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Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS)[1]

This standard is issued under the fixed designation C1481; 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 guide describes the use of single and multi-component, cold-applied joint sealants, or precured sealant systems for joint sealing applications, or both, in buildings using Exterior Insulation and Finish Systems (EIFS) on one or both sides of the joint. Refer to 10.1 for joint seal geometries.

1.2 The elastomeric sealants described by this guide meet the requirements of Specifications C834, C920, or C1311.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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.*

1.5 There are no ISO standards similar or equivalent to this ASTM standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C717 Terminology of Building Seals and Sealants

C719 Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

C794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

C834 Specification for Latex Sealants

C920 Specification for Elastomeric Joint Sealants

C1193 Guide for Use of Joint Sealants

C1311 Specification for Solvent Release Sealants

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

C1397 Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage

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

E2110 Terminology for Exterior Insulation and Finish Systems (EIFS)

E2511 Guide for Detailing of EIFS-Clad Barrier and Drainage Wall Assemblies

E2568 Specification for PB Exterior Insulation and Finish Systems

2.2 *ANSI Standard:*

American National Standard for Exterior Insulation and Finish Systems (EIFS)[3]

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology C717 for definitions of the following terms used in this guide: *bicellular sealant backing, bond breaker, bridge sealant joint, butt sealant joint, chemically curing sealant, closed cell sealant backing, compatibility, compatible materials, cure, elastomeric, elongation, fillet sealant joint, joint, lap sealant joint, latex sealant, modulus, non-sag sealant, open cell sealant backing, precured sealant, primer, seal, sealant, sealant backing, shelf-life, solvent-release sealant, shrinkage, substrate, tooling, tooling time, working life (pot life).*

3.1.2 Refer to Terminology E2110 for definitions of the following terms used in this guide: *accessories, base coat, cure, dry, durability, edge wrap, embed, expansion joint, exterior insulation and finish system (EIFS), finish coat, lamina, nonmetallic reinforcing mesh, primers, reinforced base coat, substrate, texture, thermal insulation board, wrap.*

4. Significance and Use

4.1 The intent of this guide is to provide information and guidelines for consideration by the designer or applicator of

[1] This guide is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.10 on Specifications, Guides and Practices.

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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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

joint seals in, or adjacent to, EIFS. Refer to Specification E2568 for additional information pertaining to specifying Class PB EIFS. Refer to Guide E2511 for additional information pertaining to detailing of EIFS-Clad Wall Assemblies.

4.2 Proper selection and use of a sealant is fundamental to its ultimate performance, service life, and durability. A sealant joint subjected to movement and other similar performance factors should be designed for the particular application to avoid compromising its performance capability and causing failures. Refer to C1193 for guidance.

4.3 In addition to the design and installation data in this guide, consult the sealant manufacturer about applications for its products and their proper use and installation.

5. General

5.1 The major components of a joint seal in, or adjacent to, EIFS that should be considered when selecting or using sealants are as follows: EIFS, primer, sealant backing or bond-breaker, adjacent substrates and sealant (see Figs. 1-11).

NOTE 1—This legend applies to Figs. 1-11

Legend	
A.	Sealant
B.	Sealant Backing
C.	Bond Breaker
D.	Joint Width
E.	Finish Coat
F.	Reinforcing Mesh Embedded in Base Coat
G.	Wrapped Mesh Embedded in Base Coat
H.	Insulation Board
I.	Adjacent Substrate
J.	Sealant Bead
K.	Manufacturer's Primer or Paint Coating (if required)
L.	Trim Accessory
M.	Precured Sealant
N.	Existing Sealant Joint with Optional Cut Down the Middle

5.2 EIFS presents a substrate that may be acceptable for sealant adhesion if the sealant joint is properly designed in accordance with the EIFS and sealant manufacturer recommendations. Most EIFS manufacturers recommend adhering sealant directly to the base coat or primed base coat and avoiding adhesion to the finish coat, which can soften on exposure to moisture and lose cohesion as the sealant extends and exerts a stress on the finish coat. Typically, a sealant that has a low modulus should be used. A low modulus sealant will have a lower stress at the sealant and substrate interface when the joint is in extension.

