



Designation: F 2111 – 01

Standard Practice for Measuring Intergranular Attack or End Grain Pitting on Metals Caused by Aircraft Chemical Processes¹

This standard is issued under the fixed designation F 2111; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the procedures for testing and measuring intergranular attack (IGA) and end grain pitting on aircraft metals and alloys caused by maintenance or production chemicals.

1.2 The standard does not purport to address all qualification testing parameters, methods, critical testing, or criteria for aircraft production or maintenance chemical qualifications. Specific requirements and acceptance testing along with associated acceptance criteria may be found where applicable in procurement specifications, materials specifications, or appropriate process specifications.

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:

E 3 Practice for Preparation of Metallographic Specimens²

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens³

G 15 Terminology Relating to Corrosion and Corrosion Testing³

G 46 Guide for Examination and Evaluation of Pitting Corrosion³

2.2 ASME Standard:

B46.1 Surface Texture (Surface Roughness, Waviness, and Lay)⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *long transverse (LT)*—the longest dimension perpendicular to the rolling or extruded direction of the extrusion in the original shape.

3.1.2 *pit*—a depression or cavity with a width to depth ratio of <6 to 1.

3.1.3 *short transverse (ST)*—the shortest dimension perpendicular to the rolling or extruded direction of the extrusion in the original shape.

3.1.4 *surface roughness (R_a)*—filtered mean line μ in. (μ m) as defined in ASME B46.1, Surface Texture.

4. Significance and Use

4.1 If not properly qualified, chemicals and chemical processes can attack metals used during aircraft maintenance and production. It is important to qualify only processes and chemical formulas that do not have any deleterious effects on aircraft metallic skins, fittings, components, and structures. This test procedure is used to detect and measure intergranular attack or pitting depth caused by aircraft maintenance chemical processes, hence, this test procedure is useful in selecting a process that will not cause intergranular attack or end grain pitting on aircraft alloys.

4.2 The purpose of this practice is to aid in the qualification or process conformance testing or production or maintenance chemicals for use on aircraft.

4.2.1 Some examples of maintenance and production chemicals include: organic solvents, paint strippers, cleaners, deoxidizers, water-based or semi-aqueous cleaners, or etching solutions and chemical milling solutions.

5. Apparatus and Materials

5.1 *Metallurgical Microscope*, capable of 500× or greater magnification with scaled filar units in microscope eyepiece.

5.2 *Metallurgical Polishing Wheel*, capable of polishing test specimen to a surface finish of 5- μ in. R_a or finer.

5.3 *Noncorrosive Metallurgical Quality Polishing Media or Compound*, capable of polishing test specimens to 5- μ in. R_a or finer.

6. Test Specimens

6.1 Unless otherwise specified, manufacture test specimens as follows:

6.1.1 Prepare at least one test specimen (or more when specified by applicable process specification) from plate, sheet,

¹ This practice is under the jurisdiction of ASTM Committee F07 on Aerospace and Aircraft and is the direct responsibility of Subcommittee F07.07 on Qualification Testing of Aircraft Cleaning Materials.

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² Annual Book of ASTM Standards, Vol 03.01.

³ Annual Book of ASTM Standards, Vol 03.02.

⁴ Available from American Society of Mechanical Engineers, Headquarters, Three Park Ave., New York, NY 10016-5990.