Designation: C1382 – 16

Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints[1]

This standard is issued under the fixed designation C1382; 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 test method describes a laboratory procedure for measuring tensile adhesion properties of sealants to exterior insulation and finish systems (EIFS) under dry, wet, frozen, heat-aged, and artificial weather-aged conditions.

1.2 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

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

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C717 Terminology of Building Seals and Sealants

C1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants

C1442 Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E2110 Terminology for Exterior Insulation and Finish Systems (EIFS)

G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials

G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology C717 for definitions of terms used in this test method, including but not limited to the following: adhesion failure, cohesive failure, primer, sealant, standard conditions, and substrate.

3.1.2 Refer to Terminology G113 for definitions of terms relating to natural and artificial weathering.

3.2 *Description of Terms Specific to This Standard*—refer to Terminology E2110 for definitions of the following terms used in this test method: base coat, EIFS, and finish coat.

4. Summary of Test Method

4.1 This test method is a modification of Test Method C1135. Preliminary testing using Test Method C794 may be helpful as a screen test to determine dry adhesion capabilities and priming requirements before proceeding with this test. This test is performed after the specimen assemblies are subjected to a variety of conditions that artificially accelerate the effect of weathering impact on the sealant-to-EIFS bond. The conditioning employed in this test does not necessarily address all field conditions.

5. Significance and Use

5.1 EIFS are barrier-type systems that must be weatherproofed to prevent the passage of moisture, air, dust, heat, and cold from entering a structure.

5.2 This test method is intended to determine the adhesion properties of the sealant with the EIFS substrate as determined by its tensile adhesive properties for dry, wet, frozen, heat-aged, and artificial weather-aged conditions.

[1] This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.30 on Adhesion.

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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.

6. Apparatus and Materials

6.1 *Tensile Testing Machine*—Capable of producing a tensile load on the specimen at the rate of 50± 5 mm (2.0 ± 0.20 in.)/min., and with a recording chart to show stress/strain values (tensile modulus).

6.1.1 *Fixed Member*—A fixed or essentially stationary member carrying one grip.

6.1.2 *Movable Member*—A movable member carrying a second grip.

6.1.3 *Grips*—The grips should be suitable to firmly grasp the test fixture that holds the test specimen and should be designed to eliminate eccentric specimen loading. Specimen loading should be perpendicular to the substrate/sealant interfaces. For alignment purposes, each grip shall have a swivel or universal joint at the end nearest to the specimen.

6.1.4 *Grip Fixture*—A fixture capable of being held by the grips and furnishing a tensile force to the sealant specimen.

6.2 *Spatulas*—For use in applying sealant.

6.3 *Caulking Gun*—For extruding sealant from cartridges, when applicable.

6.4 *Primer,* if applicable.

6.5 *Sealant.*

6.6 *Spacer*—One piece of spacer made from polytetrafluorethylene (PTFE) or a suitable rigid material shall be used to which the test sealant will not bond.

6.7 *Knife,* with sharp razor-type blade.

6.8 *Masking Tape.*

6.9 *EIFS substrates,* as identified in 10.1.5.

6.10 *Rigid substrate,* for applying EIFS coating in the peel adhesion test.

6.11 *Waterproof membrane,* such as molten paraffin.

6.12 *Freezer,* –18± 2°C (0 ± 3.6°F).

6.13 *Oven,* 70 ± 2°C (158 ± 3.6°F).

6.14 *Exposure Apparatus*—Choice of type of apparatus shall be by mutual agreement among the interested parties. Because of differences in test conditions, test results may differ with the type of apparatus used. Consult Practices G154 and G155 for differences in the spectral power distributions of the exposure sources and Practice C1442 for the differences in test parameters in the two types of apparatus specified.

6.14.1 *Fluorescent UV/Condensation Apparatus,* as described in Practice C1442, Section 7.3.

6.14.2 *Xenon Arc Light Apparatus,* as described in Practice C1442, Section 7.2.