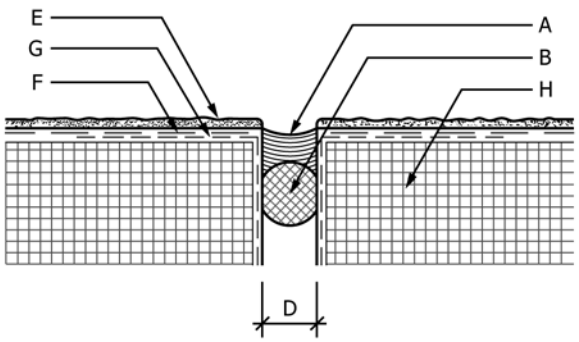

FIG. 1 Sealant Butt Joint Seal (EIFS to EIFS)

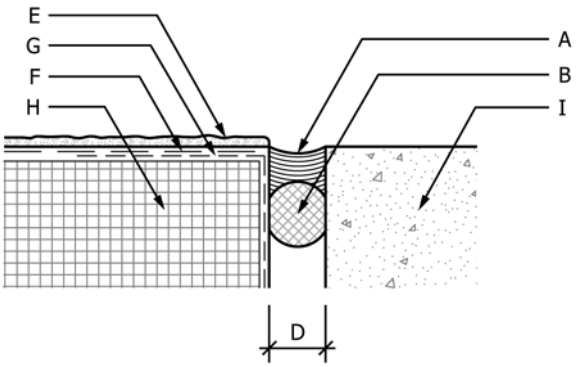

FIG. 2 Sealant Butt Joint Seal (EIFS to Dissimilar Substrates)

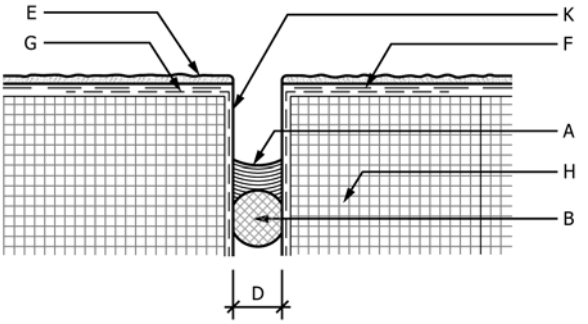

FIG. 3 Recessed Sealant Butt Joint Seal (EIFS to EIFS)

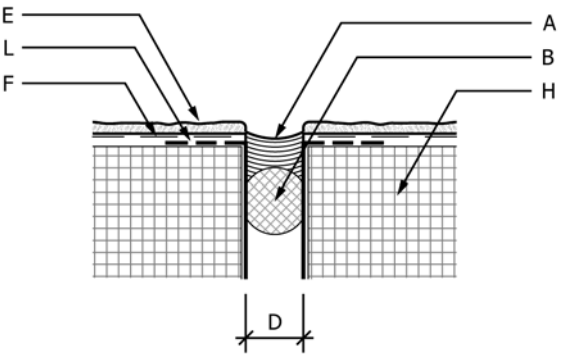

FIG. 4 Sealant Butt Joint Seal (Accessory to Accessory)

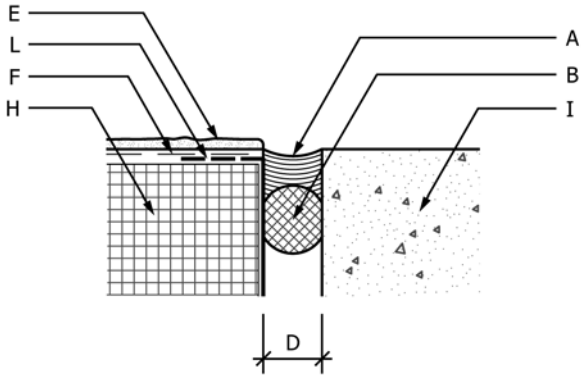

FIG. 5 Sealant Butt Joint Seal (Accessory to Dissimilar Substrate)

