



Designation: C1535 – 05 (Reapproved 2023)

Standard Practice for Application of Exterior Insulation and Finish Systems Class PI¹

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1. Scope

1.1 This practice covers the minimum requirements and procedures for field or prefabricated application of Class PI Exterior Insulation and Finish Systems (EIFS). Class PI EIFS are systems applied over polyisocyanurate insulation board, in which the base coat ranges from not less than $\frac{1}{16}$ in. (1.6 mm) to $\frac{1}{4}$ 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. The insulation board shall be applied over a substrate or over open framing.

1.2 This practice does not cover Class PI EIFS with drainage. Consult the EIFS producer for information.

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

1.4 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes shall not be considered as requirements of the standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This practice is under the jurisdiction of ASTM Committee C11 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. Referenced Documents

2.1 *ASTM Standards:*²

C11 Terminology Relating to Gypsum and Related Building Materials and Systems

C79/C79M Specification for Gypsum Sheathing Board (Withdrawn 2004)³

C150 Specification for Portland Cement

C1063 Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster

C1177/C1177M Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C1186 Specification for Flat Fiber-Cement Sheets

C1278/C1278M Specification for Fiber-Reinforced Gypsum Panel

C1280 Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing

C1289 Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

C1325 Specification for Fiber-Mat Reinforced Cementitious Backer Units

C1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints

C1472 Guide for Calculating Movement and Other Effects When Establishing Sealant Joint Width

C1481 Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS)

E1825 Guide for Evaluation of Building Exterior Enclosure Materials, Products, and Systems

E2110 Terminology for Exterior Insulation and Finish Systems (EIFS)

3. Terminology

3.1 Definitions used in this standard shall be in accordance with Terminologies **C11** and **E2110**.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

4. Significance and Use

4.1 This practice provides minimum requirements for the application of Class PI EIFS. The requirements for materials, mixtures, and details shall be contained in the project plans and specifications. See Guide **E1825** for guidance.

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 and be a part of the purchase agreement.

6.2 Inspection shall include the determination that the materials supplied are as required for the Class PI EIF System specified. Mixing of materials from different manufacturers is not allowed.

7. Rejection

7.1 Materials that are damaged, frozen or 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 *Insulation Boards:*

8.2.1 Insulation boards shall be in compliance with Specification **C1289**, Type II, Class 2.

8.2.2 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.

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

8.2.4 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) unless otherwise specified by the manufacturer.

9.3 Portland Cement shall meet Specification **C150** and 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 otherwise specified by the manufacturer or unless temporary heat and enclosures are provided to maintain minimum 40°F (4°C) for a minimum period of not less than 24 hours before, during and after application. (See **X1.8.3**)

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.

11.1.1 Polyisocyanurate boards for use over open framing in conformance with the EIFS producer's specification shall not be less than 1.0 in. (25.4 mm) in thickness.

11.1.2 Polyisocyanurate boards for use over a substrate in conformance with the EIFS producer's specification shall not be less than 5/8 in. (15.9 mm) in thickness.

NOTE 1—Polyisocyanurate board thickness shall conform to building code requirements.

11.2 The substrate shall be inspected by the applicator and general contractor to assure 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 the following:

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 **C79/C79M** gypsum sheathing boards have a water-resistant treated core.

11.3.4 Tongue and groove water-resistant core gypsum sheathing boards conforming to Specification **C79/C79M** are installed with the tongue edge oriented to the top.

11.3.5 Gypsum sheathing shall be installed with the face paper exposed in accordance with Specification **C1280**.

11.3.6 Gypsum sheathing shall be protected from moisture at all penetrations and terminations.

11.3.7 Glass mat gypsum sheathing complying with Specification **C1177/C1177M** shall be installed in accordance with the sheathing producer's written installation instructions, which include details of framing type and spacing, fastener type and spacing, and sheathing orientation and spacing.

11.3.8 Plywood shall be not less than 1/2 in. (12.7 mm) nominal in thickness, exterior or exposure 1 panel sheathing. The plywood shall be installed with a 1/8 in. (3.2 mm) space between sheets at edges and ends.

11.3.9 Fiber-Cement sheets complying with Specification **C1186**, 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.

11.3.10 Water-resistant exterior fiber-reinforced gypsum sheathing complying with Specification **C1278/C1278M** shall be installed in accordance with the sheathing producer's written installation instructions, which include details of framing type and spacing, fastener type and spacing, and sheathing orientation and spacing.

11.3.11 Fiber-mat reinforced cement sheets complying with Specification **C1325**, type A, 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.

11.3.12 Sheathing shall be continuous.

11.4 *Alignment*—All substrate surfaces shall be straight and true within $\frac{1}{4}$ 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 shall be firm, sound, and undamaged in order to receive the EIFS.

11.6 *Cleanliness*—The surface of all substrates shall be clean and free from any foreign materials such as paint, form release agents, curing compounds, dust, dirt, frost, oil or grease, efflorescence and laitance that would affect the EIFS application.

11.7 *Dryness*:

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 Substrate surfaces shall be free of visible water.

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 **C1063**, except lath edges and ends shall be butted and not lapped. Metal lath shall be 3.4 lb/yd² (1.3 kg/m²) self-furring, galvanized.

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

11.8.2 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 code.

12.2 *Mechanical Attachment Method*:

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

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

NOTE 2—Specific consideration of building code wind load requirements shall be given for mechanically fastened systems.

