



Standard Test Method for Staining of Porous Substrate by Joint Sealants¹

This standard is issued under the fixed designation C 1248; 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 covers an accelerated laboratory procedure to determine if a joint sealant has a probability of staining a porous substrate (such as marble, limestone, sandstone, and granite).

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, 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 717 Terminology of Building Seals and Sealants²

G 53 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Non-Metallic Materials³

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology C 717 for definitions of the following terms used in this test method: *bead; compound; cure; elastomer; joint; primer; sealant; self leveling sealant; and substrate.*

4. Summary of Test Method

4.1 This test method consists of subjecting standard joint specimens to various exposure treatments as follows: (a) all specimens are compressed and clamped at the manufacturer's rated movement capability; (b) one-third of the specimens are stored at standard conditions while under compression for up to 28 days; (c) one-third of the specimens are exposed in an oven while under compression for up to 28 days; and (d) one-third

of the specimens are exposed in an ultraviolet (UV) fluorescent test chamber while under compression for up to 28 days.

4.2 The effects of the test are evaluated by visual inspection for changes in surface appearance and average measurements of any stain depth and stain width.

4.3 This test method is applicable to any type of elastomeric joint sealant and any type of porous substrate.

5. Significance and Use

5.1 Staining of building materials is an aesthetically undesirable occurrence. This test method evaluates the likelihood of a sealant causing an early stain on a porous substrate due to exudation of materials from the sealant. Since this is an accelerated test, it does not necessarily predict that the tested sealants will not stain or discolor porous substrates over longer periods of time.

6. Apparatus

6.1 *Forced-Draft Oven.*

6.2 *Ultraviolet Chamber*, conforming to Practice G 53 and UVA 340 type bulbs.

6.3 *"C" Clamps*, or other device for maintaining the specimen under compression.

6.4 *TFE-Fluorocarbon Spacers.*

6.5 *Masking Tape.*

7. Test Specimens

7.1 Substrates shall be 25 by 25 by 75 mm (1 by 1 by 3 in.). A total of 24 substrates are required to make the twelve test specimens.

NOTE 1—The precision and bias statement is based on Vermont white marble and Bethel white granite substrates.

7.2 *Primers*—When a primer is recommended by the sealant manufacturer, apply the primer to one substrate block of each test specimen. Apply the primer where the sealant will be in contact with the substrate.

7.3 *Preparation of Test Specimens:*

7.3.1 Standard conditions of temperature and relative humidity used throughout this test method are defined as $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$, respectively.

7.3.2 *Multi-Component Sealants*—Prepare twelve test specimens for each substrate that is to be used in the test. After maintaining the unopened sample for at least 24 h at standard

¹ This test method is under the jurisdiction of ASTM Committee C-24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.40 on Weathering.

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² *Annual Book of ASTM Standards*, Vol 04.07.

³ *Annual Book of ASTM Standards*, Vol 14.02.

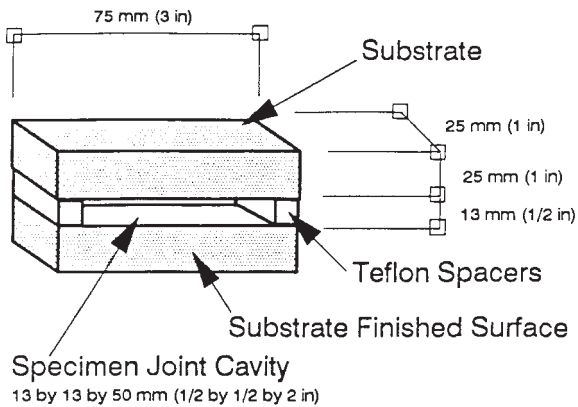
conditions, mix thoroughly for 5 min at least 250 g of base compound with the appropriate amount of curing agent. Apply a bead of sealant 13 by 13 by 50 mm (1/2 by 1/2 by 2 in.) between parallel 25 by 75 mm (1 by 3 in.) faces of substrates (see Fig. 1). Use appropriate spacers to form the proper size bead. Use adhesive tape, rubber bands, or clamps to hold the test specimen together before and after filling it with the sealant. In the case of a self leveling sealant, use masking or other suitable tape to retain the sealant. Use masking tape on the top surface of substrates to prevent sealant from curing on the finished surface. Remove the tape immediately following filling of the specimen joint cavity.

7.3.3 *Single-Component Sealants*—Prepare the specimens as described in 7.3.2 except that no mixing is required. Condition the sealed cartridge or bulk container at standard conditions for at least 24 h before use.

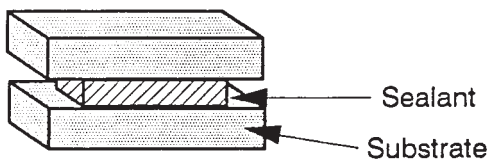
8. Conditioning

8.1 Cure specimens for 21 days at standard conditions. Separate the TFE-fluorocarbon spacers from the sealant as soon as practical during the curing period without damaging the sealant.

NOTE 2—The producer may request conditions other than standard conditions for the curing of single-component sealants provided they meet the following requirements: the curing period shall extend for 21 days; and the temperature during the curing period shall not exceed 50°C (122°F).



