AEROSPACE MATERIAL SPECIFICATION

AMS6437™	REV. J

Issued 1959-11
Revised 2015-12

Superseding AMS6437H

Steel, Sheet, Strip, and Plate
5.0Cr - 1.3Mo - 0.50V (0.38 - 0.43C) (H-11)
(Composition similar to UNS T20811)

RATIONALE

AMS6437J results from a Five Year Review and update of this specification that revises decarburization testing and reporting.

1. SCOPE

1.1 Form

AMS6437J results from a Five Year Review and update of this specification that revises decarburization testing and reporting.

1.2 Application

These products have been used typically for parts requiring relatively high levels of strength, fatigue resistance, toughness, ductility, and thermal stability for service up to 1000 °F (538 °C), and where such parts may require welding during fabrication, 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 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2252 Tolerances, Low-Alloy Steel Sheet, Strip, and Plate

AMS2259 Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels

AMS2301 Steel Cleanliness, Aircraft Quality Magnetic Particle Inspection Procedure

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**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS6437J

AMS2370 Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft 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 E112 Determining Average Grain Size

ASTM E290 Bend Testing of Material for Ductility

ASTM E350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

ASTM E384 Knoop and Vickers Hardness of Materials

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E350, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	min	max
Carbon	0.38	0.43
Manganese	0.20	0.40
Silicon	0.80	1.00
Phosphorus	--	0.020
Sulfur	--	0.020
Chromium	4.75	5.25
Molybdenum	1.20	1.40
Vanadium	0.40	0.60
Nickel	--	0.25
Copper	--	0.35

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259.

3.2 Condition

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

3.2.1 Sheet and Strip

Cold finished and bright annealed, or hot rolled, annealed if necessary, and descaled, having tensile strength not higher than 125 ksi (862 MPa), or equivalent hardness (see 8.2).

3.2.2 Plate

Hot rolled, annealed if necessary, and descaled, having tensile strength not higher than 125 ksi (862 MPa), or equivalent hardness (see 8.2).

3.3 Properties

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

3.3.1 Decarburization

Decarburization shall be evaluated by one of the methods of 3.3.1.1 or 3.3.1.2.

3.3.1.1 Metallographic Method

A cross section taken perpendicular to the surface shall be prepared, etched, and examined metallographically at a magnification not to exceed 100X. The product shall not show a layer of complete (ferrite) or partial decarburization exceeding the limits of Table 2.

3.3.1.2 Hardness Traverse Method

The total depth of decarburization shall be determined by a traverse method using microhardness testing in accordance with ASTM E384, at a magnification not exceeding 100X, conducted on a hardened but untempered specimen protected during heat treatment to prevent changes in surface carbon content. Tempering is generally not recommended, but if tempered, the tempering temperature shall be not higher than 300 °F (149 °C). Depth of decarburization is defined as the perpendicular distance from the surface to the depth under that surface where there is not further increase in hardness. Such measurements shall be far enough away from any adjacent surface to be uninfluenced by any decarburization on the adjacent surface. Acceptance shall be as listed in Table 2.

Table 2A - Maximum total depth of decarburization, inch/pound units

Nominal Thickness Inches	Total Depth of Decarburization Inch
0.375 to 0.500, incl	0.015
Over 0.500 to 1.000, incl	0.025
Over 1.000 to 2.000, incl	0.035

Table 2B - Maximum total depth of decarburization, SI units

Nominal Thickness Millimeters	Total Depth of Decarburization Millimeter
9.52 to 12.70, incl	0.38
Over 12.70 to 25.40, incl	0.64
Over 25.40 to 50.80, incl	0.89

3.3.1.3 When determining the depth of decarburization, it is permissible to disregard local areas provided the decarburization of such areas does not exceed the above limits by more than 0.005 inch (0.13 mm) and the width is 0.065 inch (1.65 mm) or less.

3.3.1.4 In the case of dispute, the total depth of decarburization determined using the microhardness traverse method shall govern.

3.3.2 Bending

Product 0.437 inch (11.10 mm) and under in nominal thickness shall be tested in accordance with ASTM E290 using a sample prepared nominally 0.75 inch (19.0 mm) in width with its axis of bending parallel to the direction of rolling and shall withstand without cracking when bending at room temperature through the angle and bend radius shown in Table 3. In case of dispute, the results of tests using the guided bend test of ASTM E290 shall govern.

Table 3 - Bend requirements

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Angle Degrees	Bend Radius t = nominal thickness
Up to 0.249, incl	Up to 6.32, incl	180	1.5 t
Over 0.249 to 0.437, incl	Over 6.32 to 11.10, incl	90	1.5 t

3.3.3 Response to Heat Treatment

Tensile specimens shall meet the following requirements after being austenitized by heating to 1850 °F ± 25 °F (1010 °C ± 14 °C), holding at heat for 15 to 25 minutes, and cooling at a rate equivalent to air cooling to room temperature, and tempered three times by heating to a temperature not lower than 1000 °F (538 °C), holding at heat for 2 to 3 hours, and cooling in air.

3.3.3.1 Tensile Properties

Shall be as shown in Table 4.

Table 4 - Minimum tensile properties

Property	Value
Tensile Strength	260 ksi (1793 MPa)
Yield Strength at 0.2% Offset	220 ksi (1517 MPa)
Elongation in 2 inches (50.8 mm) or 4D	5%

3.3.3.2 Hardness

Shall be 50 to 56 HRC, or equivalent (see 8.3).

3.3.3.3 Average Grain Size

Shall be ASTM No. 7 or finer, determined in accordance with ASTM E112. For grain size samples only, it is permissible to omit the temper cycle of 3.3.3 to assist in delineating the grain boundaries.

3.4 Quality

The product, 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 product.

3.4.1 Steel shall be aircraft-quality conforming to AMS2301.

3.5 Tolerances

Shall conform to all applicable requirements of AMS2252.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product 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 product conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.