7. Test Specimens

7.1 Two (2) EIFS samples are required for each test specimen assembly as shown in Fig. 1. The EIFS sample size shall be determined by the size of the test machine grips, yet they must be a minimum of 25 by 75 mm (1 by 3 in.). It may be necessary to cut the EIFS substrate into rectangles appropriately sized for the test. If cutting is required, the EIFS must be configured such that three of the four long ends of the EIFS substrate will be coated with EIFS base coat, primed base coat, or finish coat. The remaining long end and two short ends will be uncoated EPS board with cut edges of the EIFS coating visible. In all cases, the sealant should be applied to the EIFS base coat, primed base coat, or finish coat on a long side at the edge where a coated surface continues around the corner. The sealant should not be applied on the edge where coating stops and EPS board is exposed on the adjoining corner.

7.2 The EIF system being tested must be applied over minimum 25 mm (1 in.) insulation board with coating thickness consistent with the EIFS manufacturer's requirements and allowed to cure 28 days minimum at standard conditions. Select surface to be tested (for example, EIFS primer, base coat, finish coat, etc.).

NOTE 1—Five test specimen assemblies per condition should be prepared for each sealant and substrate system being tested for a total of 25 specimens per sealant/EIFS substrate combination. It may be beneficial to prepare up to five extra specimen assemblies in the event one or more samples is unusable.

7.3 Prior to assembling the test specimens, clean the surfaces to be sealed with a clean, dry, lint-free cloth or soft, nonmetallic bristle brush.

7.4 Prime surfaces (if applicable) to be sealed with appropriate primer as recommended by the sealant manufacturer. Do not allow primer to contact EPS insulation. Allow primer to dry as specified by sealant manufacturer.

7.5 Provide a 12 mm (~½ in.) spacer to form a sealant cavity centered on the test specimen measuring 12 by 12 by 50 mm (½ by ½ by 2 in.) between the test samples. (See Fig. 1.)

7.6 Sandwich the spacer between the two test samples and secure them together with clamps or mechanical devices.

7.7 Fill each set of five test specimen assemblies with the sealant being tested and immediately strike off any excess sealant.

7.8 Identify each of the five test specimens.

7.9 Cure specimens under one of the following cycles:

7.9.1 Cure at standard conditions for a minimum of 21 days.

7.9.2 Alternately, cure for a total of 21 days as follows: (a) 7 days at standard conditions above; (b) 7 days at 38 ± 2°C (100 ± 3.6 °F) and 95 % relative humidity; (c) 7 days at standard conditions.

7.9.3 The sealant manufacturer may request conditions other than those specified provided the temperature does not exceed 50°C (122°F).

8. Conditioning

8.1 Following completion of cure as outlined in 7.9, test samples under the following conditions:

8.1.1 *Dry/Room Temperature*—Test samples at standard conditions.

8.1.2 *Water Immersion:*

8.1.2.1 Prior to immersing samples, seal perimeter edges and the outer (nonsealant surface face) of each EIFS component of the test specimen with a waterproof membrane such as molten paraffin. Do not heat the paraffin above 65°C (150°F) in order to avoid damage to EPS insulation. The interior facing surfaces that create the 12-mm (½ in.) gap will not be waxed.

