



# Standard Test Method for Open Time of Latex Paints<sup>1</sup>

This standard is issued under the fixed designation D7488; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers a procedure to determine the length of time a latex paint remains “wet” or “open” enough to allow for brush-in and repair.

1.2 *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:*<sup>2</sup>

[D3924](#) Specification for Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials

[D5068](#) Practice for Preparation of Paint Brushes for Evaluation

[D5301](#) Practice for Physical Characterization of Paint Brushes

[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

## 3. Terminology

3.1 *Definitions:*

3.1.1 *open time, n*—the length of time a coating remains wet or open enough to allow for brush-in without the edges of the first coat becoming visible and allowing for repair within the previously painted area.

## 4. Summary of Test Method

4.1 Since environmental conditions such as temperature, humidity and air flow can result in variable results, it is recommended that this test method be performed in a constant

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.42 on Architectural Coatings.

Current edition approved April 1, 2016. Published April 2016. Originally approved in 2010. Last previous edition approved in 2011 as D7488 – 11. DOI: 10.1520/D7488-11R16.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

temperature / humidity room ( $23 \pm 2^\circ\text{C}$  ( $73.5 \pm 3.5^\circ\text{F}$ )) /  $50 \pm 5\%$  relative humidity. Test paints are applied to the center of a sealed chart with a 76 microns (3 mil) wet film thickness. X marks are made immediately. The number of X marks will depend on how many can fit on one drawdown (see Fig. 1). The test paint is then applied in perpendicular sections, brushing each section across the initial painted section. The perpendicular sections are repeated at agreed upon time intervals. After drying, wet edge is recorded as the last time the test paint could be brushed into the initial painted section without the edges of the first coat being visible. The time at which the X marks become visible is also noted.

## 5. Significance and Use

5.1 Latex paints dry very quickly which often causes difficulty in final appearance of painted areas, especially paints formulated below 100g/L VOC where lower amounts of solvents are in the formulated latex paint. This method is a means of determining the time available before a test paint cannot be worked into a previously painted area.

## 6. Apparatus

6.1 *Constant Temperature/Humidity Room* ( $23 \pm 2^\circ\text{C}$  ( $73.5 \pm 3.5^\circ\text{F}$ )) /  $50 \pm 5\%$  relative humidity in accordance with Specification [D3924](#).

6.2 *Contrasting Sealed Chart* (that is, black sealed chart for white paints or white sealed chart for tinted paints), typically 30 by 60 cm (1 by 2 ft.).

6.3 *Glass Plate*, 30 by 60 cm (1 by 2 ft.) or vacuum plate.

6.3.1 If using a glass plate, tape to secure sealed chart to glass plate.

6.4 *Good Quality Brush*, 50 mm (2 in.) wide with straight edge, polyester bristles in accordance with Practice [D5301](#).

6.5 *Timer or Clock* to record time intervals.

6.6 *Film Applicator*, capable of applying a film with a width of 7.5 cm (3 in.) and approximate wet film thickness of 75 microns (3 mil).

## 7. Procedure

7.1 Condition the brush in with the test paint accordance with Practice [D5068](#).

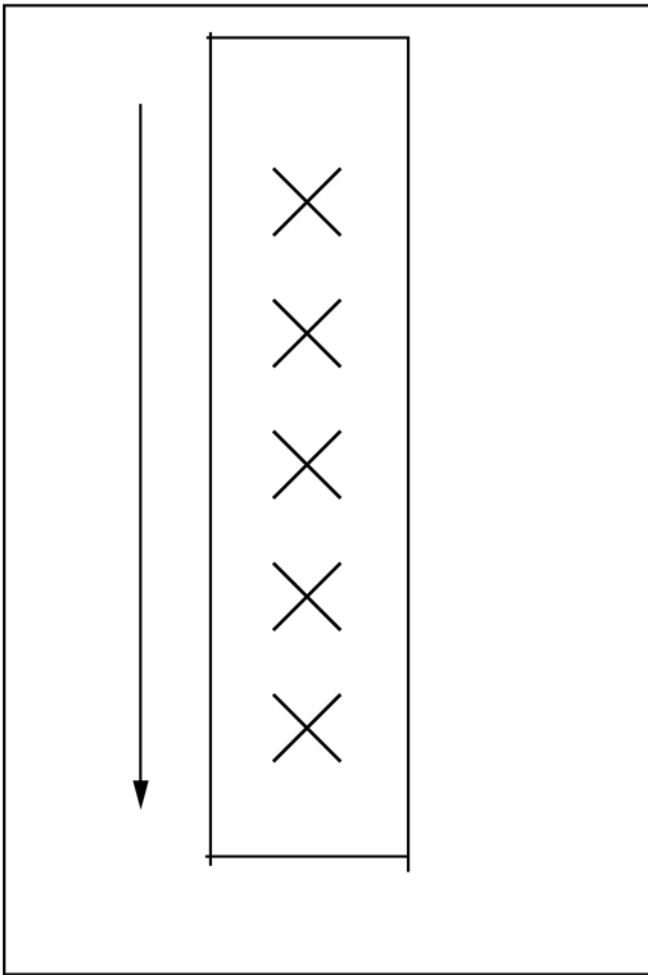


FIG. 1 Illustration

7.2 Tape the edges of the chart to a smooth glass plate or use a vacuum plate.

7.3 Along the length of the panel, drawdown 76 microns (3 mil) wet film thickness of the test paint (see Fig. 1). The drawdown must be free of ridges, craters, or other imperfections.

