



Designation: D4400 – 18

# Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator<sup>1</sup>

This standard is issued under the fixed designation D4400; 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.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## INTRODUCTION

The multinotch applicator used in this test method is a drawdown blade with a series of notches of successively higher clearance, referred to as the Anti-Sag Meter. See Fig. 1 and Fig. 2 for a representative diagram and photograph. The numerical value for sag resistance obtained with this instrument is referred to as the Anti-Sag Index.

Anti-Sag Meters are made with several clearance ranges for different types of coatings (see 5.1 and Table 1). In developing this standard the task group used an instrument with a range from 4 to 24 mils, but the method is applicable to any clearance range, and results using instruments with overlapping ranges correlate and have equal validity.

The basic method was developed in 1962<sup>2</sup> and is referenced in U.S. Federal specifications TT-E-508, TT-E-506, and TT-P-1511.

A preshear program is essential for a drawdown sag test to duplicate the breakdown in structure that occurs when thixotropic paints are applied by brushout or other practical application methods. The procedures therefore include the preshearing of paints just prior to making test applications.

## 1. Scope

1.1 This test method covers the laboratory determination of the sag resistance of aqueous and nonaqueous liquid coatings at any level of sag resistance.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

NOTE 1—Because the only manufacturer of the applicator known to the committee manufactures to inch-pound units, inch-pound units will be regarded as the standard when referring to the applicator.

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.*

<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.

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<sup>2</sup> “Design of an Improved Sag Tester,” *Official Digest*, Vol 34, No. 453, October 1962.

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:*<sup>3</sup>

D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer

2.2 *U.S. Federal Specifications:*<sup>4</sup>

Fed. Spec. TT-E-508 Alkyd semi-gloss enamel

Fed. Spec. TT-E-506 Alkyd gloss enamel

Fed. Spec. TT-P-1511 Interior latex gloss and semi-gloss finishes

## 3. Summary of Test Method

3.1 After preshearing, the coating is applied to a test chart with a multinotch applicator. The charts are immediately hung

<sup>3</sup> 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.

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, http://quicksearch.dla.mil.

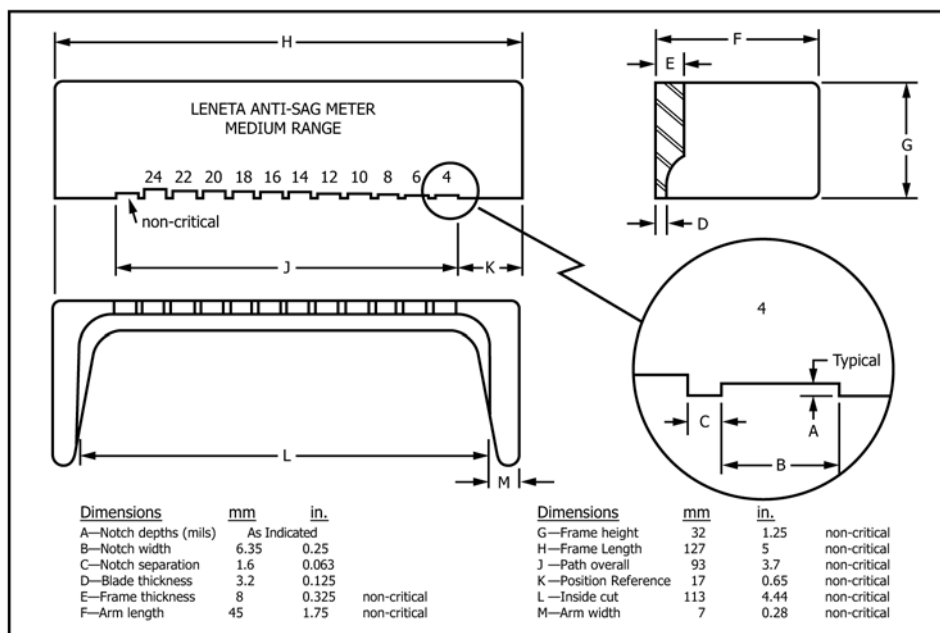


FIG. 1 Diagram of the Medium Range Anti-Sag Meter

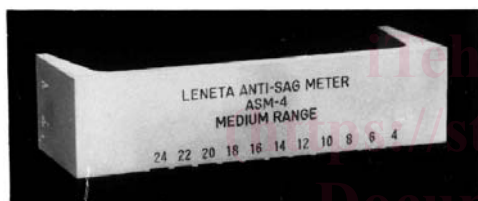


FIG. 2 Medium Range Anti-Sag Meter

vertically with the drawdown stripes horizontal, similar to rungs of a ladder, with the thinnest stripe at the top. After drying in this position, the drawdown is examined and rated for sagging. A typical sag pattern obtained by this procedure is shown in Fig. 3.

#### 4. Significance and Use

4.1 Evaluation of sag resistance is essential in quality control for both producers and purchasers of coatings. Practical application tests are poor in reproducibility, while viscometric methods, for example Test Methods D2196, are time-consuming and lack the convincing aspect of actual sagging. This method provides simple and rapid tests, whereby sag resistance is demonstrated by a visible sag pattern, and is rated objectively in terms of numerical values that correlate with brushout test observations.

#### 5. Apparatus

5.1 *Multinotch Applicator, Anti-Sag Meter*, a drawdown blade with a series of notches of successively higher clearance. Select a clearance range suitable for the type of coating under test in accordance with Table 1.

5.2 *Test Surfaces*, sealed, smooth-surfaced paper test charts, with sizes and designs as follows:

5.2.1 *Black and White Charts*, about 193 by 288 mm (7<sup>5</sup>/<sub>8</sub> by 11<sup>3</sup>/<sub>8</sub> in.), the black area comprising about 140 mm (5<sup>1</sup>/<sub>2</sub> in.) centered on the drawdown path. A chart of this design is shown in Figs. 3 and 4.

5.2.2 *Plain White Charts*, about 193 by 285 mm (7<sup>5</sup>/<sub>8</sub> by 11<sup>1</sup>/<sub>4</sub> in.).

5.3 *Glass Drawdown Plate*, plus straightedge guide for attachment thereto.

5.4 *Catch-papers*, thin sheets of sealed paper, for catching surplus paint at the completion of a drawdown.

5.5 *Equipment for the Preshearing of Aqueous Coatings:*

5.5.1 *Syringe*, 10-mL, disposable plastic type.

5.5.2 *Syringe Needle*, 15 g by 40 mm (1<sup>1</sup>/<sub>2</sub> in.) to fit syringe.

5.5.3 *Syringe Extension Tubing*, clear vinyl, inside diameter 3.2 mm (1/8 in.), outside diameter 5 mm (3/8 in.).

5.6 *Equipment for the Preshearing of Nonaqueous Coatings:*

5.6.1 *Rotary Mechanical Stirrer*, variable speed.

5.6.2 *Circular Mixing Paddle*, diameter approximately 48 mm (1<sup>7</sup>/<sub>8</sub> in.).

5.6.3 *Mixing Container*, cylindrical jar or can with capacity of up to 500 mL (1 pt).

#### 6. Procedure

6.1 *Preparation of Sample:*

6.1.1 Stir thoroughly with a spatula in the original container.

6.1.2 Strain if necessary to remove large particles or skins.

6.1.3 Adjust the temperature of the coating to 23 ± 2°C (73.5 ± 3.5°F).

6.2 *Preshearing with Syringe and Needle (Aqueous Coatings):*

6.2.1 Prepare the paint as described in 6.1.