



Designation: G46 – 21

Standard Guide for Examination and Evaluation of Pitting Corrosion¹

This standard is issued under the fixed designation G46; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This guide covers the selection of procedures that can be used in the examination and evaluation of pitted metals. These procedures include both nondestructive and destructive approaches.

1.2 The procedures covered in this guide include those that may be used in laboratory evaluations of corroded metal specimens and field examinations and inspections.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.3.1 *Exception*—In **X1.2.1**, mils per year (MPY) are regarded as standard for the target corrosion rate.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

E3 Guide for Preparation of Metallographic Specimens

G1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens

G16 Guide for Applying Statistics to Analysis of Corrosion Data

G61 Test Method for Conducting Cyclic Potentiodynamic Polarization Measurements for Localized Corrosion Susceptibility of Iron-, Nickel-, or Cobalt-Based Alloys

G193 Terminology and Acronyms Relating to Corrosion

2.2 *ISO Standard:*³

ISO 25178-604:2013(E) Geometrical product specifications (GPS) — Surface texture: Areal — Part 604: Nominal characteristics of non-contact (coherence scanning interferometry) instruments

2.3 *NACE Standards:*⁴

NACE RP-01-73 Collection and Identification of Corrosion Products⁵

NACE SP0775 Preparation, Installation, Analysis, and Interpretation of Corrosion Coupons in Oilfield Operations

3. Terminology

3.1 Terms and acronyms used in this guide are defined in Terminology **G193**.

4. Significance and Use

4.1 It is important to be able to determine the extent of pitting, either in a service application in which it is necessary to predict the remaining life in a metal structure, or in laboratory test programs that are used to select the most pitting-resistant materials for service. The purpose of the study is crucial in determining the appropriate examination and evaluation steps.

4.2 Some typical purposes of laboratory tests include, but are not limited to, evaluating performance of alloys, determining whether an alloy is resistant to the environment, evaluating how environmental conditions including corrosion inhibitor affect or prevent pitting, and evaluating whether a lot of metal is sufficiently resistant for its use in a particular application or environment.

¹ This guide is under the jurisdiction of ASTM Committee **G01** on Corrosion of Metals and is the direct responsibility of Subcommittee **G01.05** on Laboratory Corrosion Tests.

Current edition approved Aug. 1, 2021. Published October 2021. Originally approved in 1976. Last previous edition approved in 2018 as G46-94 (2018). DOI: 10.1520/G0046-21.

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 Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

⁴ Available from Association for Materials Protection and Performance (AMPP), 15835 Park Ten Pl., Houston, TX 77084, <http://www.ampp.org>.

⁵ Insert in *Materials Protection and Performance*, Vol 12, June 1973, p. 65.