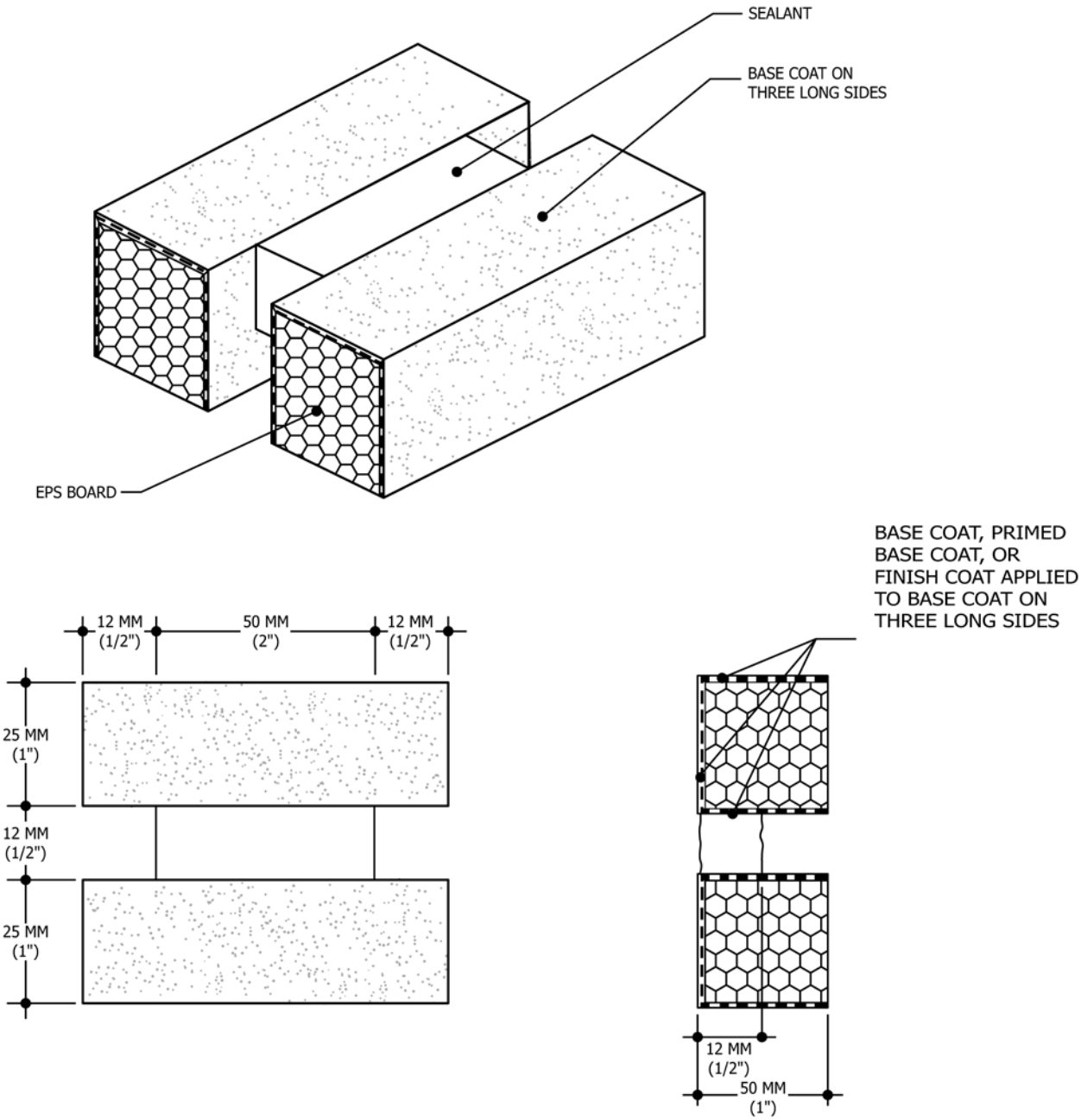

FIG. 1 Test Specimen Assembly

(See Fig. 2) Multiple dips or turns may be required to adequately cover the substrate.

8.1.2.2 Completely immerse 5 test specimen assemblies for 7 days. Weight or attach the samples so that they are completely covered to a depth of 50 mm (2 in.) with water. Test within 5 min of removal from water.

8.1.3 *Frozen*—Condition five test specimen assemblies in a –18 ± 2°C (0 ± 3.6°F) freezer for 24 h. Remove assemblies one at a time. Test each assembly within 5 min of removal from the freezer.

8.1.4 *Heat Conditioning*—Condition five test specimen assemblies in a 70 ± 2°C (158 ± 3.6°F) oven for 24 h. Remove assemblies one at a time. Test each assembly within 5 min of removal from the oven.

