Designation: B489 – 85 (Reapproved 2018)

Standard Practice for Bend Test for Ductility of Electrodeposited and Autocatalytically Deposited Metal Coatings on Metals[1]

This standard is issued under the fixed designation B489; 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 practice covers a test procedure for determining the ductility of electrodeposited and autocatalytically deposited coatings on sheet or strip basis metals. The purpose of the test is to determine the resistance of metal coatings to cracking during distortion.[2]

1.2 Test Methods E8 can be used if the coatings are too ductile and require mandrels too small to be practical.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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:*[3]

B177 Guide for Engineering Chromium Electroplating

D1193 Specification for Reagent Water

E8 Test Methods for Tension Testing of Metallic Materials

3. Summary of Practice

3.1 The practice consists of bending a narrow strip of the electroplated or coated article over a mandrel. An elongation measurement is obtained from the smallest diameter mandrel that does not cause the coating to fracture.

4. Significance and Use

4.1 The routine measurement of the ductility of electrodeposited and autocatalytically deposited metal coatings can be useful in process control, especially when the electroplating process is used for decorative and engineering purposes.

5. Apparatus

5.1 *Series of Mandrels,* with diameters from 6 to 50 mm, in 3-mm steps with lengths of 100 to 150 mm so they can be held in a vise.

5.2 *Micrometer,* to measure the thickness of the test specimens.

5.3 *Guillotine Shears* or other device to cut the specimens to size.

5.4 *File or Grinder* to remove burrs and to round or chamfer edges.

5.5 *Vise,* to hold mandrels.

5.6 *Magnifier,* 10×.

6. Test Specimen

6.1 Flat specimens, 10 mm wide, and not less than 150 mm long, shall be cut from the electroplated or coated article if the shape permits, no closer than 25 mm from the edges. Guillotine shears are preferred, but any convenient method may be used. Basis metal thickness and temper shall be suitable to permit bending around the smallest diameter mandrel, if necessary. Low-carbon AISI 1010 to 1025 steel strip or sheet, 0.25 to 1.0 mm thick is usually suitable. Basis metals that have low ductility can initiate cracks that can propagate through the coatings. The procedure indicated in 6.2 shall then be followed.

6.2 When the shape is such that a test specimen cannot be obtained from the part, a test panel may be prepared of appropriate basis metal, such as low-carbon steel (see 6.1), with the same coating system in the same baths. The panel shall

[1] This practice 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] For a discussion and theory for this test see Mohrnheim, A. F., "The Bend Test for Measuring the Strain Limit of Surfaces," *Plating,* Vol 50, 1963, pp. 1094 – 1099.

[3] 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.