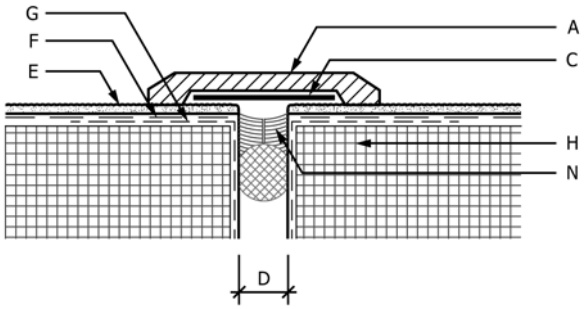

FIG. 6 Sealant Bridge Joint Seal Using Liquid—Applied Sealant and Bond Breaker

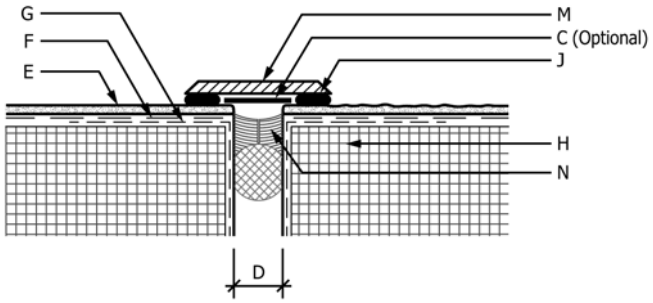

FIG. 7 Sealant Bridge Joint Seal Using Precured Sealant

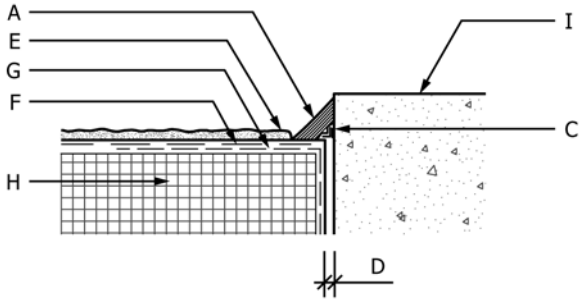

FIG. 8 Sealant Fillet Joint Seal With Bond Breaker

NOTE 1—References[4,5,6] provide information pertaining to the evaluation of various sealants with EIFS, factors affecting durability of sealants in contact with the finish coating of EIFS, and thermal movement analysis for panelized PB EIFS Claddings.

