



Standard Test Method for Gross Defects and Mechanical Damage in Metallic Coatings by Polysulfide Immersion¹

This standard is issued under the fixed designation B 866; 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 equipment and methods for detecting gross defects and mechanical damage (including wear-through) in metallic coatings where the breaks in the coating penetrate down to a copper or copper alloy substrate.

1.2 This test method is suitable for coatings consisting of single or combined layers of any coating that does not significantly tarnish in an alkaline polysulfide solution. Examples are gold, nickel, tin, tin-lead, and palladium, or their alloys.

1.3 Recent reviews of porosity testing (which include those for gross defects) and testing methods can be found in literature.^{2,3} An ASTM guide to the selection of porosity and gross defect tests for electrodeposits and related metallic coatings is available as Guide B 765. Other related porosity test standards are Test Methods B 735, B 741, B 798, B 799, and B 809.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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:

- B 246 Specification for Tinned Hard-Drawn and Medium-Hard-Drawn Copper Wire for Electrical Purposes⁴
- B 374 Terminology Relating to Electroplating⁵
- B 488 Specification for Electrodeposited Coatings of Gold

¹ This test method is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.10 on Test Methods.

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² Clarke, M., "Porosity and Porosity Tests," in *Properties of Electrodeposits*, edited by Sard, Leidheiser, and Ogburn, The Electrochemical Society, 1975, p. 122.

³ Krumbein, S. J., "Porosity Testing of Contact Platings," Trans. Connectors and Interconnection Technology Symposium, Philadelphia, PA, October 1987, p. 47.

⁴ *Annual Book of ASTM Standards*, Vol 02.03.

⁵ *Annual Book of ASTM Standards*, Vol 02.05.

for Engineering Uses⁵

B 542 Terminology Relating to Electrical Contacts and Their Use⁶

B 545 Specification for Electrodeposited Coatings of Tin⁵

B 605 Specification for Electrodeposited Coatings of Tin-Nickel Alloy⁵

B 679 Specification for Electrodeposited Coatings of Palladium for Engineering Use⁵

B 689 Specification for Electrodeposited Engineering Nickel Coatings⁵

B 733 Specification for Autocatalytic (Electroless) Nickel-Phosphorus Coatings on Metal⁵

B 735 Test Method for Porosity in Gold Coatings on Metal Substrates by Nitric Acid Vapor⁶

B 741 Test Method for Porosity in Gold Coatings on Metal Substrates by Paper Electrography⁶

B 765 Guide for Selection of Porosity Tests for Electrodeposits and Related Metallic Coatings⁵

B 798 Test Method for Porosity in Gold or Palladium Coatings on Metal Substrates by Gel-Bulk Electrography⁶

B 799 Test Method for Porosity in Gold and Palladium Coatings by Sulfurous Acid/Sulfur Dioxide Vapor⁶

B 809 Test Method for Porosity in Metallic Coatings by Humid Sulfur Vapor ("Flowers-of-Sulfur")⁵

3. Terminology

3.1 *Definitions*: Many terms used in this test method are defined in Terminologies B 374 or B 542.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *defect indications*—black or dark colored products resulting from the reaction between the alkaline polysulfide reagent and exposed copper or copper alloy underlying metal.

3.2.2 *gross defects*—breaks in the coating that expose relatively large areas of underlying metal to the environment (compare with *intrinsic porosity* (3.2.3)). Gross defects include those produced by mechanical damage and wear, in addition to as-plated large pores (with diameters an order of magnitude greater than intrinsic porosity) and networks of microcracks.

NOTE 1—Such large pores and microcrack networks indicate serious deviations from acceptable coating practice (as, for example, dirty

⁶ *Annual Book of ASTM Standards*, Vol 02.04.