(A) PREPARED SPECIMEN BEFORE APPLICATION OF SEALANT



(B) SPECIMEN AFTER APPLICATION OF SEALANT AND REMOVAL OF SPACERS

FIG. 1 Stain Test Specimen

Start Date: _____ Job Reference: _____ Log No.: _____
 Completion Date: _____ Customer: _____ Submitter: _____

Test Materials

Sealant Name: _____ Substrate Name: _____
 Sealant Type: _____ Substrate Type: _____
 Identifying Batch No.: _____ Substrate Finish: _____
 Rated Movement Capability: _____
 Primer Name: _____

Average Measurements of Substrate Stain

Measured At:	Primed		Unprimed	
	Finished Surface	Interior	Finished Surface	Interior
14 days at RT	_____	_____	_____	_____
28 days at RT	_____	_____	_____	_____
14 days 70°C	_____	_____	_____	_____
28 days 70°C	_____	_____	_____	_____
14 days UV	_____	_____	_____	_____
28 days UV	_____	_____	_____	_____

Testing Equipment

Oven: _____ UV Lamp Type: _____
 UV Chamber: _____
 Description of test effects: _____

Description of variation from procedure (if any): _____

FIG. 2 Staining Test Report Form

TABLE 1 Repeatability (I_r) and Reproducibility (I_R)

Material	Depth of Stain (mm)		Width of Stain (mm)	
	I _r	I _R	I _r	I _R
Polyurethane				
Marble	0.68	1.14	0.72	1.10
Granite	1.02	2.29	1.25	3.56
Silicone				
Marble	2.72	10.35	3.14	6.69
Granite	1.38	13.46	2.69	5.93
Polysulfide				
Marble	2.74	12.73	1.42	3.62
Granite	1.48	13.33	1.08	1.73
Latex				
Marble	1.27	2.03	0.51	1.02
Granite	1.02	2.03	0.76	1.78
Styrene Block Copolymer				
Marble	0.51	1.52	0.25	0.76
Granite	0.51	1.02	0.25	0.51
Oil Base				
Marble	5.08	6.10	4.83	7.11
Granite	2.54	3.05	3.81	4.57

9. Procedure

9.1 Compress all test specimens and clamp them at the manufacturer’s rated movement capability for the sealant being tested.

9.2 Store four compressed specimens at standard conditions. Remove two after 14 days and two after 28 days.

9.3 Place four compressed specimens in an oven at 70 ± 2°C (158 ± 3.6°F). Remove two after 14 days and two after 28 days.

9.4 Place four compressed specimens in a UV fluorescent test chamber maintaining the sealant surface 50 mm (2 in.) from the light source, finished surface facing the light source.

Set the cycle of the UV fluorescent test chamber to 4 h UV light at $60 \pm 2^\circ\text{C}$ ($140 \pm 3.6^\circ\text{F}$), four hours condensing humidity at $50 \pm 2^\circ\text{C}$ ($122 \pm 3.6^\circ\text{F}$). Remove two specimens after 14 days (336 h) and two after 28 days (672 h).

9.5 Allow specimens to cool at standard conditions for one day. Examine the surface of the substrates (both pieces on each specimen) to determine if the surface appearance has changed in any way. Measure the width of any stain in at least three places. Record the average of the measurements to the nearest 0.5 mm. If primer was used, record the stain width separately for the primed and unprimed substrates on each specimen.

9.6 Break the substrates into two pieces along the 25 mm axis (the final pieces will be approximately 40 by 25 by 25 mm in size). If there was a surface stain, break the substrates at the point of maximum surface stain. Measure the stain depth in at least three places. Record the average of the measurements to the nearest 0.5 mm. If primer was used, record the stain width separately for the primed and unprimed substrates on each specimen.

10. Report

10.1 Report the following information:

10.1.1 Name of sealant, type of sealant, rated movement capability and identifying batch number,

10.1.2 Substrates used,

10.1.3 Name and description of primers used, if any,

10.1.4 Testing equipment, including manufacturer of apparatus, type of lamps,

10.1.5 Description of test effects observed, such as change in finished surface appearance, discoloration into the substrate, or other characteristics; average measurement of stain width and depth,

10.1.6 Description of, and reasons for any variations from the test procedure,

10.1.7 Statement describing curing conditions if other than at standard conditions, and

10.1.8 Record data on report form (see Fig. 2).

11. Precision and Bias

11.1 *Repeatability (Ir)*—The repeatability (within a given laboratory) intervals for six test parameters tested by four laboratories are listed in Table 1. In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed the values in Table 1 only about 5 % of the time.

11.2 *Reproducibility (IR)*—The reproducibility (between given laboratories) intervals for six test parameters tested by four laboratories are listed in Table 1. In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed the values in Table 1 only about 5 % of the time.

11.3 Both UVA and UVB type bulbs were evaluated in the round robin testing. Negligible difference was found between these two types of bulbs during this short exposure period. However, UVA bulbs are the recommended light source inasmuch as they more closely represent natural ultraviolet.

12. Keywords

12.1 joint sealants; porous substrates; sealants; staining; ultraviolet exposure

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