



Standard Practice for Application of Class PB Exterior Insulation and Finish Systems¹

This standard is issued under the fixed designation C 1397; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

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 Systems²
- C 79/C 79M Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board²
- C 1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster²
- C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing²
- C 1186 Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets³

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

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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 ft² (465 m²), 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/yd² (1.3 kg/m²), 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 ¼ in. (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 $\frac{5}{16}$ 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 $\frac{3}{4}$ 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 $\frac{3}{4}$ 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 $\frac{1}{16}$ in. (1.6 mm) shall be corrected. All board joints shall be tightly abutted or shall be filled with an insulating material. 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 $\frac{1}{16}$ 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 $2\frac{1}{2}$ 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.

17.8 Wall Penetrations—All edges of the insulation board at penetrations of the EIFS, such as at windows, doors, HVAC, 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, and HVAC shall be diagonally reinforced at corners with mesh not less than 9 in. (230 mm) by 12 in. (305 mm).

17.8.1 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 2½ in. (64 mm) on both sides of the corner.

17.9 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.

17.10 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.

17.11 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.

17.12 Special Insulation Shapes—When special insulation shapes are installed over EIFS, fiberglass reinforcing mesh encapsulated in the base coat shall be used.

18. Finish Coat Application

18.1 The reinforced base coat shall be allowed to dry and harden for not less than 24 h prior to finish coat application.

18.2 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.

18.3 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, the wall shall be permitted to be fogged 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.

18.4 Joints—The application of finish into the joints shall be as required by the project plans and specifications.

19. Curing Time Between Application Steps

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

19.2 Auxiliary protection (tenting, supplemental heat, shading) from adverse environmental conditions shall be utilized to minimize deviations from standard, expected cure or dry times. (See Appendix X1.9.3.)

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

20. Cleanup

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

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

21. Keywords

21.1 class PB; EIFS; exterior insulation and finish system

APPENDICES

(Nonmandatory Information)

These Appendixes give general information and also suggestions for inclusions to be made elsewhere by the specifier. They are not part of this practice.

X1. GENERAL INFORMATION

X1.1 General:

X1.1.1 The work includes all labor, materials, services, equipment and scaffolding required to complete the EIFS installation on the project in accordance with the project drawings and specifications, except electrical power and potable water.

X1.1.2 Where a specific fire resistance rating is required for the EIFS assemblies and construction, details of construction shall be in accordance with official reports of tests conducted by recognized testing laboratories and a part of approved plans and specifications.

X1.1.3 The installation of the EIFS is to be coordinated by

the owner's authorized agent with work of other trades.

X1.1.4 Surfaces and accessories to receive EIFS components shall be examined and accepted as provided in 11.2 before the EIFS components are installed thereto. The proper authorities shall be notified about unacceptable conditions. The unsatisfactory conditions shall be corrected prior to the application of the EIFS components. Unsatisfactory conditions shall be corrected by the party or parties responsible for such conditions.

X1.1.5 The construction specifier shall describe, in the proper section of the project specifications, the physical characteristics of the surfaces to receive the EIFS.

X1.2 *Design Considerations:*

X1.2.1 EIFS are attached to outside surfaces of all types of structures to provide weather resistant, energy efficient, and durable claddings. The claddings will be subjected to various exposures such as abrasion, vibration, moisture, freezing, thawing, negative and positive wind loading, ultraviolet light, acid rain, thermally induced expansion and contraction, and impact.

X1.2.2 Provide sufficient slope on faces of EIFS surfaces to prevent water, snow or ice from accumulating or standing. A minimum 6 in. (152 mm) in 12 in. (305 mm) (1:2) pitch is recommended. Length of sloped surfaces shall not be more than 12 in. (305 mm).

X1.2.3 Provide parapet cap made only from corrosion resistant materials. The parapet cap shall extend not less than 2½ in. (64 mm) over the faces of the EIFS, not including wood blocking and shall include a drip edge detail. Detailed requirements for furnishing and installing the parapet cap shall be in the appropriate section of the project specifications. Parapet caps shall be clearly shown in large scale details. Parapet caps shall be installed as soon as practical after the installation of the EIFS.

X1.2.4 Provide for sealing of expansion joints, panel joints, system terminations and all interfaces of the EIFS with other building components.

X1.2.5 At soffits, window and door heads provide for a drip edge.

X1.2.6 Windows installed in EIFS walls shall have metal sill flashing.

X1.2.7 The specifier shall evaluate the potential of the EIFS surface being subjected to abnormal stresses or impacts.

X1.2.8 Wall assemblies have properties that in certain applications make a dew point analysis critical to ensure successful performance of the wall system. The specifier shall evaluate these conditions.

