



Standard Test Method for Determining the Crevice Repassivation Potential of Corrosion-Resistant Alloys Using a Potentiodynamic- Galvanostatic-Potentiostatic Technique¹

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1. Scope

1.1 This test method covers a procedure for conducting anodic polarization studies to determine the crevice repassivation potential for corrosion-resistant alloys. The concept of the repassivation potential is similar to that of the protection potential given in Reference Test Method G5.

1.2 The test method consists in applying successively potentiodynamic, galvanostatic, and potentiostatic treatments for the initial formation and afterward repassivation of crevice corrosion.

1.3 This test method is a complement to Test Method G61.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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:²

- B575** Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, Low-Carbon Nickel-Chromium-Molybdenum-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Tungsten, and Low-Carbon Nickel-Molybdenum-Chromium Alloy Plate, Sheet, and Strip
- D1193** Specification for Reagent Water
- E691** Practice for Conducting an Interlaboratory Study to

¹ This test method is under the jurisdiction of ASTM Committee G01 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.11 on Electrochemical Measurements in Corrosion Testing.

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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.

Determine the Precision of a Test Method

- G1** Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens
- G5** Reference Test Method for Making Potentiodynamic Anodic Polarization Measurements
- G15** Terminology Relating to Corrosion and Corrosion Testing (Withdrawn 2010)³
- G48** Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
- G61** Test Method for Conducting Cyclic Potentiodynamic Polarization Measurements for Localized Corrosion Susceptibility of Iron-, Nickel-, or Cobalt-Based Alloys
- G78** Guide for Crevice Corrosion Testing of Iron-Base and Nickel-Base Stainless Alloys in Seawater and Other Chloride-Containing Aqueous Environments

3. Terminology

3.1 *Definitions*—For definitions of corrosion-related terms used in this test method, see Terminology G15.

4. Summary of Test Method

4.1 This anodic polarization test method combines techniques such as potentiodynamic, galvanostatic, and potentiostatic polarization methods. This test method is called the Tsujikawa-Hisamatsu Electrochemical (THE) test method to honor the two precursors of this technique (see 1 and 2).⁴ The new technique will be called the THE test method. This new THE test method is more time-consuming than the already well-established cyclic potentiodynamic polarization (CPP) described in Test Method G61.

4.2 The THE test method can be used with any corrosion-resistant alloy, but it was developed by studying Alloy 22 (UNS N06022). The composition and other properties of Alloy 22 are given in Specification B575. Alloy 22 is a nickel-based alloy containing approximately 22wt% Cr, 13wt% Mo, 3wt%

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

⁴ The boldface numbers in parentheses refer to a list of references at the end of this standard.