



# Standard Practice for Establishing Conformance to the Minimum Expected Corrosion Characteristics of Metallic, Painted-Metallic, and Nonmetallic-Coated Steel Sheet Intended for Use as Cold Formed Framing Members<sup>1</sup>

This standard is issued under the fixed designation A1004/A1004M; 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.

## 1. Scope

1.1 This practice covers procedures for establishing the acceptability of metallic-coated steel sheet, painted metallic-coated steel sheet and painted nonmetallic-coated steel sheet for use as cold formed framing members.

1.2 This practice shall be used to assess the corrosion resistance of different coatings on steel sheet in a laboratory test. It shall not be used as an application performance standard for the cold formed framing members.

1.3 The practice shall be used to evaluate coatings under consideration for addition to Specification [A1003/A1003M](#).

1.4 The values stated in either inch-pound or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other.

1.5 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of the standard.

## 2. Referenced Documents

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

[A902 Terminology Relating to Metallic Coated Steel Products](#)

[A1003/A1003M Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members](#)

[B117 Practice for Operating Salt Spray \(Fog\) Apparatus](#)

<sup>1</sup> This practice is under the jurisdiction of Committee [A05](#) on Sheet Specifications.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[D714 Test Method for Evaluating Degree of Blistering of Paints](#)

[D1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments](#)

## 3. Terminology

3.1 For definitions of terms related to metallic-coated steel products, see Terminology [A902](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *red rust, n*—the oxide formed when iron combines chemically with oxygen.

3.2.2 *red rust stains, n*—the discoloration of the surface of a coated steel sheet caused by the bleeding of red rust from adjacent areas.

## 4. Summary of Practice

4.1 This practice involves exposing flat and formed samples of metallic-coated, painted metallic-coated and painted nonmetallic-coated steel sheet to a controlled saline environment using Practice [B117](#) and measuring the extent of corrosion after a predetermined time of exposure in the accelerated test.

4.2 The samples exposed to the saline environment are prepared according to Test Method [D1654](#).

4.3 The maximum acceptable amount of corrosion allowed for each material is described in Specification [A1003/A1003M](#).

## 5. Significance and Use

5.1 This practice is intended solely for the evaluation of metallic-coated, painted metallic-coated, and painted nonmetallic-coated materials used for the manufacture of cold formed framing members.

5.2 Correlation and extrapolation of corrosion performance based on exposure to the test environment provided by Practice [B117](#) are not always predictable. Correlation and extrapolation should be considered only in cases where appropriate corroborating long-term atmospheric exposures have been conducted.

5.3 This practice assesses whether coated materials not currently in Specification **A1003/A1003M** satisfy the required minimum corrosion characteristics.

## 6. Procedure

### 6.1 General Requirements:

6.1.1 Select test panels from routine production material ensuring that the samples are representative of the material. Test panels with the normally applied surface coatings such as chemical treatment or oil, or both.

6.1.2 The size of flat test panels shall be 4 by 12 in. [100 by 300 mm]. Formed panels shall be 4 by 12 in. [100 by 300 mm] or the actual production width, if smaller than the 4-in. [100-mm] width requirement.

6.1.3 Orient test panels in the salt spray cabinet with the 12-in. [300-mm] dimension in the vertical position.

### 6.2 Metallic-Coated Products:

6.2.1 Use Practice **B117** to evaluate conformance with the minimum expected corrosion characteristics.

6.2.2 Test at least three samples from three different production runs of a candidate product.

6.2.3 Protect the edges of all test panels from exposure to the salt solution.

6.2.4 Metallic-coated materials shall satisfy the minimum corrosion characteristics of G60 [Z180] for the Type H and Type L steels and G40 [Z120] for the Type NS steels.

6.2.5 Test for 100 h for Type H and Type L materials or 75 h for Type NS material.

6.2.6 Loss of coating is indicated by the appearance of red rust in areas devoid of any metallic coating. The products of oxidation combined with the salt solution have a tendency to coat the test sample with a red rust stain. Remove the red rust stain before evaluating the test panel.