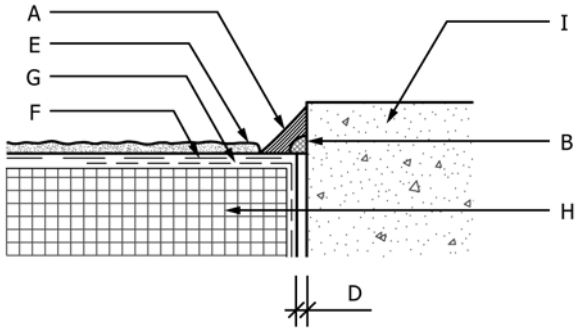

FIG. 9 Sealant Fillet Joint Seal With Triangular Sealant Backing

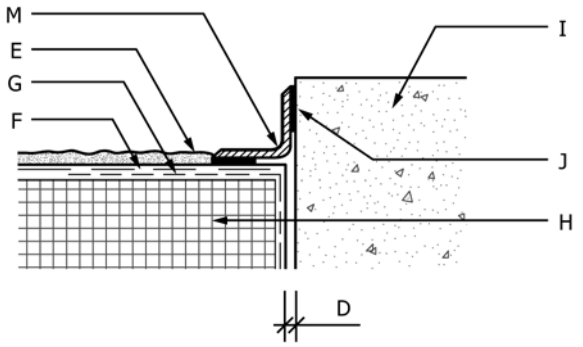

FIG. 10 Sealant Fillet Joint Seal Using Precured Sealant

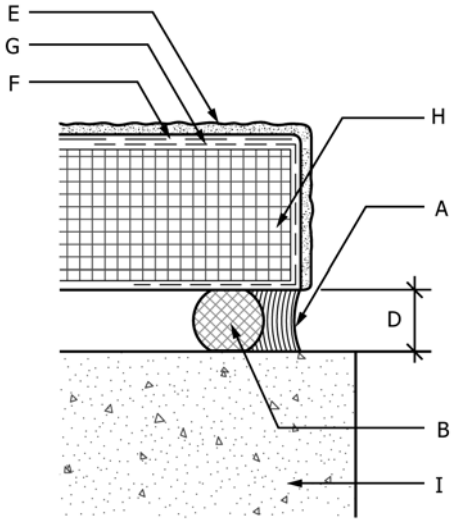

FIG. 11 Sealant Lap Joint Seal

[4] Yarosh, K. F., "Evaluation of Various Sealants with EIFS," *Science and Technology of Building Seals, Sealants, Glazing, and Waterproofing - Seventh Volume, ASTM STP 1334*, J. M. Klosowski, Ed., ASTM International, 1998, pp. 169-178.

[5] Kenney, R. J., and Piper, R. S., "Factors Affecting the Durability of Sealants in Contact with the Finish Coating of EIF Systems," *Science and Technology of Building Seals, Sealants, Glazing, and Waterproofing, ASTM STP 1168*, C. J. Parise, Ed., ASTM International, 1992, pp. 117–127.

[6] Williams, M. F., and Williams, B. L., "Thermal Movement Analyses for Panelized Polymer-Based Exterior Insulation and Finish System (PB EIFS) Claddings," *Science and Technology of Building Seals, Sealants, Glazing, and Waterproofing, ASTM STP 1168*, C. J. Parise, Ed., ASTM International, 1992, pp. 128-138.

5.3 Due to the difficulty that can be encountered in performing remedial work for an EIFS sealant joint, the selected sealant should have very good environmental weathering characteristics so that it will last for the maximum useful lifetime of the sealant. Since an EIFS system is water-based, if it becomes saturated with rainwater or snow melt, the adhesion of a sealant to an EIFS base coat can be lessened. Information on sealant tensile adhesion properties when used with EIFS can be found in Test Method C1382. EIFS can be damaged by grinding or cutting during sealant removal, so it is a good candidate for use of a bridge type sealant joint or precured sealant, in a remedial application. This may be helpful since it does not require the removal of all the old or failed sealant but does change the appearance of the joint seal.

6. EIFS

6.1 *Joint Location and Configuration*—In an EIFS-clad building, sealant joints typically are required at the following locations:

6.1.1 At the floor line of multi-level wood frame construction;

6.1.2 At an existing building expansion joint;

6.1.3 Where dissimilar substrates form the joint;

6.1.4 When an EIFS abuts dissimilar building construction;

6.1.5 Some EIFS manufacturers may require movement joints in long continuous elevations;

6.1.6 The size and location of joints is the responsibility of the design professional and shall be consistent with the project conditions and guidelines of the EIFS manufacturer.

6.1.7 *Joint Configuration*—The EIFS Industry accepted minimum joint width for EIFS applications is 19 mm with sufficient depth to accommodate the sealant backing and sealant material. Some EIFS manufacturers may permit joint widths that are less than 19 mm. Consider the sealant manufacturer's published sealant movement capability when determining the appropriate joint width. Refer to Guide C1472 for additional information on establishing the sealant joint size. Good architectural practice calls for joint designs that allow for construction tolerances and material variations.

6.2 *EIFS Installation*—The EIFS manufacturer's recommended installation procedures should be followed at all times.

6.2.1 Practice C1397 provides a minimum requirement for the application of Class PB EIFS.

6.2.2 Exposed edges of thermal insulation board which create the sides of the joint must be protected by wrapping the edge with base coat and reinforcing mesh, trim accessory, or other method specified by the EIFS manufacturer.

6.2.2.1 Encapsulation of the exposed edges of the thermal insulation board with nonmetallic reinforcing mesh in the base coat is referred to as wrapping. There shall be no exposed thermal insulation or mesh at joint locations or elsewhere.

6.2.2.2 EIFS manufacturers may require the use of an accessory to terminate a joint (see Figs. 4 and 5). Where an EIFS manufacturer's approved trim accessory is used as a termination and sealant substrate, wrapping may not be required.

6.2.3 The base coat portion of the lamina for the EIFS must be allowed sufficient time to cure or dry before the application of sealants. A minimum drying time of 24 h is required. Curing/drying time may be affected by environmental conditions as well as whether the EIFS base coat is cementitious or noncementitious. Consult EIFS manufacturer for recommendations for appropriate curing/drying time.

