AEROSPACE MATERIAL SPECIFICATION

AMS5640™	REV. W

Issued 1939-12
Revised 2023-02

Superseding AMS5640V

Steel, Corrosion-Resistant, Bars, Wire, and Forgings 18Cr - 9.0Ni Free Machining (Compositions similar to UNS S30300 (Type 1), UNS S30323 (Type 2), UNS S30310 (Type 3))

RATIONALE

AMS5640W is the result of a Five-Year Review and update of the specification. The revision prohibits unauthorized exceptions (3.6, 4.4.4, 5.2.1.1, 8.6), updates in the composition test methods and reporting (3.1, 3.1.1), removes strain rate control during testing (3.3.1.2), removes condition as a periodic test (4.2.2), provides guidance on the use of AS1182 (8.4), and allows prior revisions (8.5).

1. SCOPE

1.1 Form

This specification covers three types of a free-machining, corrosion-resistant steel in the form of bars, wire, forgings, and forging stock.

1.2 Application

These products have been used typically for parts on which the amount of machining warrants use of a free-machining grade of steel requiring corrosion resistance similar to the 18-8 type steels but not subjected to temperatures exceeding 700 °F (371 °C) during fabrication or in service, but usage is not limited to such applications.

1.3 Classification

The steels covered by this specification are classified as follows:

Type 1: 18Cr - 9.0Ni - 0.28S

Type 2: 18Cr - 9.0Ni - 0.14P - 0.28Se

Type 3: 18Cr - 8.5Ni - 3.5Mn - 0.28S

1.3.1 Unless a specific type is ordered, any type may be supplied.

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/AMS5640W/

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

AMS2248 Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys

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

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

2.3 Definitions

Terms used in AMS are defined in AS7766.

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	Type 1 Min	Type 1 Max	Type 2 Min	Type 2 Max	Type 3 Min	Type 3 Max
Carbon	--	0.15	--	0.15	--	0.15
Manganese	--	2.00	--	2.00	2.50	4.50
Silicon	--	1.00	--	1.00	--	1.00
Phosphorus	--	0.15	0.12	0.17	--	0.20
Sulfur	0.15	--	--	0.04	0.15	--
Chromium	17.00	19.00	17.00	19.00	17.00	19.00
Nickel	8.00	10.00	8.00	10.00	7.00	10.00
Molybdenum	--	1.00	--	1.00	--	1.00
Selenium	--	--	0.15	0.40	--	--
Copper	--	1.00	--	1.00	--	1.00

3.1.1 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 AMS2248.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars, Wire, and Forgings

Solution heat treated free from continuous carbide network and descaled.

3.2.1.1 All hexagons regardless of size, other bars 2.75 inches (69.8 mm) and under in nominal diameter or least distance between parallel sides, and wire shall be cold finished.

3.2.1.2 Bars, other than hexagons, over 2.75 inches (69.8 mm) in nominal diameter or least distance between parallel sides shall be hot finished or cold finished.

3.2.1.3 Bars shall not be cut from plate (see 4.4.2).

3.2.2 Forging Stock

As ordered by the forging manufacturer.

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 Hardness

3.3.1.1 Bars over 0.500 Inch (12.7 mm) in Nominal Diameter or Least Distance Between Parallel Sides

Shall be as shown in Table 2, or equivalent (see 8.2), determined at approximate mid-radius or quarter thickness.