



Standard Test Method for Porosity of Paint Films¹

This standard is issued under the fixed designation D 3258; 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 the determination of the porosity of a white or near white mineral spirits insoluble paint film to indicate the degree to which a subsequent coat will penetrate.

1.2 The texture of the film can affect cleanup that will influence the results of the test. A stain applied to a high-hiding paint will not lower the reflectance as much as the same stain applied to a low-hiding paint of equal porosity. These points must be considered in comparing different paints.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are 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:

E 97 Test Method for Directional Reflectance Factor, 45-deg, 0-deg, of Opaque Specimens by Broad-Band Filter Reflectometry²

3. Summary of Test Method

3.1 The test paint is applied to a nonporous surface, air dried, then measured for reflectance. A special colored penetrating medium is applied, the excess removed in a specified manner, and reflectance measured again. The difference between the two readings indicates the degree of porosity; the smaller the difference, the lower the porosity of the film and the greater its ability to resist penetration.

4. Apparatus and Materials

4.1 *Film Applicator*, 6 in. (150 mm) wide with a clearance of 12 mils (300 μm).

4.2 *Film Applicator*, 5½ in. (140 mm) wide with a clearance of 10 mils (250 μm).

4.3 *Reflectometer*, meeting the requirements of Test Method E 97.

4.4 *Vacuum Drawdown Plate*.

4.5 *Camelhair Brush* (approximately ½ in. (13 mm) wide).

4.6 *Plastic Wash Bottle*, containing odorless mineral spirits (about 16 oz (500 mL)).

4.7 *Test Panel*—Smooth nonporous panel such as sealed white, cardboard chart, or white plastic sheet.

4.8 *Penetrating Medium*—A composition of pigment and dark-colored dye dispersed in organic liquid vehicle.³

4.9 *Filter Paper*.

5. Procedure

5.1 Place the test panel on the vacuum plate and apply the paint under test with the 12-mil (30- μm) clearance drawdown blade. Remove the test panel from the vacuum plate and air dry 48 h under standard conditions of $73 \pm 3.5^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) and $50 \pm 5\%$ relative humidity.

5.2 Determine the percent reflectance of the dry film using the green filter on the reflectometer. When making this reading, back up the panel with a flat rigid opaque object and mark the area on which the reading was made.

5.3 Place the panel containing the dry paint film on the vacuum plate. Using the 10-mil (25- μm) clearance blade, apply the penetrating medium over the test paint, covering the area marked as above and drawing the applicator blade in the same direction as before.

5.4 After $5 \text{ min} \pm 15 \text{ s}$ wash off excess penetrating medium. To do this, hold the panel vertically and remove the medium using the camelhair brush wet with odorless mineral spirits. Repeat the process until most of the excess is removed. Then continue to remove more of the excess by applying mineral spirits directly from the wash bottle to the area above the stain so that it flows across the stained area. Pause to observe the bead that forms at the bottom of the panel. If the bead is not clear, continue washing with mineral spirits until the bead is essentially clear. Test with filter paper to be sure no dye remains in the bead.

5.5 Hang the panel in a vertical position and air dry for 3 h. As before, read the percent reflectance over the same area of

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.42 on Architectural Finishes.

Current edition approved Jan. 10, 2000. Published March 2000. Originally published as D 3258-73. Last previous edition D 3258-80 (1998).

² Discontinued; see 1992 *Annual Book of ASTM Standards*, Vol 06.01.

³ The sole source of supply of a penetrating medium known to the committee at this time is the 5-68 Special Test Compound available from K & N Laboratories, Inc., 5331 Dansher Rd., Countryside, IL 60525. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

the panel with the same flat rigid opaque object behind the panel.

6. Report

6.1 Report the difference between the percent reflectance of the untested film and that of the penetrated film.

7. Precision

7.1 On the basis of an interlaboratory study of this test method in which one operator in each of ten laboratories tested paint films of two nominally different levels of porosity, the within-laboratory and between-laboratories standard deviations were found to be:

| Nominal Difference in Reflectance, % | Standard Deviations | |
|---|---------------------|----------------------|
| | Within-Laboratory | Between-Laboratories |
| 7 | 0.27 | 1.26 |
| 35 | 0.60 | 4.22 |

Based on these standard deviations the following criteria

should be used to judge the precision or results at the 95 % confidence level:

7.1.1 *Repeatability*—Duplicate results, obtained by a single operator, should be considered suspect if they differ by more than 0.8 % relative for difference in reflectance levels of about 7 % and more than 1.8 % relative for difference in reflectance levels of about 35 %.

7.1.2 *Reproducibility*—Two results, each the mean of duplicate measurements obtained in different laboratories should be considered suspect if they differ by more than 4.0 % relative for difference in reflectance levels of about 7 % and 14 % relative for difference in reflectance levels of about 35 %.

8. Keywords

8.1 film porosity; porosity; resistance—penetration (into paint films)

The American Society for Testing and Materials 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 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, 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).