



## Standard Guide for Laboratory Immersion Corrosion Testing of Metals<sup>1</sup>

This standard is issued under the fixed designation TM0169/G31; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision.

### 1. Scope

1.1 This guide covers and describes the factors that influence laboratory immersion corrosion tests, particularly mass loss tests. These factors include apparatus, sampling, test specimen, test conditions (test solution composition, temperature, gas sparging, fluid motion, solution volume, method of supporting test specimens, duration of test), methods of cleaning test specimens, interpretation of results, and calculation of corrosion rates. This guide also emphasizes the importance of recording all pertinent data and provides a checklist for reporting test data.

1.2 The specific evaluation of localized attack, environmentally assisted cracking, and effects of solution flow are not within the scope of this guide.

1.3 This guide is intended to be used by those designing laboratory immersion tests who may not be familiar with all of the variables to consider and the pitfalls that could be encountered when designing and conducting this kind of testing. It should be used as a reference to ensure that the test will allow generation of data relevant to the application with the minimum of interferences.

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:<sup>2</sup>

- A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- D1193 Specification for Reagent Water
- E8 Test Methods for Tension Testing of Metallic Materials
- E300 Practice for Sampling Industrial Chemicals

<sup>1</sup> This guide is under the jurisdiction of NACE/ASTM Committee J01, Joint Committee on Corrosion, and is the direct responsibility of Subcommittee J01.01, Working Group on Laboratory Immersion Tests.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM Web site, [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 Web site. For NACE standards, visit the NACE Web site, [www.nace.org](http://www.nace.org), or contact NACE FirstService at [firstservice@nace.org](mailto:firstservice@nace.org).

- G1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens
- G28 Test Methods for Detecting Susceptibility to Intergranular Corrosion in Wrought, Nickel-Rich, Chromium-Bearing Alloys
- G34 Test Method for Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)
- G46 Guide for Examination and Evaluation of Pitting Corrosion
- G48 Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
- G66 Test Method for Visual Assessment of Exfoliation Corrosion Susceptibility of 5XXX Series Aluminum Alloys (ASSET Test)
- G67 Test Method for Determining the Susceptibility to Intergranular Corrosion of 5XXX Series Aluminum Alloys by Mass Loss After Exposure to Nitric Acid (NAMLT Test)
- G71 Guide for Conducting and Evaluating Galvanic Corrosion Tests in Electrolytes
- G78 Guide for Crevice Corrosion Testing of Iron-Base and Nickel-Base Stainless Alloys in Seawater and Other Chloride-Containing Aqueous Environments
- G82 Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance
- G107 Guide for Formats for Collection and Compilation of Corrosion Data for Metals for Computerized Database Input
- G108 Test Method for Electrochemical Reactivation (EPR) for Detecting Sensitization of AISI Type 304 and 304L Stainless Steels
- G110 Practice for Evaluating Intergranular Corrosion Resistance of Heat Treatable Aluminum Alloys by Immersion in Sodium Chloride + Hydrogen Peroxide Solution
- G112 Guide for Conducting Exfoliation Corrosion Tests in Aluminum Alloys
- G116 Practice for Conducting Wire-on-Bolt Test for Atmospheric Galvanic Corrosion
- G135 Guide for Computerized Exchange of Corrosion Data for Metals
- G170 Guide for Evaluating and Qualifying Oilfield and Refinery Corrosion Inhibitors in the Laboratory
- G184 Practice for Evaluating and Qualifying Oil Field and Refinery Corrosion Inhibitors Using Rotating Cage
- G185 Practice for Evaluating and Qualifying Oil Field and Refinery Corrosion Inhibitors Using the Rotating Cylinder Electrode