



AEROSPACE MATERIAL SPECIFICATION

AMS5611™**REV. G**

Issued 1970-05
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Superseding AMS5611F

Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Forging and Ring Stock,
Mechanical Tubing, and Rings
12Cr
Ferrite Controlled, Annealed, Consumable Electrode Melted
(Composition similar to UNS S41001)

RATIONALE

AMS5611G prohibits unauthorized exception (3.7, 4.4.4, 5.2.1.2, 8.8), adds types and a default type (1.3, 8.9), updates composition testing (3.1), updates bar condition (3.3.1.1, 3.3.1.2, 8.9) and forging condition (3.3.3), modifies macroetch (3.4.1), adds decarburization test method (3.4.2.1.2), prohibits bars cut from plate (3.5.4.4, 4.4.2), adds stock allowance information (3.5.2, 8.6), adds country of origin requirements (4.4.1, 4.4.3), adds requirements for reporting of forging and ring stock (4.4.3), allows prior revisions (8.7), and is the result of a Five-Year Review and update of the specification.

1. SCOPE

1.1 Form

This specification covers a premium aircraft-quality, corrosion and heat-resistant steel in the form of bars, wire, forgings, mechanical tubing, flash welded rings, and stock for forging or flash welded rings.

1.2 Application

These products have been used typically for parts requiring uniformly high room-temperature tensile properties with oxidation resistance up to 1000 °F (538 °C), where control of delta ferrite is necessary, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP1110 recommends practices to minimize such conditions.

1.3 Classification

Steel covered by this specification is classified by melting practice as follows:

Type 1 - Multiple melted using consumable electrode vacuum arc (VAR) practice in the remelt cycle.

Type 2 - Multiple melted using electroslag (ESR) remelting in the final melting cycle.

1.3.1 When a type is not specified, Type 1 shall be supplied (see 8.9).

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Documents

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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.

AMS2241	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS2243	Tolerances, Corrosion and Heat-Resistant Steel Tubing
AMS2248	Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS2300	Steel Cleanliness, Premium Aircraft-Quality Magnetic Particle Inspection Procedure
AMS2315	Determination of Delta Ferrite Content
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings
AMS2806	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification Forgings
AMS7493	Rings, Flash Welded, Ferritic and Martensitic Corrosion-Resistant Steels
ARP1110	Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications
AS1182	Standard Stock Removal Allowance, Aircraft-Quality and Premium Aircraft-Quality Steel Bars and Mechanical Tubing

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 A370	Mechanical Testing of Steel Products
ASTM A604	Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets
ASTM A751	Chemical Analysis of Steel Products
ASTM E112	Determining Average Grain Size

ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

ASTM E1077 Estimating the Depth of Decarburization of Steel Specimens

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751, or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	0.12	0.15
Manganese	--	0.60
Silicon	--	0.50
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	11.50	12.50
Nickel	--	0.75
Molybdenum	--	0.20
Aluminum	--	0.05
Copper	--	0.50
Tin	--	0.05
Nitrogen	--	0.18

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Melting Practice

Shall be multiple melted using vacuum consumable electrode remelting (Type 1) or electroslag remelting (Type 2) in the remelt cycle (see 1.3).

3.3 Condition

The product shall be supplied in the following condition; hardness and tensile strength shall be determined in accordance with ASTM A370:

3.3.1 Bars

Annealed having hardness not higher than 241 HB, or equivalent (see 8.2).

3.3.1.1 All hexagons, regardless of size, and other bars 2.750 inches (69.85 mm) and under in nominal diameter or least distance between parallel sides, shall be cold finished.

3.3.1.2 Bars, other than hexagons, over 2.750 inches (69.85 mm) in nominal diameter or least distance between parallel sides shall be hot finished or cold finished.

3.3.2 Wire

Cold drawn and annealed having tensile strength not higher than 115 ksi (793 MPa).

3.3.3 Forgings and Flash Welded Rings

Annealed having hardness not higher than 241 HB, or equivalent (see 8.2).