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Endorsed by American  
Electroplaters' Society  
Endorsed by National  
Association of Metal Finishers

## Standard Test Method for Peel Strength of Metal Electroplated Plastics<sup>1</sup>

This standard is issued under the fixed designation B 533; 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 gives two procedures for measuring the force required to peel a metallic coating from a plastic substrate.<sup>2</sup> One procedure (Procedure A) utilizes a universal testing machine and yields reproducible measurements that can be used in research and development, in quality control and product acceptance, in the description of material and process characteristics, and in communications. The other procedure (Procedure B) utilizes an indicating force instrument that is less accurate and that is sensitive to operator technique. It is suitable for process control use.

1.2 The tests are performed on standard molded plaques. This method does not cover the testing of production electroplated parts.

1.3 The tests do not necessarily measure the adhesion of a metallic coating to a plastic substrate because in properly prepared test specimens, separation usually occurs in the plastic just beneath the coating-substrate interface rather than at the interface. It does, however, reflect the degree that the process is controlled.

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 Document

2.1 *ASTM Standards:*

E 4 Practices for Force Verification of Testing Machines<sup>3</sup>

### 3. Summary of Test Method

3.1 A properly prepared standard test specimen, called a plaque, is copper electroplated, with no additional metal

coating. The coated plaque is either tested as is, or it is conditioned by a low-temperature bake and then tested. The coating is cut through to the plastic substrate in a way that forms two strips of coating (see Fig. 1). Each strip is peeled from the substrate at a right angle using an instrument that indicates the force required to separate it from its substrate.

### 4. Significance and Use

4.1 The force required to separate a metallic coating from its plastic substrate is determined by the interaction of several factors: the generic type and quality of the plastic molding compound, the molding process, the process used to prepare the substrate for electroplating, and the thickness and mechanical properties of the metallic coating. By holding all others constant, the effect on the peel strength by a change in any one of the above listed factors may be noted. Routine use of the test in a production operation can detect changes in any of the above listed factors.

4.2 The peel test values do not directly correlate to the adhesion of metallic coatings on the actual product.

4.3 When the peel test is used to monitor the coating process, a large number of plaques should be molded at one time from a same batch of molding compound used in the production moldings to minimize the effects on the measurements of variations in the plastic and the molding process.

### 5. Apparatus

5.1 *Procedure A*—A tension testing machine that has self-aligning grips and that has a loading range that includes the forces to be measured, 5 to 200 N, shall be used to separate the coating from the substrate, and measure the force required. The machine shall meet the verification requirements of Practices E 4.<sup>4</sup> The speed of separation of the crossarms of the machine shall be adjusted to give a separation rate of  $25 \pm 3$  mm/min. The machine shall automatically and continuously record on a chart the load on one coordinate and the amount of peel on the other coordinate. The amount of peel may be obtained from calculation, using a known chart speed.

<sup>4</sup> The Instron universal testing machine, Instron Corp., Canton, MA, has been found to be satisfactory.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee B-8 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.08.03 on Decorative Coatings.

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<sup>2</sup> This test is also known as the Jacquet Test. A detailed treatment of the test has been published by Saubestre et al in *Plating*, Vol 52, 1965, p. 982.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.01.

