



<b>AEROSPACE MATERIAL SPECIFICATION</b>	<b>AMS4905™</b>	<b>REV. G</b>
	Issued	2000-07
	Revised	2023-03
Superseding AMS4905F		
Titanium Alloy, Damage-Tolerant Grade Plate 6Al - 4V, Extra Low Interstitial (ELI) Beta Annealed (Composition similar to UNS R56401)		

## RATIONALE

AMS4905G results from a Five-Year Review and update of this specification with changes to revise the title and UNS reference to reflect extra low interstitial (ELI) composition and update general agreement language related to unauthorized exceptions (3.5.1.2, 3.9, 8.5). Revisions to applicable documents (Section 2), location of definitions (2.3), correct specimen orientation terminology and specimen sizes for consistency with reference test methods (2.3.4, 3.5.1.1, 3.5.2, 3.5.2.1, 3.5.3, 4.3.3, 4.3.4, Table 3), tensile properties (3.5.1, Table 2), fracture toughness (3.5.2, Table 3), microstructure (3.5.4), revise stress relief parameters following flattening (3.7.1), ordering information (8.6), and to allow the use of the immediate prior specification revision (8.4).

### 1. SCOPE

#### 1.1 Form

This specification covers one type of titanium alloy plate in the beta-annealed condition up through 4.000 inches (101.60 mm) inclusive, in thickness (see 8.6).

#### 1.2 Application

This plate has been used typically for parts in damage-tolerant, stress-corrosion-resistant applications requiring strength up to 750 °F (399 °C), but usage is not limited to such applications.

#### 1.3 Classification

Products shall be of the following conditions:

##### 1.3.1 Type I - Air Cooled

Product cooled from secondary anneal in accordance with 3.4.2.1 and meeting stress-corrosion resistance requirements of 3.5.3.

##### 1.3.2 Type II - Slow Cooled

Product cooled from secondary anneal in accordance with 3.4.2.2. Stress-corrosion resistance requirements of 3.5.3 are not applicable.

##### 1.3.3 When no type is specified, Type I shall be supplied (see 8.6).

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2023 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

**TO PLACE A DOCUMENT ORDER:** Tel: 877-606-7323 (inside USA and Canada)  
Tel: +1 724-776-4970 (outside USA)  
Fax: 724-776-0790  
Email: CustomerService@sae.org  
http://www.sae.org

SAE WEB ADDRESS:

For more information on this standard, visit  
<https://www.sae.org/standards/content/AMS4905G/>

## 1.4 Safety-Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards that may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

## 1.5 Stress Corrosion

Certain processing procedures and service conditions may cause these products to become subject to stress-corrosion cracking; ARP982 recommends practices to minimize such conditions.

## 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

### 2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS2242	Tolerances, Corrosion- and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Sheet, Strip, and Plate
AMS2249	Chemical Check Analysis Limits Titanium and Titanium Alloys
AMS2631	Ultrasonic Inspection, Titanium and Titanium Alloy Bar, Billet and Plate
AMS2750	Pyrometry
AMS2809	Identification, Titanium and Titanium Alloy Wrought Products
ARP982	Minimizing Stress-Corrosion Cracking in Wrought Titanium Alloy Products
AS4194	Sheet and Strip Surface Finish Nomenclature
AS6279	Standard Practice for Production, Distribution, and Procurement of Metal Stock
AS7766	Terms Used in Aerospace Metals Specifications

### 2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).

ASTM A480/A480M	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM E8/E8M	Tension Testing of Metallic Materials
ASTM E399	Linear-Elastic Plane Strain Fracture Toughness of Metallic Materials
ASTM E539	Analysis of Titanium Alloys by Wavelength Dispersive X-Ray Fluorescence Spectrometry
ASTM E1409	Determination of Oxygen and Nitrogen in Titanium and Titanium Alloys by Inert Gas Fusion

ASTM E1447	Determination of Hydrogen in Reactive Metals and Reactive Metal Alloys by Inert Gas Fusion with Detection by Thermal Conductivity or Infrared Spectrometry
ASTM E1941	Determination of Carbon in Refractory and Reactive Metals and Their Alloys by Combustion Analysis
ASTM E2371	Analysis of Titanium and Titanium Alloys by Direct Current Plasma and Inductively Coupled Atomic Emission Spectrometry (Performance-Based Test Methodology)
ASTM E2994	Analysis of Titanium and Titanium Alloys by Spark Atomic Emission Spectrometry and Glow Discharge Atomic Emission Spectrometry (Performance-Based Method)

## 2.3 Definitions

Terms used in AMS are defined in AS7766 and as follows:

### 2.3.1 PLATE

A flat rolled product 0.1875 inch (4.762 mm) and over in nominal thickness and over 12 inches (305 mm) in width with the width at least 10 times the thickness.

### 2.3.2 BETA TRANSUS TEMPERATURE (BT)

The lowest temperature that 100% of the plate is converted to the beta phase during a heat treatment of 30 minutes at temperature as evidenced by microstructural examination.

### 2.3.3 OIL CAN

An excess of material in a localized area of a thin plate that causes the thin plate to buckle in that area. When the thin plate is placed on a flat surface and hand pressure applied to the buckle, the buckle will spring through to the opposite surface or spring up in another area of the thin plate.

### 2.3.4 TEST SPECIMEN ORIENTATION

The test specimen orientations referred to in this specification for fracture toughness testing shall be in accordance with ASTM E399.

2.3.5 Commercial corrosion-resistant steel finishes are defined in ASTM A480/A480M and AS4194.

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the percentages by weight shown in Table 1; carbon shall be determined in accordance with ASTM E1941, hydrogen in accordance with ASTM E1447, oxygen and nitrogen in accordance with ASTM E1409, and other elements in accordance with ASTM E539, ASTM E2371, or ASTM E2994. Other analytical methods may be used if acceptable to the purchaser.