8.1.5 Condition five test specimen assemblies in the artificial weathering device with the sealant surface (top of joint) facing the exposure source and positioned in accordance with the manufacturer's recommendations for specimen mounting. Specimens should be confined to an exposure area in which the irradiance is at least 90 % of the irradiance at the center of the

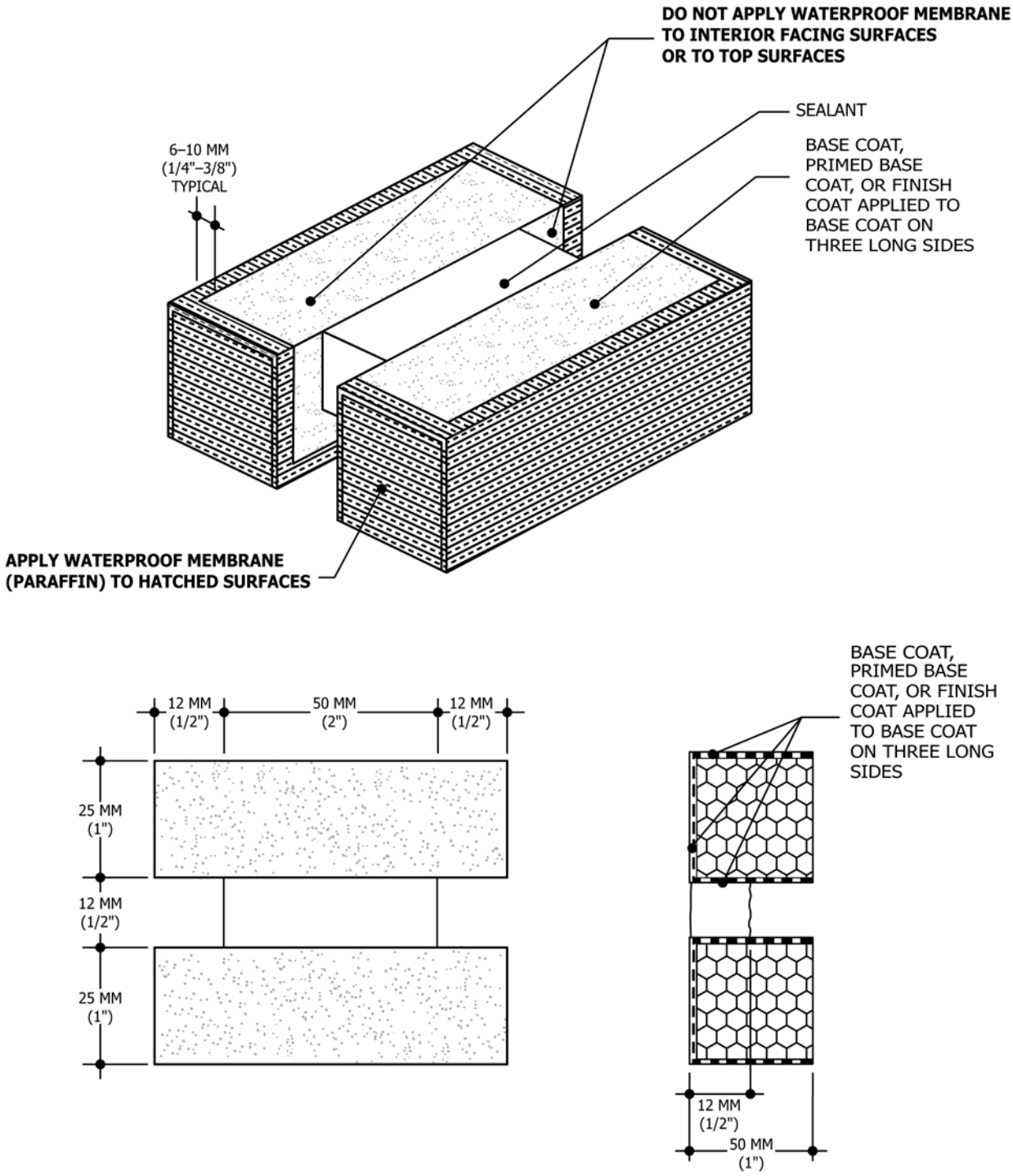

FIG. 2 Test Specimen Assembly of Water Immersion Samples

exposure area. Unless it is known that irradiance uniformity meets this requirement, use one of the procedures described in Practice G151, Section 5.1.4 to ensure equal radiant exposure on all specimens or compensation for differences within the exposure chamber. If the specimens do not completely fill the racks, fill the empty spaces with blank metal panels to maintain the test conditions within the chamber.

