



Designation: B154 – 05

## Standard Test Method for Mercurous Nitrate Test for Copper Alloys<sup>1</sup>

This standard is issued under the fixed designation B154; 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 standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope\*

1.1 This test method describes the technique for conducting the mercurous nitrate test for residual stresses in wrought copper alloy mill products.

NOTE 1—For any particular copper alloy, reference should be made to the material specification.

1.2 *Units*—The values stated in SI 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 determines the applicability of regulatory limitations prior to use.* For specific precautionary and hazard statements see Sections 1, 6, and 7. (**Warning**—Mercury is a definite health hazard in use and disposal.)

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

B846 Terminology for Copper and Copper Alloys

D1193 Specification for Reagent Water

### 3. Terminology

3.1 For terms related to copper and copper alloys, refer to Terminology B846.

### 4. Summary of Test Method

4.1 The prepared test specimen is completely immersed in the mercurous nitrate test solution for 30 min at ambient temperature. Upon removal from the solution, the test specimen is washed and immediately examined visually for cracks.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.06 on Methods of Test.

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<sup>2</sup> 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.

### 5. Significance and Use

5.1 This test method is an accelerated test for detecting the presence of residual (internal) stresses that might result in failure of individual parts in storage or in service due to stress corrosion cracking.

5.2 This test method is not intended for use on assemblies or parts under applied stress. If used for that purpose, the results shall be for information only and not a cause for rejection of the assembly, its component parts, or the original mill product.

### 6. Reagents and Materials

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagent of the American Chemical Society where such specifications are available.<sup>3</sup> Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean Type IV reagent water or better, as defined of Specification D1193.

6.3 *Mercurous Nitrate Solution*—The solution shall be an aqueous mercurous nitrate solution containing 10 g of mercurous nitrate solution ( $\text{HgNO}_3$ ) and 10 mL of nitric acid ( $\text{HNO}_3$ ) (sp gr 1.42) per litre of solution.

6.4 *Preparation*—The aqueous mercurous nitrate solution shall be prepared by either of the following procedures, A or B. Used solutions may be replenished as described in 6.5.

6.4.1 *Procedure A*—Dissolve 11.4 g of  $\text{HgNO}_3 \cdot 2\text{H}_2\text{O}$  or 10.7 g of  $\text{HgNO}_3 \cdot \text{H}_2\text{O}$  in approximately 40 mL of distilled water acidified with 10 mL of  $\text{HNO}_3$  (sp gr 1.42). After the crystals are completely dissolved, dilute the solution with water to 1000 mL. (**Warning**—The mercurous nitrate crystals

<sup>3</sup> *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For Suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

\*A Summary of Changes section appears at the end of this standard