



Designation: G 110 – 92 (Reapproved 1997)

# Standard Practice for Evaluating Intergranular Corrosion Resistance of Heat Treatable Aluminum Alloys by Immersion in Sodium Chloride + Hydrogen Peroxide Solution<sup>1</sup>

This standard is issued under the fixed designation G 110; 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 the procedures for immersion tests in sodium chloride + hydrogen peroxide solution. It is primarily for tests of wrought heat treatable aluminum alloys (2XXX and 7XXX) but may be used for other aluminum alloys, including castings. It sets forth the specimen preparation procedures and the environmental conditions of the test and the means for controlling them.

1.2 This practice is intended for evaluations during alloy development and for evaluating production where it may serve as a control test on the quality of successive lots of the same material (see MIL-H-6088 and U.S. Federal Test Method Std. 151b). Therefore strict test conditions are stipulated for maximum assurance that variations in results are attributable to lot-to-lot differences in the material being tested.

NOTE 1—This practice does not address sampling or interpretation or significance of results.

1.3 *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:

- D 1193 Specification for Reagent Water<sup>2</sup>
- E 3 Methods of Preparation of Metallographic Specimens<sup>3</sup>
- E 407 Test Methods for Microetching Metals and Alloys<sup>3</sup>
- G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens<sup>4</sup>
- G 15 Terminology Relating to Corrosion and Corrosion Testing<sup>4</sup>
- G 67 Test Method for Determining the Susceptibility to Intergranular Corrosion of 5XXX Series Aluminum Alloys

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee G-1 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.05 on Laboratory Corrosion Tests.

Current edition approved June 15, 1992. Published September 1992.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 11.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.02.

by Mass Loss After Exposure to Nitric Acid (NAMLT Test)<sup>4</sup>

G 69 Practice for Measurement of Corrosion Potentials of Aluminum Alloys<sup>4</sup>

### 2.2 Other Documents:

U.S. Military Specification MIL-H-6088, Heat Treatment of Aluminum Alloys<sup>5</sup>

U.S. Federal Test Method, Standard No. 151b, Method 822.1, Intergranular Corrosion Test for Aluminum Alloys<sup>5</sup>

## 3. Summary of Practice

3.1 This practice consists of immersing etched test specimens in a sodium chloride + hydrogen peroxide solution for 6 or more hours. After immersion metallographic sections are examined to determine extent of intergranular corrosion (see Terminology G 15).

## 4. Significance and Use

4.1 This practice is especially useful for evaluating the adequacy of quenching when performed on material in the as-quenched condition. The practice may also be used to study the effect of subsequent thermal processes (for example, paint or bonding cures) or of actual precipitation treatments on the inherent type of corrosion. Intergranular corrosion resistance of heat treatable aluminum alloys is often directly related to the quenching conditions applied after solution heat treatment and to the subsequent aging treatment.<sup>6</sup>

4.2 This practice is not well suited for non-heat treatable work hardening aluminum alloys, such as the 1XXX, 3XXX, and 5XXX series (see Test Method G 67).

4.3 This practice does not deal with the interpretation of resulting intergranular corrosion. The significance of the extent and depth of any intergranular corrosion resulting from this test is to be agreed upon between producer and user.

## 5. Reagents

5.1 Reagent grade chemicals [sodium chloride (NaCl), 70 %

<sup>5</sup> Available from Standardization Documents Order Desk, Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

<sup>6</sup> Lifka, B. W., and Sprowls, D. O., "Significance of Intergranular Corrosion of High Strength Aluminum Alloy Products," *Localized Corrosion Cause of Metal Failure*, ASTM STP 516 (1972), pp. 120-144.