8.1.5.1 Operate the fluorescent UV device in accordance with the procedure in Practice C1442, Section 7.3. Position the assemblies as shown in Fig. 3 and expose for 2500 h.

8.1.5.2 Operate the xenon arc device in accordance with the procedure in Practice C1442, Section 7.2. The exposed face of the assemblies is positioned in accordance with the manufacturer's recommendations for specimen mounting. Expose for

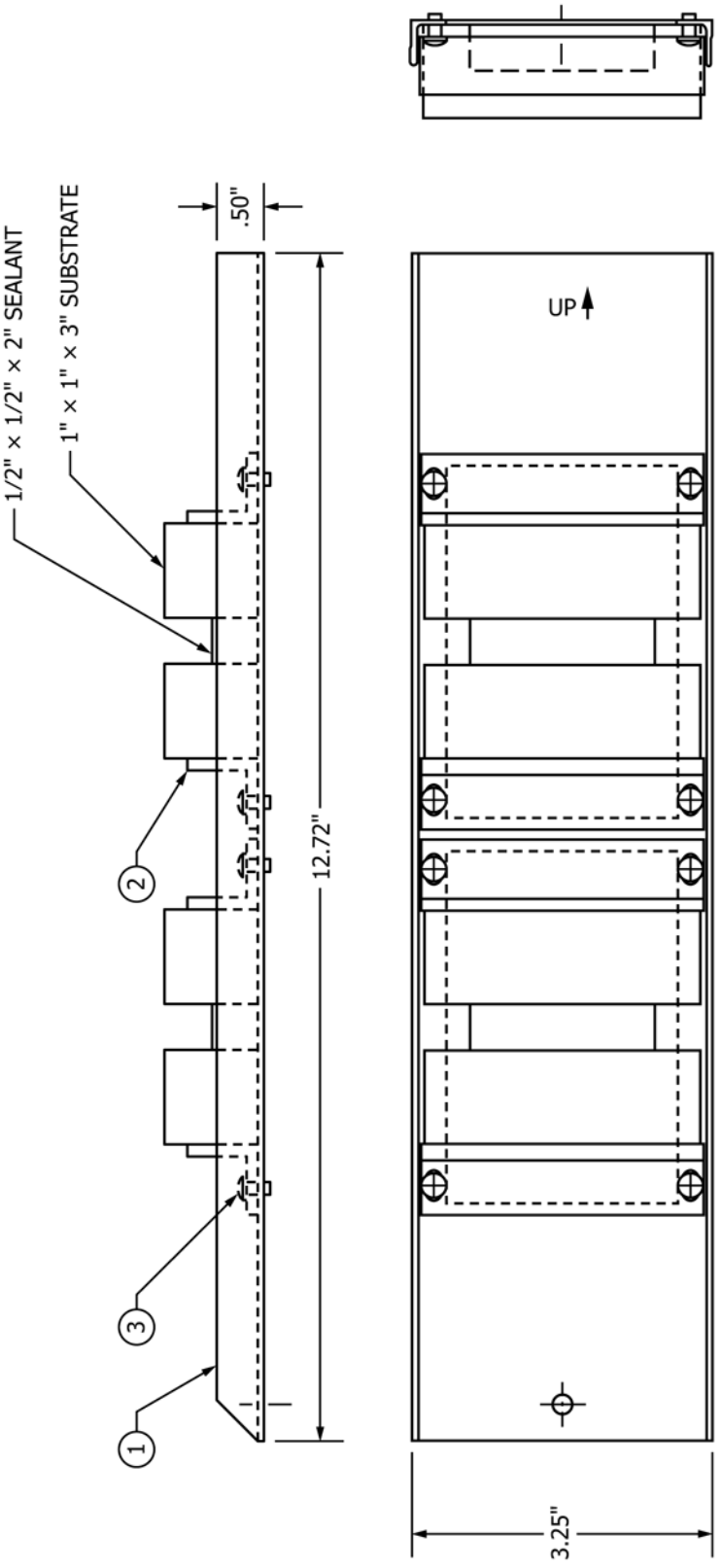

FIG. 3 Position of Test Specimens for UV/Condensation Exposure

2500 h when operated at an irradiance level of 0.51 W/(m^2.nm) at 340 nm. (At an irradiance level of 0.35 W/(m^2.nm) at 340 nm, expose for 3643 h. See Annex A1.2.1 in Practice C1442 for the formula to calculate exposure time at other irradiance levels.)

NOTE 2—The test cycles have been used by historical convention and may not adequately simulate the effects of outdoor exposure of sealants. Other cycles can be used by mutual agreement of all concernced parties.

NOTE 3—Refer to Practice G151 for full cautionary guidance regarding laboratory weathering of nonmetallic materials.

8.1.5.3 After exposure, condition samples in laboratory for 16 h minimum at standard conditions.

9. Procedure

9.1 Measure and record the initial distance between the EIFS substrates prior to loading.

9.2 Place the test specimen assembly in the grips of the tensile test machine and test at a rate of 50 mm ± 5 mm (2.0 ± 0.20 in.)/min.

9.3 Record the tensile load at 10, 25, 50, and 100 % elongation (based on measurement obtained in 9.1) Other coincidence points may be recorded as desired. Stop the extension at 100 % elongation. If failure occurs prior to 100 % elongation, record elongation and tensile load at failure point.

9.4 Measure and record adhesive or cohesive failures, if either occurs.

10. Report

10.1 The report shall include the following information for each sample tested:

10.1.1 Sample identification,

10.1.2 Sealant identification (single versus multicomponent, color, chemical category, etc.),

10.1.3 Actual conditioning time as used in 8.1,

10.1.4 Surface preparation (if used, primer identification),

10.1.5 EIFS identification including base coat thickness, type, and amount of mix water. Describe surface tested (such as EIFS primer, base coat, finish coat, etc.),

10.1.6 Tensile Adhesion Testing Data:

10.1.6.1 Tensile load in Newton's (pounds-force) at each elongation point described in 9.3,

