AEROSPACE MATERIAL SPECIFICATION

AMS4982™	REV. G

Issued 1974-12
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Revised 2020-07

Superseding AMS4982F

Titanium Alloy Wire
44.5 Cb
(Composition similar to UNS R58450)

RATIONALE

AMS4982G results from a Five-Year Review and update of this specification that adds analytical methods ASTM E539 and ASTM E2994 (3.1) and revises exceptions (3.9, 4.4.2, and 5.1).

1. SCOPE

1.1 Form

The specification covers a titanium alloy in the form of wire.

1.2 Application

This wire has been used typically for parts, such as fasteners, where cold formability is desirable or necessary and which requires a high strength-to-weight ratio up to 800 °F (427 °C), but usage is not restricted to such applications.

1.3 Classification

This specification covers two types of wire based upon condition supplied, as follows:

Type 1: Annealed

Type 2: As drawn

1.3.1 Type 1 shall be supplied unless Type 2 is specified.

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.

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
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4982G

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.

AMS2241	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS2249	Chemical Check Analysis Limits, Titanium and Titanium Alloys
AMS2809	Identification, Titanium and Titanium Alloy Wrought Products
AS6279	Standard Practice for Production, Distribution, and Procurement of Metal Stock

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.

ASTM E8/E8M	Tension Testing of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E539	Analysis of Titanium Alloys by 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 Titanium and Titanium Alloys by the Inert Gas Fusion Thermal Conductivity/Infrared Detection Method
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 Plasma Atomic Emission Spectrometry
ASTM E2994	Analysis of Titanium and Titanium Alloys by Spark Atomic Emission Spectrometry and Glow Discharge Atomic Emission Spectrometry

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.

Table 1 - Composition

Element	Min	Max	
Columbium	42.00	47.00	
Oxygen	--	0.16	
Carbon	--	0.04	
Silicon	--	0.03	
Nitrogen	--	0.03	(300 ppm)
Iron	--	0.03	
Chromium	--	0.02	
Magnesium	--	0.01	
Manganese	--	0.01	
Hydrogen	--	0.0035	(35 ppm)
Other Elements, total (3.1.1)	--	0.40	
Titanium	remainder		

3.1.1 Determination not required for routine acceptance.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2249. Check analysis limits for columbium shall be within the limits of Table 1.

3.2 Melting Practice

Alloy shall be multiple melted. The first melt shall be made by vacuum consumable electrode, nonconsumable electrode, electron beam cold hearth, or plasma arc cold hearth melting practice. The subsequent melt or melts shall be made using vacuum arc remelting (VAR) practice. Alloy additions are not permitted in the final melt cycle.

3.2.1 The atmosphere for nonconsumable electrode melting shall be vacuum or shall be argon and/or helium at an absolute pressure not higher than 1000 mm of mercury.

3.2.2 The electrode tip for nonconsumable electrode melting shall be water-cooled copper.

3.3 Condition

3.3.1 Type 1 Wire

Cold finished (cold drawn) and annealed.

3.3.2 Type 2 Wire

Cold finished (cold drawn), with drawing lubricant removed unless otherwise specified by purchaser.

3.4 Heat Treatment

Type 1 wire shall be annealed by heating in vacuum (less than 0.1 µm mercury) to a temperature within the range 1450 to 1600 °F (788 to 871 °C), holding at heat for sufficient time to produce a recrystallized structure that will meet the requirements of 3.5, and cooling as required.

3.5 Properties

Wire shall conform to the following requirements.

3.5.1 Type 1 Annealed Wire

3.5.1.1 Tensile Properties

Shall be as shown in Table 2, determined in accordance with ASTM E8/E8M as applicable, with the rate of strain set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (0.002 mm/mm/min) through the 0.2% offset yield strain.

Table 2 - Minimum tensile properties

Properties	Value
Tensile Strength	65 ksi (448 MPa)
Yield Strength at 0.2% Offset	60 ksi (414 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	10%
Reduction of Area	50%

3.5.1.1.1 Yield strength and reduction of area requirements do not apply to wire under 0.125 inch (3.18 mm) in diameter.

3.5.1.2 Average Grain Size

Shall be ASTM No. 5 or finer, determined in accordance ASTM E112 on a polished and etched sample.

3.5.2 Type 2 As-Drawn Wire

Properties shall be as agreed upon by purchaser and producer except that Type 2 wire annealed as in 3.4 shall also meet the requirements of 3.5.1.1 and 3.5.1.2.

3.6 Quality

Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the wire.

3.7 Tolerances

Shall conform to all applicable requirements of AMS2241.

3.8 Production, distribution, and procurement of metal stock shall comply with AS6279.

3.9 Exceptions

Any exceptions shall be authorized by purchaser and reported as in 4.4.2.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of wire shall supply all samples for producer's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Tests for the following requirements are acceptance tests and shall be performed on each heat or lot as applicable.