12.3 Placement of a weather resistive barrier, if specified, shall be as required by the system producer.

13. General Requirements

13.1 Insulation boards shall be placed from a level base line with vertical joints staggered in a running bond pattern and butted tightly. Over open framing, joints shall occur over framing or horizontal blocking.

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

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

13.4 Fenestration opening corners and other wall penetrations 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.

13.5 *Mechanically Fastened*:

13.5.1 Insulation board joints shall be offset from sheathing board joints.

13.5.2 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 pattern shall be in accordance with the EIFS producer's recommendation and local building code requirements. When installed, the washer shall be left flush with the face of the insulation board and shall not fracture the face or core of insulation board.

14. Aesthetic Reveals

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

14.2 The insulation board thickness at the bottom of a reveal shall be not less than $\frac{3}{4}$ in. (19.0 mm). Over open framing, aesthetic reveals shall occur over framing or blocking.

14.3 Aesthetic reveals shall be cut true and straight.

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

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

14.6 The reveal shall be reinforced with base coat and reinforcing mesh prior to application of the full base coat and reinforcing mesh.

15. Reinforced Base Coat Application

15.1 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 $\frac{1}{16}$ in. (1.6 mm) shall be corrected. All board joints shall be tightly abutted or shall be filled with an insulating material.

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

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

15.4 *Non Metallic 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.

15.4.1 The surface shall be free of voids, projections, trowel marks and other surface irregularities. The base coat thickness shall be not less than $\frac{1}{16}$ in. (1.6 mm) dry as measured from the surface of the insulation board. The base coat shall be applied in two applications unless otherwise recommended by the EIFS's producer.

NOTE 3—The recommended method is to apply the base coat in two applications.

15.5 *Reinforcing Mesh Overlap*—All reinforcing mesh edges shall be overlapped not less than 2 $\frac{1}{2}$ in. (64 mm).

15.6 *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.

15.7 *Corners*—Reinforcing mesh shall not be lapped within 8 in. (200 mm) of any corner.

15.8 *Wall Penetrations*—All edges of the insulation board at penetrations of the EIFS, such as at windows, doors, HVAC sleeves, pipes, ducts, electrical boxes, and at the base of the wall shall be wrapped with either the base coat and reinforcing mesh or trim, or as specified by the project plans and specifications. Wall openings such as doors, windows, HVAC sleeves, shall be diagonally reinforced at corners with mesh not less than 9 in. (230 mm) by 12 in. (305 mm).

15.8.1 The corners of returns to windows, doors, and similar wall openings shall have reinforcing mesh the full width of the return and extending not less than 2 $\frac{1}{2}$ in. (64 mm) on both sides of the corner.

15.9 *Expansion Joints*—All edges of the insulation board at expansion joints shall be wrapped with either the base coat and reinforcing mesh or trim as specified by the EIFS producer for the particular EIFS. The reinforcing mesh shall be fully encapsulated.

15.10 *Aesthetic Reveal*—The reinforcing mesh shall be continuous and care shall be taken to ensure that the reinforcing mesh is fully encapsulated into the reveal and that the reinforcing mesh shall not be cut during application of the base coat.

15.11 *Reinforced Base Coat*—The reinforcing mesh shall be fully encapsulated in the base coat throughout the field of the wall, at corners, edges, and joints. The surface shall be free of voids, projections, trowel marks and other surface irregularities.

15.12 *Special Insulation Shapes*—When special insulation shapes are installed over EIFS, nonmetallic reinforcing mesh encapsulated in the base coat shall be used to cover the shape.

16. Finish Coat Application

16.1 The reinforced base coat shall be allowed to dry and harden for not less than 24 h prior to finish coat application unless specifically allowed by the EIFS producer.

16.2 *Material Preparation*—The finish coat shall be mixed in accordance with the EIFS producer's specifications. Only clean potable water shall be added to adjust workability. Always add the same amount of water to each container within a given lot of finish.

16.3 *Execution*—Finish shall be applied with a stainless steel trowel or appropriate equipment as specified by the EIFS producer. Tools and equipment shall be kept clean at all times. Finish shall be applied continuously to a natural break such as corners, joints or tape line. Apply finish to the base coat maintaining a wet edge. Sufficient manpower and scaffolding shall be provided to continuously finish a distinct wall area. Scaffolding shall be spaced a distance from the wall, consistent with safety standards, that will allow uniform texturing of the finish without staging marks. On hot windy days, misting is permitted with clean, potable water to cool the wall. Work shall precede the sun whenever possible. Water shall not be added to the finish once it is applied to the wall. Use the same tool and hand motion and match the texture of the surrounding area. The finish coat thickness shall be as specified by the EIFS producer. Protect all finish work from damage until fully dried.

16.4 *Sealant Joints*—The application of finish into the sealant joint is not allowed.

17. Curing Time Between Application Steps

17.1 Manufacturer's recommendations for climatic conditions, mixing and application practices to allow respective coats sufficient time to cure or dry before any subsequent coats are applied shall be followed. Each application step shall be cured or dried to prevent degradation to the system integrity with subsequent steps.

17.2 Auxiliary protection (tenting, supplemental heat, shading) from adverse environmental conditions shall be utilized to provide curing and drying conditions as recommended by the producer (see X1.8).

17.3 All substrates shall be sound and cured or dry before continuing on to the next application step.

18. Clean Up

18.1 Adjacent materials, surfaces and the work area shall be cleaned of foreign materials resulting from the work.

18.2 All excess EIFS materials shall be removed from the job site.

19. Keywords

19.1 Class PI; EIFS; exterior insulation and finish system