10.1.6.2 The percentage loss in bond and cohesion for each sample tested. Note failure mode,

10.1.6.3 Variation, if any, from the test procedure,

10.1.7 Freezer temperature,

10.1.8 Type, manufacturer and model of artificial weathering apparatus used, and

10.1.9 Irradiance level and actual time (number of hours) in weathering apparatus.

11. Precision and Bias

11.1 The precision of this test method is based on an interlaboratory study of Test Method C1382 conducted in 1996. Each of four laboratories tested three different sealants and three primers under varying environmental conditions. Every "test result" represents an individual determination. Each participating laboratory was instructed to submit five replicate test results for one, two, or three different sealant primer combinations. Except for the limited number of reporting laboratories, Practice E691 was followed for the design and analysis of the data; the details are given in ASTM Research Report No. C24-1059.[3]

11.1.1 *Repeatability Limit (r)*—Two test results obtained within one laboratory shall be judged not equivalent if they differ by more than the "*r*" value for that material; "*r*" is the interval representing the critical difference between two test results for the same material, obtained by the same operator using the same equipment on the same day in the same laboratory.

11.1.1.1 Repeatability limits are listed in Tables 1-20.

11.1.2 *Reproducibility Limit (R)*—Two test results shall be judged not equivalent if they differ by more than the "*R*" value for that material; "*R*" is the interval representing the critical difference between two test results for the same material, obtained by different operators using different equipment in different laboratories.

11.1.2.1 Reproducibility limits are listed in Tables 1-20.

11.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

11.1.4 Any judgment in accordance with statements 11.1.1 and 11.1.2 would normally have an approximate 95 % probability of being correct, however the precision statistics obtained in this ILS must not be treated as exact mathematical quantities which are applicable to all circumstances and uses. The limited number of materials tested and laboratories reporting results guarantees that there will be times when differences greater than predicted by the ILS results will arise, sometimes with considerably greater or smaller frequency than the 95 %

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:C24-1059.

