Designation: C1516 – 05 (Reapproved 2017)

Standard Practice for Application of Direct-Applied Exterior Finish Systems[1]

This standard is issued under the fixed designation C1516; 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 application of Direct-applied Exterior Finish Systems (DEFS). Direct-applied exterior finish systems are coating systems applied over various substrates with non-metallic reinforcing mesh, in which the base coat ranges from not less than 1⁄16 in. (1.6 mm) to 3⁄32 in. (2.4 mm) in dry thickness, depending on the mass of the reinforcing mesh. This base coat is subsequently covered with a finish coat that is available 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.*

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C11 Terminology Relating to Gypsum and Related Building Materials and Systems

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

C1325 Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

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

3. Terminology

3.1 Definitions used in this standard shall be in accordance with Terminology C11.

3.2 *Definitions of Terms Specific to This Standard:*

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

3.2.2 *back wrapping, n*—a deprecated term. See *wrap*.

3.2.3 *base coat, n*—a material, either factory or field-mixed, used to cover the substrate and to encapsulate the reinforcing mesh.

3.2.4 *cold joint, n*—the visible junction in an exterior finish.

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

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

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

3.2.8 *embed, v*—to encapsulate a non-metallic reinforcing mesh in either the joint compound or exterior finish.

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

3.2.10 *factory mixed, n*—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.

3.2.11 *field mix, n*—a material that is mixed in the field with other components, water, or both.

[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] 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.

***A Summary of Changes section appears at the end of this standard**

3.2.12 *finish coat, n*—the final wet state material, that provides color or additional texture, applied over the reinforced base coat.

3.2.13 *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."

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

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

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

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

3.2.18 *mechanical fastener, n*—corrosion resistant component used to attach the substrate to the framing member.

3.2.19 *reinforcing mesh, n*—a non-metallic component of the DEFS encapsulated in the base coat to strengthen the system.

3.2.19.1 *Discussion*—Non-metallic reinforcing mesh is available in various weights to achieve different levels of impact and stress resistance.

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

3.2.21 *primers, n*—liquid coatings applied to improve the adhesion of the DEFS to the substrate.

3.2.21.1 *Discussion*—Primers are sometimes applied to improve the water resistance of cementitious base coats.

3.2.22 *reinforced base coat, n*—base coat that has been reinforced with a non-metallic reinforcing mesh.

3.2.23 *substrate, n*—surface to which the DEFS is applied.

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

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

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

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

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

4. Significance and Use

4.1 This practice provides minimum requirements for the application of Direct-applied Exterior Finish Systems. 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 exterior finish producer shall furnish a report certifying that the materials are in conformance with product and material standards and contract documents.

8.2 The substrate panels shall be marked as complying with the applicable product specification.

9. Storage of Materials

9.1 All materials shall be kept dry by storage under cover and protected from the weather.

9.1.1 When outside storage is required, substrate panels shall be stacked flat with care taken to avoid damage to edges, ends, or surfaces.

9.1.2 All other DEFS components shall be stacked off the ground, supported on a level platform and protected from the direct sunlight, weather, surface contamination or physical damage in accordance with the DEFS producer's written instructions.

9.2 Materials shall be protected from exposure to temperatures less than 40°F (4°C), unless otherwise specified by the manufacturer.

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.

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 a minimum temperature of 40°F (4°C) for a minimum period of not less than 24 h before, during and after application or unless otherwise specified by the manufacturer.

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) unless otherwise specified by the manufacturer. Mixtures for application shall not contain any frozen ingredients.

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

11.1 The substrate shall be as required by the project plans and specifications and as specified by the DEFS producer for the particular system.

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 – 11.8.2.

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 Water-resistant exterior fiber-reinforced gypsum sheathing panels complying with Specification C1278/C1278M, 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.

11.3.4 Glass mat gypsum sheathing complying with Specification C1177/C1177M, 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.

11.3.5 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 framing type and spacing, fastener type and spacing, and sheet orientation and spacing.

11.3.6 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.

11.4 *Alignment*—All substrate surfaces shall be straight and true within ¼ in. in 10 ft. (2 mm/m). More stringent requirements by the DEFS 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 exterior finish.

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

11.6 *Cleanliness*—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 substrate panels 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 substrate panels shall be removed prior to exterior finish application. Heavy deposits shall be removed using 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.

11.7 *Substrate Condition*—There shall be no visible water.

11.8 If furring or accessories are used, they shall be installed in conformance with Specification C1063.

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

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

12. Reinforced Base Coat Application

12.1 Inspect the substrate panel surface to ensure that it is clean, dry, free of all foreign materials, and damage of any type. Substrate panel planar irregularities of more than 1/16 in. (1.6 mm) shall be corrected. All panel joints shall be tightly abutted or shall be filled with recommended joint bedding material.

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

12.3 *Base Coat Application*—The prepared base coat shall be uniformly spread over the entire surface of the substrate panel.

12.4 *Reinforcing Mesh*—The single layer reinforcing mesh, when specified, 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.

NOTE 1—The recommended method is to apply the base coat in two applications.

12.4.1 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 substrate panel.

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

12.6 *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.

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

12.8 *Wall Penetrations*—All edges of the substrate panel board at penetrations of the DEFS, such as at windows, doors, Heating, Ventilation and Air Conditioning (HVAC) sleeves, pipes, duct, 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).