6.2.4 Some EIFS manufacturers require a primer or paint coating over the base coat within the joint. The primer, provided by the EIFS manufacturer, may be used to promote sealant adhesion, protect cementitious base coat from efflorescence and/or provide color uniformity.

6.2.5 The application of finish coat into the joint is generally not recommended by EIFS manufacturers. The test method described in Test Method C1382 allows evaluation of a specific sealant to a specific EIFS substrate.

6.2.6 Careful consideration should be given to the construction sequencing of the EIFS finish coat, EIFS primer or paint coating, and sealant application as well as the termination of the EIFS finish coat relative to the joint.

6.3 *EIFS Joint Preparation:*

6.3.1 Joints must be clean, dry, and free of frost or other surface contaminants.

6.3.2 Generally, joints shall be cleaned with a nonmetallic stiff bristle brush or oil-free compressed air. Solvents may be incompatible with the EIFS or underlying thermal insulation board. Consult the EIFS manufacturer to determine if a specific solvent is compatible with their EIFS.

6.3.3 Repair deteriorated or damaged substrates as recommended by the manufacturer to provide a suitable substrate for the sealant.

7. Sealant Primer

7.1 The general purpose of a sealant primer is to improve adhesion of a sealant to the EIFS substrate.

7.1.1 In accordance with Test Methods C794 and C1382, determine whether a sealant primer is required to a specific EIFS substrate or accessory.

7.1.2 Sealant primer shall not cause damage to the EIFS lamina and underlying thermal insulation board.

7.1.3 When selecting a sealant for joints between EIFS and a dissimilar substrate, two different primers may be required. This poses a difficult application problem and should be taken into consideration when selecting a sealant.

7.1.4 Apply sealant primer in accordance with the sealant manufacturer's recommendations and allow the sealant primer to cure or dry as recommended by the manufacturer before installing sealant backing and sealant.

8. Sealant Backing or Bond Breaker

8.1 Proper joint design requires the use of appropriate sealant backing to prevent three-sided adhesion, allow tooling of the sealant and control joint profile. Closed cell and bicellular sealant backings are generally accepted by EIFS manufacturers. Open cell sealant backing, such as open cell polyurethane, can absorb and retain water, which may cause a deleterious effect on the EIFS and are not recommended by EIFS manufacturers.

8.1.1 Where sealant backing cannot be installed, a bond breaker must be applied to prevent three sided adhesion.

9. Sealant

9.1 The sealant shall be selected based on the environmental conditions in which it will be used. Test Method C1382 evaluates the performance of sealants with EIFS in a variety of conditions. Results of this test provide information to the design professional as to which sealant may be the most appropriate for its end use.

9.1.1 Sealant types and classifications are discussed in Guide C1193.

9.1.2 Section 10.1.4 on Self-Leveling of Guide C1193 does not apply.

9.1.3 Section 10.10.5 on Tooling Liquids of Guide C1193 does not apply when sealants are used with EIFS.

9.2 The EIFS industry generally recommends the use of a low modulus sealant. Refer to the EIFS manufacturer for the recommended elongation and compression capability.

9.3 The 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 manufacturer. See Guide C1472 for guidance.

10. Joint Seal Geometry

10.1 Sealant joint seals may have any of four joint seal geometry types: butt joint, bridge joint, fillet joint, and lap joint. Good design practices require a minimum sealant contact depth of 6 mm or as per the recommendations of the sealant manufacturer for any joint seal geometry type. Consult the sealant manufacture for the minimum and maximum recommended sealant depth at the center of the joint. Fig. 12 indicates a typical butt type seal geometry in an EIFS joint.

NOTE 2—The outermost surface of the sealant may come in contact with the edge of the finish coat when the sealant is tooled after the application of the EIFS finish coat (Fig. 12). This slight overlap of the sealant onto the finish coat can affect the finished appearance and may result in a slight separation between the sealant and the EIFS finish coat if the finish coat becomes softened on exposure to moisture.

