



Designation: D2203 – 01 (Reapproved 2023)

Standard Test Method for Staining from Sealants¹

This standard is issued under the fixed designation D2203; 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 a laboratory procedure for determining whether a sample of sealant will cause staining of the substrate when in the contact with masonry, concrete, or stone (marble, limestone, sandstone, granite, etc.).

1.2 The values stated in SI (metric) units are to be regarded as the standard. The values given in parentheses are provided 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—Currently there is no ISO standard similar to this test method.

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

C510 Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants

C717 Terminology of Building Seals and Sealants

3. Terminology

3.1 *Definitions*—Refer to Terminology **C717** for definitions of the following terms used in this test method: compound, sealant, substrate.

¹ This test method is under the jurisdiction of ASTM Committee **C24** on Building Seals and Sealants and is the direct responsibility of Subcommittee **C24.20** on General Test Methods.

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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.

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 an early stain on a porous substrate, when the stain is caused by gross exudation from the sealant. This test method does not predict staining caused by other factors.

4.2 See also Test Method **C510**.

5. Apparatus and Materials

5.1 *Convection Oven*, having a temperature controlled at 104.5 ± 3 °C (220 ± 5 °F).

5.2 *Brass Ring*, 19 mm ($\frac{3}{4}$ in.) inside diameter, 19 mm ($\frac{3}{4}$ in.) high, walls at one end beveled to a minimum diameter.

5.3 *Filter Paper*, ten sheets, high-grade, rapid, qualitative 9 cm in diameter.³

5.4 *Aluminum Foil*, household-type, 25.4 mm (1 in.) square.

5.5 *Weight*, 300-g.

5.6 *Spatula*, small, thin, steel.

5.7 *Glass Plate*, at least 100 by 100 mm (4 by 4 in.).

5.8 *Desiccator*, with drying agent.

6. Sampling

6.1 Take the test specimen from a previously unopened container and thoroughly mix before using, if required for homogeneity.

7. Conditioning

7.1 Condition the sample in a closed container for at least 5 h at 23 ± 2 °C (73.4 ± 3.6 °F).

8. Procedure

8.1 Dry the filter papers for 5 to 8 h in an oven maintained at 104.5 ± 3 °C (220 ± 5.4 °F). At the end of the drying period, remove from the oven and store in a desiccator until cool.

8.2 Remove ten filter papers from the desiccator, staple them together, and place them on a glass plate. Set the brass

³ This test method is based on the use of Whatman No. 1 filter paper, manufactured by Whatman, Inc., 9 Bridewell Place, Clifton, NJ 07073.

ring with beveled edge down on the center of the filter papers. Fill the ring flush with thoroughly mixed sealant, taking care to incorporate as little air as possible with the compound. Place a 25.4-mm (1-in.) square piece of aluminum foil on top of the ring, and the 300-g weight on top of that.

8.3 Allow the filled ring to stand for 72 h at 23 ± 2 °C (73.4 ± 3.6 °F). Then slide a spatula under the brass ring and remove the ring and compound. Hold the top filter paper up to the light with a glass plate under it and, with a sharp pencil, mark the maximum and minimum diameters of the stain. Measure these diameters to the nearest 0.5 mm. Subtract 19 (diameter of ring in millimetres) from the average of the two diameters and divide by 2. Record this result as *width of stain*. (Width of stain = (average – 19)/2).

8.4 Examine the ten individual papers for depth of stain by holding them up to a light. Record the number of papers, including the first one, showing any evidence of staining as *number of papers stained*.

8.5 Report the sum of *width of stain* and *number of papers stained* as the *stain index*.

9. Alternative Procedure

9.1 If the sample or compound to be tested is accompanied by a sample block of masonry (brick, marble, limestone, etc.) on which it is to be used, the standard procedure shall be waived and the following alternative test used in its place:

9.1.1 Dry duplicate specimens of the masonry sample (89 by 89 by 19 mm (3½ by 3½ by ¾ in.)) in an oven at 104.5 ± 3 °C (220 ± 5.4 °F) for 24 h and cool to room temperature.

9.1.2 Place a round pat of the material to be tested, 38 mm (1½ in.) in diameter, and about 6.5 mm (¼ in.) high on the surface of each block. Expose the blocks in air for 5 days at 23 ± 2 °C (73.4 ± 3.6 °F). At the end of this period measure and record the width of the stain (if any) in 0.1 mm. Take four readings at 90° points around each pat. Record the average of the eight readings and designate this value as *S*.

9.1.3 Remove the pat with a putty knife and break the block in two, approximately through the middle of the sealed area, by a sharp blow with a small hammer. Measure and record the depth of penetration of the stain into the block, taking three readings on each broken piece, two at the ends and one in the middle of the stained surface. Record the average of the twelve readings and designate this value as *T*.

9.1.4 The average of the two values, designated as *S* and *T*, shall be considered as the final stain value for the alternative procedure.

10. Report

10.1 *Standard Procedure*—Report the following information:

- 10.1.1 Width of stain,
- 10.1.2 Number of papers stained, and
- 10.1.3 Stain index.

10.2 *Alternative Procedure*—Report the following information:

- 10.2.1 Average stain value on surface of each block, designated as *S*,
- 10.2.2 Average stain value inside of each block, designated as *T*, and
- 10.2.3 Final stain value (average of *S* and *T*).

11. Precision and Bias⁴

11.1 *Precision*—The precision calculations for this test method are based on the stain index results of five laboratories testing two oil-based materials in triplicate in accordance with the procedure given in Section 8. The results are given in **Table 1**.

11.1.1 Round robin data was generated by testing each sealant specimen three times, whereas the procedure in this test method specifies only one test. Single specimen testing may yield more variable results than indicated in **Table 1**.

11.1.2 Committee C-24 is actively pursuing the development of data for this test method when used for other types of sealants.

11.2 *Bias*—Since there is no accepted reference material suitable for determining the bias for this test method for staining, bias has not been determined.

12. Keywords

- 12.1 porous substrate; sealant; staining

⁴ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:C24-1027.

TABLE 1 Precision Data^A

Material	Average Stain Index	Estimated Standard Deviation (Within Laboratory)	Estimated Standard Deviation (Between Laboratory)	Repeatability (Internal)	Reproducibility
G1	2.300	0.050	0.520	0.142	1.472
G2	4.738	0.250	0.429	0.708	1.214

^A At 95 % confidence a variation in the stain index of as much as 0.71 can be expected within a laboratory and 1.47 between laboratories, when materials are tested in triplicate.