X1.2.9 Sheathing must be continuous over floor slabs, intersecting walls, columns, beams and similar constructions. The EIFS shall not be installed over areas without sheathing.

X1.2.10 Where the sheathing is interrupted or out of plane, corrections must be made prior to EIFS application. If the sheathing cannot be continuous, the installation of expansion joints shall be considered.

X1.3 *Relief from Stress:*

X1.3.1 Where the EIFS and dissimilar types of substrates, materials and building components interface, provide for

appropriate size and location of expansion joints.

X1.3.2 Where roof elevations change, provide for appropriate size and location of expansion joints.

X1.4 *Bonding Agents:*

X1.4.1 Bonding compounds or agents are sometimes applied to a substrate surface to receive base coat adhesive. Follow the EIFS producer's instructions and specifications for their use.

X1.5 *Adhesives:*

X1.5.1 The types of adhesives and the methods of installation used will vary depending on the substrate to which the insulation boards will be attached. Therefore, the adhesive type and application method used shall be in accordance with the EIFS producer's written instructions and applicable building code requirements.

X1.6 *Mechanical Fasteners:*

X1.6.1 The types of mechanical fasteners used and the methods of installation will vary depending on the substrate to which the insulation boards are to be fastened.

X1.6.2 Fastener washers shall be installed flush with the insulation board surface.

X1.7 *Reinforced Base Coats:*

X1.7.1 Base coat thickness is permitted to exceed ¼ in. (1.6 mm) dry depending on the type of base coat used and the impact resistance specified.

X1.7.2 A small amount of base coat shrinkage is normal. Due to color variations, it shall not be unusual to see a very slight telegraphing of the reinforcing mesh pattern after the base coat cures. Bare mesh shall not be visible.

X1.7.3 The producers instructions shall be followed to ensure that the base coat cement is properly proportioned. The proper portioning of cement based material is important. Excess cement may cause the base coat to become hard and stiff as the cement hydrates over time.

X1.7.4 The minimum amount of mix water to form a workable mix shall be used. Excess mix water will cause the base coat to be porous and less weather resistant. Never add more water than recommended by the producer. Measure water in containers of known volume.

X1.7.5 Mix materials only at low speed with paddles designed to reduce air entrapment.

X1.7.6 Generally the second base coat layer is applied as soon as the first layer has dried firmly enough. Depending upon material composition and weather conditions, this sometimes occurs within the first 4 to 8 h after the completion of the application of the initial base coat, or, in some cases, it will require waiting until the following day.

X1.7.7 Trowel aesthetic reveals and corners with a trowel shaped to fit the profiles.

X1.8 *Finish Textures:*

X1.8.1 Textures, as a description of surface appearance, generally are identified with the method and tools used to achieve the finish appearance. Texture is sometimes varied by the size and shape of the aggregate contained in the finish,

equipment or tools employed, the consistency of the finish mix, the condition of the base to which it is applied and by decorative and protective treatments.

X1.8.2 With almost limitless variations possible for finish appearance or texture, the same term sometimes does not have the same meaning to the specifier, contractor or applicator. Sample panels of sufficient size including components and features specified shall be constructed using the methods, tools and techniques to be used in the actual construction. It is recommended that in the case of prefabrication, two panels be constructed. One panel remains at the jobsite. One panel remains at the fabrication site. The samples shall be approved by the architect and owner in writing.

X1.8.3 To provide some guidance, the following categories are generally understood and recognized to imply a particular method of application or finished appearance.

X1.8.3.1 *Sand Finish*—A finish material devoid of coarse aggregate applied in a thin coat completely covering the base coat and floated to a true plane, yielding a relatively fine-textured finish.

X1.8.3.2 *Trowel Texture*—A freshly applied finish is given various textures, designs or stippled effects by hand motion and trowel used. The effects achieved are individualized and it is sometimes difficult for different applicators to duplicate.

X1.8.3.3 *Standard Finish*—A finish with various size aggregates, applied in a thin coat completely covering the base coat and floated in a random pattern. The applicators are cautioned to use the same type texturing tools to help ensure a consistent texture.

X1.8.3.4 *Exposed Aggregate*—Varying sizes of natural or manufactured stone, gravel, shell or ceramic aggregates are embedded by hand or by machine propulsion into a freshly applied "bed coat". The size of the aggregate shall not be more than ½ in. (12.7 mm) in diameter. The size of the aggregate determines the thickness of the bedding coat. The bedding coat shall be no less than one-half the thickness of the aggregate to be embedded.

