



Standard Test Method for Stress-Corrosion of Titanium Alloys by Aircraft Engine Cleaning Materials¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

INTRODUCTION

Chemical solutions and compounds used for preinspection cleaning or for preservation of titanium alloy aircraft turbine engine parts shall be subject to qualification requirements of this test method.

1. Scope

1.1 This test method establishes a test procedure for determining the propensity of aircraft turbine engine cleaning and maintenance materials for causing stress corrosion cracking of titanium alloy parts.

1.2 The evaluation is conducted on representative titanium alloys by determining the effect of contact with cleaning and maintenance materials on tendency of prestressed titanium alloys to crack when subsequently heated to elevated temperatures.

1.3 Test conditions are based upon manufacturer's maximum recommended operating solution concentration.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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.* For specific precautionary statements, see 5.3 and 5.6.

2. Referenced Documents

2.1 ASTM Standards:²

D740 Specification for Methyl Ethyl Ketone

D841 Specification for Nitration Grade Toluene

D1193 Specification for Reagent Water

2.2 SAE Aerospace Material Specifications:

AMS 4911 Sheet, Strip and Plate-6AL-4V Annealed³

AMS 4916 Sheet, Strip, and Plate-8AL 1MO 1V, Duplex Annealed³

3. Significance and Use

3.1 Because of the tendency of prestressed titanium alloy parts to crack if heated while in contact with certain chemical reagents, it is necessary to ensure that cleaning and maintenance materials will not initiate stress corrosion of titanium alloys under controlled conditions. For test specimens, two common titanium alloys are selected, one that is very susceptible (AMS 4916) and one that is not very susceptible (AMS 4911) to stress corrosion cracking.

4. Apparatus

4.1 *Measuring Device* capable of linear measurement with a ± 0.01 -in. (± 0.25 -mm) tolerance.

4.2 *Press Forming Apparatus*⁴ with 0.56-in. (14-mm) diameter mandrel capable of producing approximately 65° bends in 0.050-in. (1.25-mm) titanium alloy sheet specimens.

4.3 *Beakers or Small Tanks* for containment of cleaning, rinsing, and test solutions, appropriately lined to prevent contamination of the solutions by container materials.

¹ This test method 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 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 Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.

⁴ The sole source of supply of the apparatus (A laboratory bench hydraulic press ENER PAC Model No. P-39 has been found satisfactory) known to the committee at this time is Black Hawk Industrial Products, Butler, WI 53007. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.