



Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels¹

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1. Scope

1.1 This guide presents two methods for estimating the atmospheric corrosion resistance of low-alloy weathering steels, such as those described in Specifications [A242/A242M](#), [A588/A588M](#), [A606](#) Type 4, [A709/A709M](#) grades 50W, HPS 70W, and 100W, [A852/A852M](#), and [A871/A871M](#). One method gives an estimate of the long-term thickness loss of a steel at a specific site based on results of short-term tests. The other gives an estimate of relative corrosion resistance based on chemical composition.

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

2. Referenced Documents

2.1 ASTM Standards:²

[A242/A242M](#) Specification for High-Strength Low-Alloy Structural Steel

[A588/A588M](#) Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance

[A606](#) Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance

[A709/A709M](#) Specification for Structural Steel for Bridges

[A852/A852M](#) Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi [485 MPa] Minimum Yield Strength to 4 in. [100 mm] Thick (Withdrawn 2010)³

[A871/A871M](#) Specification for High-Strength Low-Alloy

[Structural Steel Plate With Atmospheric Corrosion Resistance](#)

[G1](#) Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens

[G16](#) Guide for Applying Statistics to Analysis of Corrosion Data

[G50](#) Practice for Conducting Atmospheric Corrosion Tests on Metals

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *low-alloy steels*—iron-carbon alloys containing greater than 1.0 % but less than 5.0 %, by mass, total alloying elements.

3.1.1.1 *Discussion*—Most “low-alloy weathering steels” contain additions of both chromium and copper, and may also contain additions of silicon, nickel, phosphorus, or other alloying elements which enhance atmospheric corrosion resistance.

4. Summary of Guide

4.1 In this guide, two general methods are presented for estimating the atmospheric corrosion resistance of low-alloy weathering steels. These are not alternative methods; each method is intended for a specific purpose, as outlined in [5.2](#) and [5.3](#).

4.1.1 The first method utilizes linear regression analysis of short-term atmospheric corrosion data to enable prediction of long-term performance by an extrapolation method.

4.1.2 The second method utilizes predictive equations based on the steel composition to calculate indices of atmospheric corrosion resistance.

5. Significance and Use

5.1 In the past, ASTM specifications for low-alloy weathering steels, such as Specifications [A242/A242M](#), [A588/A588M](#), [A606](#) Type 4, [A709/A709M](#) Grade 50W, HPS 70W, and 100W, [A852/A852M](#), and [A871/A871M](#) stated that the atmospheric corrosion resistance of these steels is “approximately two times that of carbon structural steel with copper.” A footnote in the specifications stated that “two times carbon structural steel with copper is equivalent to four times carbon

¹ This guide is under the jurisdiction of ASTM Committee G01 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.04 on Atmospheric Corrosion.

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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.

³ The last approved version of this historical standard is referenced on www.astm.org.