



AEROSPACE MATERIAL SPECIFICATION

AMS6477™**REV. E**

Issued 1988-04
Reaffirmed 2006-02
Revised 2025-09

Superseding AMS6477D

Steel, Bars, Forgings, Mechanical Tubing and Forging Stock,
0.80Cr (0.90 - 1.03C),
For Bearing Applications
(Composition similar to UNS G51985)

RATIONALE

AMS6477E is the result of a Five-Year Review and update of the specification. The revision updates the Title to match the Scope, addresses composition reporting (see 3.1.1), adds finish option (see 3.2.1.2), updates temperature tolerances to match AMS2759 and adds pyrometry controls (see 3.3.3), updates macrostructure requirements (see 3.3.1 and 8.8), clarifies and updates decarburization requirements (see 3.3.4.6 and 3.3.4.7), specifies bar (see 4.4.2), provides for additional forging stock properties (see 4.4.3 and 8.8), updates the exceptions requirements (see 4.4.4), and addresses stock removal (see 8.6).

1. SCOPE

1.1 Form

This specification covers a low-alloy steel in the form of bars, forgings, mechanical tubing, and forging stock.

1.2 Application

These products have been used typically for bearing components requiring a through-hardening steel, usually with hardness of approximately 60 HRC and section thickness under 0.50 inch (12.7 mm), but usage is not limited to such applications.

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 (U.S. and Canada only) or +1 724-776-4970 (Outside U.S. and Canada), www.sae.org.

AMS2251 Tolerances, Low-Alloy Steel Bars

AMS2253 Tolerances, Carbon and Alloy Steel Tubing

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Documents

Standard, visit Sharing Hub

AMS2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS2372	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel 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
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 E45	Determining the Inclusion Content of Steels
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 E381	Macroetch Testing Steel Bars, Billets, Blooms, and Forgings
ASTM E1077	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 other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	0.90	1.03
Manganese	0.75	1.00
Silicon	0.15	0.35
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	0.70	0.90
Nickel	--	0.25
Molybdenum	--	0.10
Copper	--	0.35

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 applicable requirements of AMS2259.

3.2 Condition

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

3.2.1 Bars

Bar shall not be cut from plate (see 4.4.2).

3.2.1.1 Bars 0.500 inch (12.70 mm) and under in nominal diameter or least distance between parallel sides shall be cold finished, with microstructure of spheroidized cementite in ferrite matrix, having tensile strength not higher than 120 ksi (827 MPa), or equivalent hardness (see 8.2).

3.2.1.2 Bars over 0.500 inch (12.70 mm) in nominal diameter or least distance between parallel sides shall be cold or hot finished and annealed, unless otherwise ordered, with microstructure of spheroidized cementite in ferrite matrix, having hardness not higher than 207 HBW, or equivalent (see 8.3). Bars ordered cold finished may have hardness as high as 248 HBW, or equivalent (see 8.3).

3.2.2 Forgings

Forgings shall be as ordered.

3.2.3 Mechanical Tubing

Mechanical tubing shall be cold finished and annealed, unless otherwise ordered, with microstructure of spheroidized cementite in ferrite matrix. Tubing ordered hot finished and annealed shall have hardness not higher than 95 HRB, or equivalent (see 8.3).

3.2.4 Forging Stock

Forging stock shall be as ordered by the forging manufacturer.

3.3 Properties

The product shall conform to the following requirements; hardness testing shall be performed in accordance with ASTM A370:

3.3.1 Macrostructure

Visual examination of transverse full cross sections from bars, billets, forging, tube rounds (solid not hollow), or forging stock, etched in hot hydrochloric acid in accordance with ASTM E381, shall show no pipe or cracks. Porosity, segregation, inclusions, and other imperfections shall be no worse than the macrographs of ASTM E381 agreed upon by the purchaser and producer (see 8.8).

3.3.1.1 If mechanical tubing is produced directly from ingots or large blooms, transverse sections may be taken from tubes rather than tube rounds. Macrostructure standards for such tubes shall be as agreed upon by the purchaser and producer (see 8.8).

3.3.1.2 Macrostructure examination is not required for bored/hollow forgings (including ring forgings) and tubing that are produced directly from ingots or blooms unless specified by the purchaser, in which case the purchaser shall specify standards to be used (see 8.8).