NOTE 1—The test criteria for metallic-coated products are listed in Specification **A1003/A1003M**.

### 6.3 Painted Metallic-Coated:

6.3.1 Use Practice **B117** to establish the minimum expected corrosion characteristics.

6.3.2 Test at least three samples from three different production runs of a candidate product.

6.3.3 The metallic-coated substrate of the painted metallic-coated steel sheet shall satisfy the test requirements described in **6.2**

6.3.4 Painted metallic-coated test panels shall have a scribe that penetrates the nonmetallic coating only. The scribe shall be at an angle of 30° to the longest panel (12 in. [300 mm]) dimension.

6.3.5 Protect the edges of all test panels from exposure to the salt solution.

6.3.6 Test for 500 h to establish conformance to the minimum expected corrosion characteristics of the nonmetallic coating.

NOTE 2—The test criteria for painted metallic-coated product are listed in Specification **A1003/A1003M**.

6.3.7 Evaluate the mean creepage in accordance with Test Method **D1654**.

6.3.8 Evaluate the blisters in accordance with Test Method **D714**.

### 6.4 Painted Nonmetallic-Coated Products:

6.4.1 Use Practice **B117** to establish the minimum expected corrosion characteristics.

6.4.2 Test at least three samples from three different production lots of a candidate material.

6.4.3 Painted nonmetallic-coated test panels shall have a scribe that penetrates the nonmetallic coating only. The scribe shall be at an angle of 30° to the longest panel (12 in. [300 mm]) dimension.

6.4.4 Protect the edges of all test panels from exposure to the salt solution.

6.4.5 Test for 250 h to establish conformance to requirements.

NOTE 3—The test criteria for painted nonmetallic-coated product are listed in Specification **A1003/A1003M**.

6.4.6 Evaluate the mean creepage in accordance with Test Method **D1654**.

6.4.7 Evaluate the blisters in accordance with Test Method **D714**.

## 7. Report

7.1 Subcommittee A05.11 will consider the addition of coating systems not currently referenced in Specification **A1003/A1003M** through the review of results of tests conducted according to this practice.

## 8. Keywords

8.1 corrosion; metallic-coated sheet; painted metallic-coated sheet; painted nonmetallic-coated sheet; salt spray; sheet steel

**APPENDIX****(Nonmandatory Information)****X1. GENERAL INFORMATION ON THE SIGNIFICANCE AND USE OF SALT SPRAY TESTING**

X1.1 Practice **B117**, salt spray (fog) testing, is commonly used to assess the relative corrosion resistance of a coated steel product through the use of a controlled corrosive environment. The practice, however, is sometimes mistakenly considered to be a guide for the evaluation of corrosion resistance of coated products. As stated in that standard Practice **B117** describes the apparatus, procedure, and conditions required to create and maintain the salt spray (fog) test environment. The practice does not prescribe the type of test specimen or exposure periods to be used for a specific product, nor the interpretation to be given to the results. The practice provides a controlled corrosive environment that has been utilized to produce relative corrosion resistance information for specimens of metals and coated metals in any particular test chamber. Consequently, users of Practice **B117** must describe specific information on the test specimens such as size, degree of exposed surface (edges protected or not), and localization of corrosion with a

scribe through the coating. The users must also define the “end of test” criteria. Examples of these criteria include: onset of first rust, degree of delamination of protective film, or loss of coating to rust. Development of these criteria must consider the corrosion resistance mechanism of the product under test, for example, galvanic protection or barrier protection.

X1.2 Industry experience with Practice **B117** has resulted in a body of knowledge of the testing protocols and test criteria for specific products. The requirements contained in Annexes A1.1, A2.1 and A2.2 of Practice **B117** reflect this experience.

X1.3 While the limitations of salt spray testing are widely recognized, the test remains in use, especially as a quality control tool. Because of its limitations, salt spray testing should not be used to predict service performance, nor should it be used to rank dissimilar materials. Its use should be limited to process qualification and quality control.

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