X1.8.3.5 *Spray Texture*—A machine applied finish material. The texture achieved depends on many factors some of which

are the consistency of the sprayed mixture, the angle and distance of the spray nozzle to the surface, the pressure of the machine, orifice size used, operator expertise, climatic conditions (wind specifically), and base coat conditions.

X1.8.3.6 *Miscellaneous Types*—Similar to trowel textures except that the freshly applied finish is textured with instruments other than a trowel, such as swept with a broom or brush, or corrugated by raking or combing. A variation of texturing a finish involves waiting until the applied finish has partially dried and then lightly troweling the unevenly applied finish. The effects achieved are sometimes difficult for different applicators to duplicate.

X1.9 Conditions for EIFS Application:

X1.9.1 The amount of water used to mix materials is to be within the allowable range published by the EIFS producer. Factors such as the drying conditions and finishing operations must be considered in determining water usage. The applicator is cautioned that the use of excessive water results in fall off or slide off, excessive shrinkage, higher porosity, lower strength, and inconsistent color.

X1.9.2 Timing between coats will vary with climatic conditions and types of materials used. Temperature and relative humidity extend or reduce the curing and drying time. Cold or wet weather lengthens, and hot or dry weather shortens the drying period. Moderate changes in temperature and relative humidity are overcome by providing additional heating during cold weather and by pre-wetting the base during hot, dry weather.

X1.9.3 Heated enclosures require adequate air circulation to prevent hot or cold spots that allow too rapid drying or freezing. When using heated enclosures it is important to control the relative humidity as well as the temperature. Maintain relative humidity at not more than 90 %.

X1.9.4 Staining and discoloration of finishes or other building components that are caused by free water draining from one plane to another, dissimilar materials, or other building components, are minimized by providing sufficient depth and angle for drip caps and drip edges.

X2. EVALUATION OF GYPSUM SHEATHING FOR SURFACE ACCEPTABILITY

X2.1 The following procedure is valid only if, at the time of the test, the gypsum sheathing has not been wetted or exposed to high humidity in the previous 24 h.

X2.2 Using a sharp knife or razor blade, cut a 3-in. (76-mm) long diagonal in the middle of the gypsum sheathing. The cut must be sufficient to cut through the paper face and just into the underlying gypsum. Make a 3-in. (76-mm) cut at a right angle to the first, forming an "X".

X2.3 Using the sharp edge of the cutting tool, peel the paper face (in one quadrant) back approximately ¼ in. (6 mm) from the intersection of the two lines.

X2.4 Firmly holding this peeled edge between the thumb and forefinger, lift the paper face and continue removing the facing material.

X2.5 If the paper splits cohesively so that part is still adhering to the underlying gypsum, the gypsum sheathing has not been overly exposed to the weather or moisture. If the paper lifts and directly exposes the gypsum, the gypsum sheathing has been exposed to the weather beyond the required limit and shall be replaced.

X3. SEALANT SYSTEMS

X3.1 The size and location of joints and selection of the sealant to be used is the responsibility of the design professional and shall be consistent with project conditions and guidelines of the EIFS producer.

X3.2 The sealant system must be tested for compatibility with the specified EIFS by an independent laboratory and found to be compatible with the EIFS.

X3.3 The sealant system is recommended by the EIFS and sealant producer. Non-recommended sealant systems must be jointly approved by the architect and the sealant producer.

X3.4 Base the joint design and surface preparation on the sealant producer's recommendations and project conditions.

X3.5 Allow the EIFS material to cure prior to sealant system installation.

RELATED DOCUMENTS

The following are ASTM Standards

Specification C 150 for Portland Cement, Vol 04.01
 Specification C 514 for Nails for the Application of Gypsum Wall Board, Vol 04.01
 Specification C 522 for Cellular Glass Thermal Insulation, Vol 04.06
 Specification C 578 for Preformed, Cellular Polystyrene Thermal Insulation, Vol 04.06
 Specification C 612 for Mineral Fiber Block and Board Thermal Insulation, Vol 04.06
 Specification C 630 for Water-Resistant Gypsum Backing Board, Vol 04.01
 Specification C 645 for Nonstructural Steel Framing Members, Vol 04.01
 Specification C 754 for Installation of Steel Framing Members to Receive Screw-Attached Gypsum, Vol 04.01
 Specification C 847 for Metal Lath, Vol 04.01

Specification C 920 for Elastomeric Joint Sealants, Vol 04.07
 Specification C 932 for Surface-Applied Bonding Agents for Exterior Plastering, Vol 04.01
 Specification C 954 for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness, Vol 04.01
 Specification C 955 for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases, Vol 04.01
 Specification C 1002 for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases, Vol 04.01
 Specification C 1007 for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories, Vol 04.01

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