TABLE 1 Tensile Strength (psi) – 10 % – 21 Days Room Temperature Cure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	7.610	4	1.252	3.864	3.505	10.820
B/B	5.656	4	0.634	3.849	1.774	10.778
C/C	9.700	3	1.753	7.413	4.909	20.756

[A] The average of the laboratories' calculated averages.

TABLE 2 Tensile Strength (psi) – 25 % – 21 Days Room Temperature Cure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	14.932	4	1.638	6.526	4.587	18.272
B/B	9.345	3	0.838	4.485	2.346	12.558
C/C	18.097	3	1.567	8.807	4.386	24.660

[A]The average of the laboratories' calculated averages.

TABLE 3 Tensile Strength (psi) – 50 % – 21 Days Room Temperature Cure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	24.086	4	1.984	5.379	5.556	15.061
B/B	13.576	3	0.780	4.989	2.184	13.969
C/C	25.029	3	2.334	9.703	6.535	27.168

[A]The average of the laboratories' calculated averages.

TABLE 4 Tensile Strength (psi) – 100 % – 21 Days Room Temperature Cure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	33.931	4	3.169	6.187	8.873	17.324
B/B	20.532	3	0.666	6.926	1.865	19.394
C/C	32.057	3	1.592	10.691	4.457	29.935

[A]The average of the laboratories' calculated averages.

TABLE 5 Tensile Strength (psi) – 10 % – 21 Days Room Temperature plus 7 days H_2O

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	6.850	4	1.243	3.716	3.480	10.404
B/B	3.272	3	1.302	2.485	3.647	6.957
C/C	8.757	3	1.494	7.514	4.183	21.038

[A]The average of the laboratories' calculated averages.

probability limit would imply. The repeatability limit and the reproducibility limit should be considered as general guides, and the associated probability of 95 % as only a rough indicator of what can be expected.

11.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

11.3 The precision statement was determined through statistical examination of 951 results, from four laboratories, on three material/primer combinations. These three sealants and primers were described as the following:

Sealant A: One component silicone
Sealant B: One component polysulphide
Sealant C: Multi-component polyurethane

TABLE 6 Tensile Strength (psi) – 25 % – 21 Days Room Temperature plus 7 days H_2O

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	12.891	3	2.160	6.253	6.047	17.507
B/B	6.724	3	1.059	3.655	2.964	10.234
C/C	16.662	3	1.496	9.485	4.188	26.559

[A]The average of the laboratories' calculated averages.

TABLE 7 Tensile Strength (psi) – 50 % – 21 Days Room Temperature plus 7 days H_2O

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	20.300	3	2.644	6.794	7.404	19.023
B/B	10.661	3	0.676	3.464	1.893	9.700
C/C	22.897	3	1.319	9.599	3.694	26.877

[A]The average of the laboratories' calculated averages.

TABLE 8 Tensile Strength (psi) – 100 % – 21 Days Room Temperature plus 7 days H_2O

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	26.454	2	4.013	8.761	11.235	24.530
B/B	16.137	3	0.659	3.751	1.847	10.503
C/C	27.147	3	0.888	9.534	2.486	26.696

[A]The average of the laboratories' calculated averages.

TABLE 9 Tensile Strength (psi) – 10 % – 21 Days Room Temperature plus 24 h at 0°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	7.934	4	1.613	5.550	4.517	15.541
B/B	13.511	3	4.006	12.449	11.216	34.858
C/C	15.444	3	4.320	14.059	12.097	39.364

[A]The average of the laboratories' calculated averages.

Primer A: One component primer for Sealant A
Primer B: Two component primer for Sealant B
Primer C: One component primer for Sealant C

11.4 To judge the equivalency of two test results, it is recommended to choose the sealant/primer combination closest in characteristics to the test materials.

TABLE 10 Tensile Strength (psi) – 25 % – 21 Days Room Temperature plus 24 h at 0°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	15.816	4	1.740	6.962	4.873	19.493
B/B	22.032	3	4.537	16.974	12.704	47.526
C/C	25.737	3	5.214	18.002	14.600	50.404

[A]The average of the laboratories' calculated averages.

