



Standard Guide for Electroforming with Nickel and Copper¹

This standard is issued under the fixed designation B832; 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 guide covers electroforming practice and describes the processing of mandrels, the design of electroformed articles, and the use of copper and nickel electroplating solutions for electroforming.

1.2 *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:²

- B183 Practice for Preparation of Low-Carbon Steel for Electroplating
- B242 Guide for Preparation of High-Carbon Steel for Electroplating
- B252 Guide for Preparation of Zinc Alloy Die Castings for Electroplating and Conversion Coatings
- B253 Guide for Preparation of Aluminum Alloys for Electroplating
- B254 Practice for Preparation of and Electroplating on Stainless Steel
- B281 Practice for Preparation of Copper and Copper-Base Alloys for Electroplating and Conversion Coatings
- B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity
- B343 Practice for Preparation of Nickel for Electroplating with Nickel
- B374 Terminology Relating to Electroplating
- B489 Practice for Bend Test for Ductility of Electrodeposited and Autocatalytically Deposited Metal Coatings on Metals

- B490 Practice for Micrometer Bend Test for Ductility of Electrodeposits
- B558 Practice for Preparation of Nickel Alloys for Electroplating
- B571 Practice for Qualitative Adhesion Testing of Metallic Coatings
- B578 Test Method for Microhardness of Electroplated Coatings
- B636 Test Method for Measurement of Internal Stress of Plated Metallic Coatings with the Spiral Contractometer
- B659 Guide for Measuring Thickness of Metallic and Inorganic Coatings
- B849 Specification for Pre-Treatments of Iron or Steel for Reducing Risk of Hydrogen Embrittlement
- E8 Test Methods for Tension Testing of Metallic Materials
- E384 Test Method for Knoop and Vickers Hardness of Materials

3. Summary of Electroforming Practice

3.1 Electroforming is defined (see Terminology B374) as the production or reproduction of articles by electrodeposition upon a mandrel or mold that is subsequently separated from the deposit.

3.2 The basic fabrication steps are as follows: a suitable mandrel is fabricated and prepared for electroplating; the mandrel is placed in an appropriate electroplating solution and metal is deposited upon the mandrel by electrolysis; when the required thickness of metal has been applied, the metal-covered mandrel is removed from the solution; and the mandrel is separated from the electrodeposited metal. The electroform is a separate, free-standing entity composed entirely of electrodeposited metal. Electroforming is concerned with the fabrication of articles of various kinds.

4. Significance and Use

4.1 The specialized use of the electroplating process for electroforming results in the manufacture of tools and products that are unique and often impossible to make economically by traditional methods of fabrication. Current applications of nickel electroforming include: textile printing screens; components of rocket thrust chambers, nozzles, and motor cases; molds and dies for making automotive arm-rests and instrument panels; stampers for making phonograph records, video-discs, and audio compact discs; mesh products for making

¹ This guide is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.03 on Engineering Coatings.

Current edition approved Dec. 1, 2013. Published December 2013. Originally approved in 1993. Last previous edition approved in 2008 as B832 – 93(2008). DOI: 10.1520/B0832-93R13.

² 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.