10.2 A butt joint is the most common type of sealant joint seal and may be used at EIFS to EIFS (Fig. 1) and joints where EIFS abuts dissimilar materials (Fig. 2). To allow for potential sealant joint restoration should the first sealant joint fail, consider installing the sealant recessed from the outboard surface of the EIFS cladding (Fig. 3). Test Method C1382 specifically evaluates performance of a sealant with EIFS in a similar joint seal geometry.

10.3 A sealant bridge joint seal is sometimes used to restore an existing sealant joint seal without removal of the existing sealant joint but also may be used in new construction. The sealant of a bridge joint seal may be in the form of a liquid-applied sealant (Fig. 6) or a precured sealant joint seal (Fig. 7). The old sealant may be cut down the middle before installing the bridge joint seal. A bond breaker material shall be installed prior to applying the wet sealant to prevent three-sided adhesion. A precured sealant joint seal typically uses a bead of compatible liquid-applied sealant as an adhesive on each side of the existing joint to form a watertight joint. A bond breaker may be useful in preventing the old sealant from being adhered to the new precured sealant by the liquid-applied sealant. A sealant bridge seal may be evaluated in accordance with a modified Test Method C1382 procedure to the EIFS substrate. If acceptable to the EIFS manufacturer, evaluation by a modified Test Method C1382 procedure can be used to assist the specifier in determining whether application of a sealant bridge joint seal can be applied directly to the EIFS finish coat.

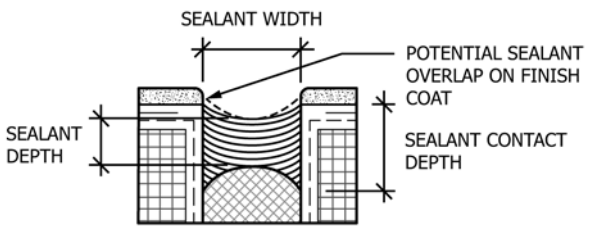

FIG. 12 Typical Butt Type Sealant Joint Cross-Section in EIFS

10.4 A sealant fillet joint is sometimes used to restore an existing sealant joint seal where EIFS abuts dissimilar materials that are approximately perpendicular to each other. A bond breaker material shall be installed prior to applying the wet sealant to prevent three sided adhesion. The bond breaker material may be in the form of a tape (Fig. 8). The bond breaker may also be in the form of a quarter-round or triangular shaped sealant backing material (Fig. 9). A precured sealant joint seal may also be used in this condition (Fig. 10). A modified procedure in Test Method C1382 may be used to evaluate this joint seal geometry.

10.5 A sealant lap joint (Fig. 11) is applied within the joint between approximately parallel substrates that are face to face. Test Method C1382 is not currently applicable to evaluate a sealant lap joint seal since joint movement is in shear as opposed to tension.

11. Test Methods

11.1 Test Method C1382 may be used to evaluate the tensile adhesion properties of sealants and EIFS. Test Methods C719 and C794, additionally, may be considered when qualifying a specific sealant/EIFS combination.

11.2 Test Method C719 identifies adhesion and cohesion of elastomeric joint sealants under cyclic movement. Use of this test method with foam plastic insulation may be difficult because of the limited compressive strength of the foam plastic material.

11.3 Test Method C794 identifies adhesion-in-peel of elastomeric joint sealants. This test method is useful to determine sealant adhesion and sealant primer requirements for a specific EIFS substrate. This test method is intended as a preliminary screen for Test Method C1382 and should not be considered as a stand alone method to qualify a sealant with EIFS. Test Method C794 does not evaluate the effect of sealant performance with the EIFS substrate after various environmental exposures.

11.4 Test Method C1382 determines the tensile adhesion properties of sealants when used in EIFS. This test method describes tensile adhesion properties of sealants to EIFS under dry, wet, frozen, heat-aged, and UV/condensation-aged conditions. This test method provides information to the design

professional on the performance of sealants with EIFS including sealant adhesion under dry and wet conditions; sealant modulus change with temperature; sealant property change after accelerated weathering (UV/condensation exposure); integrity of the EIFS substrate; and, effect of sealant modulus on EIFS substrate. When specifying sealants with EIFS, Test Method C1382 is the recommended test method to determine acceptable performance.

12. Keywords

12.1 exterior insulation and finish systems; EIFS; joint sealant; tensile adhesion