TABLE 11 Tensile Strength (psi) – 50 % – 21 Days Room Temperature plus 24 h at 0°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	24.950	4	2.482	5.599	6.948	15.677
B/B	28.191	3	4.586	18.719	12.841	52.413
C/C	33.626	3	6.091	20.138	17.055	56.385

[A]The average of the laboratories' calculated averages.

TABLE 12 Tensile Strength (psi) – 100 % – 21 Days Room Temperature plus 24 h at 0°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	36.139	4	3.401	6.733	9.524	18.851
B/B	34.813	3	4.379	20.295	12.260	56.827
C/C	40.234	3	6.103	21.523	17.088	60.263

[A]The average of the laboratories' calculated averages.

TABLE 13 Tensile Strength (psi) – 10 % – 21 Days Room Temperature Cure plus 24 h at 70°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	6.892	4	0.564	5.738	1.580	16.065
B/B	3.329	3	0.996	1.232	2.788	3.449
C/C	7.603	3	1.787	6.165	5.002	17.263

[A]The average of the laboratories' calculated averages.

TABLE 14 Tensile Strength (psi) – 25 % – 21 Days Room Temperature Cure plus 24 h at 70°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	13.710	4	1.072	8.054	3.002	22.551
B/B	6.356	3	0.997	1.093	2.790	3.059
C/C	15.741	3	2.049	8.279	5.739	23.182

[A]The average of the laboratories' calculated averages.

TABLE 15 Tensile Strength (psi) – 50 % – 21 Days Room Temperature Cure plus 24 h at 70°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	21.910	4	1.633	8.492	4.573	23.777
B/B	9.488	3	0.910	1.021	2.547	2.859
C/C	23.258	3	2.611	9.055	7.310	25.355

[A]The average of the laboratories' calculated averages.

TABLE 16 Tensile Strength (psi) – 100 % – 21 Days Room Temperature Cure plus 24 h at 70°C

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	29.239	4	2.629	11.484	7.362	32.156
B/B	14.424	3	1.099	1.494	3.077	4.185
C/C	30.817	3	2.714	9.508	7.599	26.623

[A]The average of the laboratories' calculated averages.

TABLE 17 Tensile Strength (psi) – 10 % – 21 Days Room Temperature Cure plus 2500 h Fluorescent UVB-313/Condensation Exposure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	9.793	4	2.070	6.366	5.795	17.826
B/B	5.759	3	2.343	3.933	6.560	11.011
C/C	8.972	3	2.738	10.205	7.666	28.574

[A]The average of the laboratories' calculated averages.

TABLE 18 Tensile Strength (psi) – 25 % – 21 Days Room Temperature Cure plus 2500 h Fluorescent UVB-313/Condensation Exposure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	22.133	4	3.642	10.824	10.197	30.307
B/B	10.913	3	3.256	5.270	9.117	14.755
C/C	18.786	3	4.416	15.102	12.365	42.287

[A]The average of the laboratories' calculated averages.

TABLE 19 Tensile Strength (psi) – 50 % – 21 Days Room Temperature Cure plus 2500 h Fluorescent UVB-313/Condensation Exposure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	28.309	3	7.468	11.967	20.911	33.508
B/B	17.047	3	3.632	6.677	10.169	18.695
C/C	32.109	3	4.640	14.652	12.993	41.025

[A]The average of the laboratories' calculated averages.

TABLE 20 Tensile Strength (psi) – 100 % – 21 Days Room Temperature Cure plus 2500 h Fluorescent UVB-313/Condensation Exposure

Sealant/ Primer	Average[A] psi $\bar{x}$	Number of Laboratories Included in Precision Calculations	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
A/A	31.766	3	15.247	15.358	42.692	43.003
B/B	24.707	3	4.482	9.003	12.549	25.207
C/C	33.003	2	10.241	10.807	28.675	30.259

[A]The average of the laboratories' calculated averages.