (9.5 mm) thick. Dabs not less than 4 in. (102 mm) in diameter by not less than ⅜ in. (9.5 mm) thick shall be applied not more than 8 in. (204 mm) on center over the remainder of the board.

13. Adhesive and Mechanical Attachment Method

13.1 Adhesive shall be applied using the ribbon and dab method, the notched trowel method, or in accordance with system producer's current published instructions.

13.2 Mechanical fasteners shall be installed into the framing or nailable substrate.

13.3 Fasteners shall penetrate not less than 5⁄16 in. (8 mm) into steel framing members, 1 in. (25 mm) into wood framing members, and 1 in. (25 mm) into masonry substrates.

13.4 Mechanical fasteners shall be corrosion resistant. Fastener type and spacing shall be in accordance with system producer's current published instructions.

13.5 Selection and frequency of fasteners and fastener type will vary depending on substrate type, insulation board thickness and design wind load and whether used in combination with an adhesive attachment. Therefore fastener type, patterns, and use shall be in accordance with the EIFS producer's written instructions and shall be included in the project plans and specifications.

14. Mechanical Attachment Method

14.1 Mechanical fasteners shall be installed into the framing or nailable substrate.

14.2 Mechanical fasteners shall be corrosion resistant. Fastener type and spacing shall be in accordance with system producer's current published instructions.

NOTE 4—Specific consideration of building code wind-load requirements shall be given for mechanically fastened systems.

15. General Requirements

15.1 Insulation boards shall be placed from a level base line with vertical joints staggered in a running bond pattern and butted tightly.

15.2 Insulation board joints at all inside and outside corners shall be staggered and interlocked.

15.3 Insulation boards must abut without gaps, eliminating space for adhesive or base coat intrusion between the board edges and ends.

15.4 Window corners and similar reentrant corners shall be cut out of a single insulation board. Board joints shall not be aligned at corners with head, sill or jambs of windows, doors, similar openings, and aesthetic reveals.

15.5 *Adhesively Attached*:

15.5.1 The insulation board thickness shall be not less than ¾ in. (19.1 mm) and not more than allowed by building codes.

15.5.2 Insulation board joints shall be offset not less than 6 in. (150 mm) from horizontal sheathing board joints.

15.6 *Mechanically Fastened*:

15.6.1 The insulation board thickness shall be not less than 1 in. (25 mm) or not more than allowed by building codes.

15.6.2 Insulation board joints shall be offset from horizontal sheathing board joints. All vertical insulation board joints shall fall upon a framing member.

15.7 When attachment is by adhesive or adhesive and mechanical fasteners, each board shall be installed by sliding it into place until it abuts the adjoining board tightly. Pressure shall be applied over the entire surface of the board to achieve uniform contact and an overall level surface. The insulation board shall be occasionally checked for proper contact with the substrate by removing a piece of insulation board. Proper contact has been achieved when approximately equal portions of the adhesive remain on both the substrate and the insulation board when the board is removed from the wall. The insulation board shall remain undisturbed for no less than 24 h prior to proceeding with the installation of mechanical fasteners or the base coat. Cool, damp weather conditions extend minimum curing or drying time.

15.8 When the boards are attached only with mechanical fasteners, they shall be affixed to a nailable substrate or structural members with the proper fasteners, ensuring that all boards abut tightly. Fastening patterns shall be in accordance with the EIFS producer's recommendation. When installed, the portion of the fastener left flush with the face of the insulation board shall not fracture the insulation board.

16. Aesthetic Reveals

16.1 Aesthetic reveals shall be cut into the insulation board prior to applying the reinforcing mesh.

16.2 The insulation board thickness in the bottom of a reveal shall be not less than ¾ in. (19.1 mm).

16.3 Aesthetic reveals shall be cut true and straight.

16.4 Horizontal aesthetic reveal configuration shall provide for outward positive drainage.

16.5 Aesthetic reveals shall not occur at the abutment of two pieces of insulation board.

17. Reinforced Base Coat Application

17.1 Inspect the insulation board surface to ensure that it is clean, dry, free of all foreign materials, and damage of any type. Insulation board planar irregularities of more than 1⁄16 in. (1.6 mm) shall be corrected. All board joints shall be tightly abutted or shall be filled with an insulating material. The entire wall area shall be sanded or rasped to minimize any irregularities.

17.2 *Base Coat Preparation*—All materials requiring field preparation shall be mixed in accordance with the EIFS producer's specifications.

17.3 *Base Coat Application*—The prepared base coat shall be uniformly spread over the entire surface of the insulation board.

17.4 *Nonmetallic Reinforcing Mesh*—The single layer reinforcing mesh shall be fully encapsulated in the field of the wall, at corners, edges, and joints. Trowel from the center to the edge of the reinforcing mesh to avoid wrinkles. The single layer reinforcing mesh shall be continuous at all corners.

17.4.1 The surface shall be free of voids, projections, trowel marks and other surface irregularities. The base coat thickness shall be not less than 1⁄16 in. (1.6 mm) dry as measured from the surface of the insulation board.

NOTE 5—The recommended method is to apply the base coat in two applications.

17.5 *Reinforcing Mesh Overlap*—All reinforcing mesh edges shall be overlapped not less than 2½ in. (64 mm).

17.6 *Impact Layers*—When required, higher impact performance shall be achieved with multiple layers of reinforcing mesh or by incorporating heavier weight reinforcing mesh. All areas requiring higher impact performance shall be detailed on the project plans and specifications. When overlapping of high impact mesh is not required, a complete second layer of reinforcing mesh shall be applied over the layer of high impact mesh.

17.7 *Corners*—Reinforcing mesh shall not be lapped within 8 in. (204 mm) of any corner.