



## Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion<sup>1</sup>

This standard is issued under the fixed designation D 2197; 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 method has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This test method covers the determination of the adhesion of organic coatings such as paint, varnish, and lacquer when applied to smooth, flat (planar) panel surfaces.

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

- D 609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products<sup>2</sup>
- D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels<sup>2</sup>
- D 1005 Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers<sup>2</sup>
- D 1186 Test Methods for Nondestructive Measurement of Dry-Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base<sup>2</sup>
- D 1400 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base<sup>2</sup>

### 3. Summary of Test Method

3.1 The materials under test are applied at uniform thickness to flat panels, usually sheet metal of uniform surface texture. After drying, the adhesion is determined by pushing the panels beneath a rounded stylus or loop that is loaded in increasing amounts until the coating is removed from the substrate surface.

<sup>1</sup> 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 D01.23 on Physical Properties of Applied Paint Films. Current edition approved Feb. 10, 1998. Published October 1998. Originally published as D 2197 – 63 T. Last previous edition D 2197 – 86(1991) $\epsilon$ <sup>1</sup>.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 06.01.

### 4. Significance and Use

4.1 Coatings to perform satisfactorily must adhere to the substrates on which they are applied. This test method has been found useful in differentiating the degree of adhesion of coatings to substrates. It is most useful in providing relative ratings for a series of coated panels exhibiting significant differences in adhesion.

4.2 Studies performed in a laboratory using the loop stylus specified in the previous edition showed meaningful adhesion data were impossible when loads of 10 to 20 kg were required to break the surface of a solvent based coating. The chrome plated loop stylus chattered and skipped across the coating surface when loads of this magnitude were required. Similar meaningless data were obtained when powder coatings were tested that required more than 10 kg to break the surface. Therefore, testing under these conditions is not applicable.

### 5. Apparatus

- 5.1 *Application Equipment*, as described in Practices D 823.
- 5.2 *Film-Thickness Measuring Apparatus*, as described in Test Methods D 1005, D 1186, or D 1400.
- 5.3 *Balanced Beam, Scrape Adhesion Tester* (Figs. 1 and 2), consisting of a balanced beam to which is secured a platform for supporting weights, and a rod at an angle of 45° that holds the scraping loop. The rod shall be set so that the scraping loop contacts test surfaces directly below the weights. The loop shall be 1/16-in. (1.6-mm) diameter rod, bent into a “U” shape with an outside radius of 0.128 ± 0.002 in. (3.25 ± 0.05 mm) and hardened to Rockwell HRC 56 to 58, and shall be a smooth finish. The loop can be either chromium plated, nickel plated, or heat treated polished steel, as agreed upon between the purchaser and the supplier. These testers are adjustable to accommodate flat, metallic, and nonmetallic specimens to 0.5-in. (12-mm) thick and 4 to 16 in. (100 to 400 mm) wide and long; the specimen should be at least 1/2-in. (12-mm) wide.

### 6. Preparation of Specimens

6.1 Apply the materials under test to panels of the composition and surface condition on which it is desired to determine adhesion. The panel material (6.1.1), surface preparation, thickness, and number of coats shall be specified or agreed