



AEROSPACE MATERIAL SPECIFICATION

AMS5609™**REV. F**

Issued 1964-01
Reaffirmed 2013-08
Revised 2024-09

Superseding AMS5609E

Steel, Corrosion and Heat Resistant, Bars, Wire,
Forgings, Mechanical Tubing, Rings and Stock for Forging and Rings
12Cr - 0.12Cb (Nb) (410 Modified)
Ferrite Controlled, Annealed
(Composition similar to UNS S41040)

RATIONALE

AMS5609F is the result of a Five-Year Review and update of the specification. The revision updates the Title to match the Scope, updates composition testing and reporting (see 3.1 and 3.1.1), clarifies wire condition (see 3.2.2), revises decarburization requirements (see 3.3.3), adds grain size requirements (see 3.3.4.1), adds pyrometry controls (see 3.3.6), adds tensile testing strain rate control (see 3.3.6.3), revises ferrite content and response to heat-treatment test frequency (see 4.4.1), updates exception requirements (see 4.4.3 and 8.7), and adds additional forging stock options (see 4.4.4 and 8.8).

1. SCOPE

1.1 Form

This specification covers an 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 a combination of high room-temperature tensile properties with oxidation resistance up to 1000 °F (538 °C) and where control of ferrite content 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.

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.

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 © 2024 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, or used for text and data mining, AI training, or similar technologies, 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:

Full document details: SAE AMS5609F

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS5609F/>

Documents

Standard, visit Sharing Hub

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
AMS2303	Steel Cleanliness, Aircraft Quality, Martensitic Corrosion-Resistant Steels, 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
AMS2750	Pyrometry
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
AS1182	Standard Stock Removal Allowance, Aircraft-Quality and Premium Aircraft-Quality Steel, Bars and Mechanical Tubing
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.

ASTM A370	Mechanical Testing of Steel Products
ASTM A751	Chemical Analysis of Steel Products
ASTM E112	Determining the 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 E340	Macroetching Metals and Alloys
ASTM E1077	Standard Test Methods for Estimating the Depth of Decarburization of Steel Specimens

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

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 the 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
Columbium (Niobium)	0.05	0.20
Nickel	--	0.75
Molybdenum	--	0.20
Aluminum	--	0.05
Copper	--	0.50
Tin	--	0.05
Nitrogen	--	0.08

3.1.1 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the requirements of AMS2248 except that check analysis limits for columbium shall be 0.02 under minimum and 0.05 over maximum.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars

Bars shall be annealed.

3.2.1.1 Round Bar

Round bars shall be ground or turned.

3.2.1.2 Bars, other than rounds, over 0.500 to 2.750 inches (12.70 to 69.85 mm), inclusive, in nominal distance between parallel sides and all hexagons shall be cold finished.