7.4 Start the timer or record the time.

7.5 Immediately make X marks approximately in 4 cm (1½ in.) wide and 4 cm (1½ in.) long in four to five different areas on the drawdown, as shown in Fig. 1.

NOTE 1—The wide curved end of a wooden tongue blade/paint brush or the end of a tongue depressor/metal spatula has been found suitable for this purpose.<sup>3</sup> Depending on the type of instrument used to make the X mark, ensure that the X marks are consistent in size down the chart and throughout your testing.

7.6 Re-wet the brush by dipping it into the test paint. Remove excess paint by lightly scraping both sides of the brush across the top edge of the can.

NOTE 2—The objective is to keep the brush wet; but not to add significantly more paint to the area being tested.

<sup>3</sup> It is suggested that you wrap the brush in a disposable plastic wrap between timed intervals to prevent the paint from drying on the brush.

7.7 At agreed upon time intervals between each X mark, start brushing the first X mark in perpendicular direction to the initial drawdown using ten strokes back and forth (1 stroke = 1 back and forth motion) to work the brush-applied paint into the drawdown area. The length of the strokes should be slightly less than the width of the chart and moving across and pass the initial drawdown to determine the time elapsed when the edges of the first coat become visible.

7.8 Repeat 7.6 and 7.7 by moving sequentially down the chart to each X mark at the agreed upon time interval. (For example, 2 minute intervals from 8 to 14 minutes.)

7.9 Dry the chart in a horizontal position overnight.

7.10 After drying overnight, observe each panel to determine the time elapsed when the edges of the first coat become visible and the time elapsed when the X marks become visible.

### 8. Report

8.1 The time elapsed when the edges of the first coat become visible.

8.2 The time elapsed when the X marks become visible.

8.3 Any deviations from this test method.

### 9. Precision and Bias<sup>4</sup>

9.1 The precision of this test method is based on an interlaboratory study conducted in 2006/2007. Each of 15 laboratories tested four commercial paints for time elapsed when edges of first coat become visible (min) and time elapsed when the X marks become visible (min) to determine precision. Practice E691 was followed for the design and analysis of the data; the details are given in ASTM Research Report No. RR:D01-1154.

9.2 Because different paint formulations vary in open time, precision will also vary. This interlaboratory study included samples from four different commercial paints each resulting in different open time measurements.

9.2.1 *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.

9.2.1.1 Repeatability limits are listed in Table 1 and Table 2.

9.2.2 *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.

9.2.2.1 Reproducibility limits are listed in Table 1 and Table 2. At times in this data you will see that the reproducibility

<sup>4</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1154. Contact ASTM Customer Service at service@astm.org.

**TABLE 1 Time Elapsed When Edges of First Coat Become Visible (minutes)**

Material	Average <sup>A</sup>		Repeatability Limit	Reproducibility Limit	R / Xbar
	Xbar		r	R	
Paint A	2.33		1.50	2.71	1.16
Paint B	2.18		0.83	1.64	0.75
Paint C	2.04		0.83	0.83	0.41
Paint D	3.02		1.77	3.87	1.28

<sup>A</sup> The average of the laboratories' calculated averages.

**TABLE 2 Time Elapsed When the X Marks Become Visible (minutes)**

Material	Average <sup>A</sup>		Repeatability Limit	Reproducibility Limit	R / Xbar
	Xbar		r	R	
Paint A	4.51		2.64	5.95	1.32
Paint B	3.02		2.04	3.40	1.12
Paint C	3.11		1.45	3.96	1.27
Paint D	6.33		3.04	8.44	1.33

<sup>A</sup> The average of the laboratories' calculated averages.

limit is higher than average Xbar. Variable environmental conditions from lab to lab with this test method can influence reproducibility data.

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

9.2.4 Any judgement in accordance with statements 9.2.1 and 9.2.2 would have an approximate 95 % probability of being correct.

9.3 *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 can be made.

9.4 *Materials*—The paints tested in this study were commercially-purchased white semi-gloss architectural paints. The paints were selected because of the variation in claimed volatile content (VOC) levels. VOC levels as indicated by the manufacturer on the corresponding paint labels are as follows:

Paint A – 150 g/L

Paint B – 0 g/L

Paint C – 0 g/L

Paint D – 250 g/L

## 10. Keywords

10.1 coatings; lapping; latex; open time; overlap; paint; waterborne; wet edge

*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). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/*