



Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants¹

This standard is issued under the fixed designation C 510; 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.

^{ε1} NOTE—Keywords were added editorially in June 1997.

1. Scope

1.1 This test method covers an accelerated laboratory procedure to determine if a sample of a joint sealant will stain the substrate when in contact with masonry, concrete, or stone (such as marble, limestone, sandstone, and granite). This test method also is intended to determine whether the sealant itself will change in color when exposed to the weather.

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

1.3 *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 109 Test Method for Compressive Strength of Hydraulic

Cement Mortars (Using 2-in. or 50-mm Cube Specimens)²

C 150 Specification for Portland Cement²

C 207 Specification for Hydrated Lime for Masonry Purposes²

C 717 Terminology of Building Seals and Sealants³

D 2203 Test Method for Staining from Sealants³

G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology C 717.

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

Current edition approved May 25, 1990. Published July 1990. Originally published as C 510 – 63 T. Last previous edition C 510 – 77 (1983).

² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.07.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

4. Significance and Use

4.1 Staining of a building is an aesthetically undesirable occurrence. This test method evaluates the likelihood of a sealant causing early stain on a porous substrate due to certain chemical exudations from the sealant.

4.1.1 This test method may not predict staining caused by such factors as residue run-down or dirt pick-up by a sealant exudate.

4.2 This test method is useful to predict potential color changes in the sealant itself after weathering.

4.3 See also Test Method D 2203.

5. Apparatus

5.1 The exposure apparatus shall be an accelerated weathering machine, twin enclosed carbon arc, with 102-18 deionized water cycle (102 min light followed by 18 min light and spray), conforming to Type D of Practice G 23.

NOTE 1—Fluorescent and xenon-arc light sources are being investigated as alternatives.

6. Materials

6.1 *Portland Cement*, white, nonstaining, conforming to Type I of Specification C 150.

6.2 *Hydrated Lime*, conforming to Type S of Specification C 207.

6.3 *Ottawa Sand*, graded, white, conforming to the requirements of Section 4 of Test Method C 109.

6.4 *Aluminum Plates*, three 152 by 70-mm (6 by 2¾-in.), No. 16 gage.

6.5 *Metal Frames*, two rectangular noncorrosive, designated as A and B; frame A shall be 6 mm (¼ in.) thick with the inside opening slightly larger than an aluminum plate described in 6.4; frame B shall have inside dimensions of 127 by 38 by 6 mm (5 by 1½ by ¼ in.) thick.

7. Test Specimens

7.1 The test specimen shall consist of a slab of mortar mix upon which is placed a layer of sealant.

7.2 The mortar mix shall be prepared by combining, by weight, 1 part white portland cement, 0.25 part hydrated lime, and 4 parts graded Ottawa sand, with sufficient water to make a smooth, workable paste (water-cement ratio = 0.8).

7.3 The mortar mix shall be spread, with the aid of frame A, over the entire surface of each of the three aluminum plates to a depth approximately 6 mm (1/4 in.) and struck off flat with a spatula. After carefully removing the frame, allow the specimens to cure in air for 4 h at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

8. Conditioning

8.1 Store the unopened sample of one- or two-part sealant at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity for 16 to 24 h immediately before testing.

9. Procedure

9.1 At the end of the 4-h curing period described in 7.3, spread a 6-mm (1/4-in.) thick layer of sealant, with the aid of frame B, over the surface of two of the three specimens, leaving a margin of approximately 13 mm (1/2 in.) of mortar free of sealant. Leave the third specimen without sealant.

9.1.1 Where a primer is submitted with a sample, apply the primer in accordance with the manufacturer's directions to half the surface of the cured mortar of the three specimens before application of the sealant. For two-part sealants, mix approximately 200 g.

9.2 Then expose the three specimens in air for 16 to 24 h at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

9.3 After the 16 to 24-h curing period, place two specimens, one with and one without sealant, on the inside of the drum of the accelerated weathering machine for 100 h.

9.3.1 Specimen temperature shall be $60 \pm 2.8^\circ\text{C}$ ($140 \pm 5^\circ\text{F}$) and water temperature $24 \pm 2.2^\circ\text{C}$ ($75 \pm 4^\circ\text{F}$).

9.4 Expose the third specimen (with sealant) in air in the laboratory at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity for 14 consecutive days. During this exposure period immerse the third specimen in distilled water for 1 min once a day (5 days per week).

9.5 At the end of the exposure periods, examine the specimens containing the sealant for stains in the mortar and color changes in the sealant. Use the mortar specimen without the sealant as a control.

10. Report

10.1 Report a stain if there is any discoloration in the mortar color of the sealant test specimens when compared with the mortar color of the control specimen.

10.2 Record a color change if there is any variation in color of the sealant specimen that has been placed in the weathering machine and the sealant specimen exposed under laboratory conditions.

11. Precision

11.1 In a round-robin test series eight producers tested nine sealants for stain and color-change properties. Excellent agreement was obtained by the testing laboratories among the 432 determinations that were completed in the test series.

12. Keywords

12.1 color change; sealant; stain

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).