



Designation: B 858 – 95

Standard Test Method for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using an Ammonia Vapor Test¹

This standard is issued under the fixed designation B 858; 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 method² describes a procedure that may be used to determine the presence of residual stresses which may lead to stress corrosion cracking of wrought copper alloy products. This test method uses an ammonia atmosphere to simulate service conditions under which stress corrosion cracking may occur.

1.2 This test method is only suitable for products fabricated from copper alloys that are known to be susceptible to stress corrosion cracking in ammonia vapor atmospheres. It is intended to create an environmental condition of reproducible severity, but it is well known that the critical step in the cracking mechanism is the development of an environment in the condensate film that occurs on the surface of the test specimen, which is rich in copper complex ions.

1.3 This test method is a conversion of ISO 6957, “Copper Alloys—Ammonia Test for Stress Corrosion Resistance.”

1.4 The severity of this test method depends upon the pH of the corrosive solution. In Annex A1 are given four different atmospheres to which the product may be exposed, and the appropriate pH of the solution to be used for the test, depending on the risk level associated with the intended application.

1.4.1 The appropriate pH value for the test shall be specified in the product specification, or as per established agreement between the supplier and purchaser, with respect to the alloy and its intended application.

1.5 The values stated in SI units are the standard.

1.6 *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 154 Test Method for Mercurous Nitrate Test for Copper and Copper Alloys³

D 1193 Specification for Reagent Water⁴

2.2 Other Documents:

ISO 6957 Copper Alloys—Ammonia Test for Stress Corrosion Resistance⁵

3. Terminology

3.1 Definitions:

3.1.1 *applied stress*—stress in a body as a result of application of an external load.

3.1.2 *residual stress*—stresses that remain within a body as the result of processing, which may include plastic deformation or casting.

3.1.3 *stress corrosion crack*—spontaneous failure of metals by cracking under combined action of corrosion and stress, residual or applied.

4. Summary of Test Method

4.1 The prepared test specimen is placed in a closed container and exposed to ammonia vapor at ambient temperature for 24 h. Upon removal from the test atmosphere, the test specimen is examined for the presence of cracks.

5. Significance and Use

5.1 This test method is an accelerated test to determine if a copper alloy product in a specific stress condition will be susceptible to stress corrosion cracking when exposed to a particular atmospheric condition during service with the appropriate risk level—see Annex A1. This test method is generally intended to determine if a copper alloy product will crack because of internal stresses when subjected to the test, and is not intended for testing assemblies under applied stress. If used for this purpose it shall be for information only and not a cause for rejection of the assembly, its component parts, or the original mill product.

6. Apparatus

6.1 pH meter.

6.2 Closed vessel, such as a desiccator.

¹ 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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² This test method is a conversion of ISO 6957 “Copper Alloys—Ammonia Test for Stress Corrosion Resistance.” Additional background information is included in Appendix X1.

³ *Annual Book of ASTM Standards*, Vol 02.01.

⁴ *Annual Book of ASTM Standards*, Vol 11.01.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.