# AEROSPACE MATERIAL SPECIFICATION

| AMS5639™ | REV. K |
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Issued 1953-06
Reaffirmed 2007-04
Revised 2022-11

Superseding AMS5639J

(R) Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings and Forging and Ring Stock
19Cr - 10Ni
Solution Heat Treated
(Composition similar to UNS S30400)

RATIONALE

AMS5639K 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 (3.1), prohibits bar being cut from plate (3.2.1.1.3, 4.4.4), updates Table 2 adding hot and cold finished properties, adds strain rate (3.3.1.1.1), addresses hardness/tensile requirements (3.3.2 and Table 3), adds AS11182 (3.4.2, 8.3), prohibits unauthorized exceptions (3.6, 4.4.8, 5.2.1.1, 8.5), allows prior revisions (8.4), and adds provisions for forging stock (8.6).

## 1. SCOPE

### 1.1 Form

This specification covers a corrosion-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 corrosion and heat resistance up to 800 °F (427 °C), but usage is not limited to such applications. Welding, brazing, or other exposure to temperatures over 800 °F (427 °C) during fabrication may impair corrosion resistance.

## 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.



**TO PLACE A DOCUMENT ORDER:** **Tel: 877-606-7323 (inside USA and Canada)**
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**For more information on this standard, visit**
https://www.sae.org/standards/content/AMS5639K/

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

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

AMS7490 Rings, Flash Welded, Corrosion and Heat-Resistant Austenitic Steels and Austenitic-Type Alloys, or Precipitation Hardenable 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 A262 Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

ASTM A276 Stainless Steel Bars and Shapes

ASTM A370 Mechanical Testing of Steel Products

ASTM A473 Stainless Steel Forgings

ASTM A751 Chemical Analysis of Steel Products

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 | Min | Max |
|---|---|---|
| Carbon | -- | 0.08 |
| Manganese | -- | 2.00 |
| Silicon | -- | 1.00 |
| Phosphorus | -- | 0.040 |
| Sulfur | -- | 0.030 |
| Chromium | 18.00 | 20.00 |
| Nickel | 8.00 | 12.00 |
| Molybdenum | -- | 1.00 |
| Copper | -- | 1.00 |

3.1.1 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, Forgings, Mechanical Tubing, and Flash Welded Rings

Solution heat treated.

3.2.1.1 Bars and Wire

3.2.1.1.1 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.

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

3.2.1.1.3 Bars shall not be cut from plate (see 4.4.4).

3.2.1.2 Mechanical Tubing

Shall be cold finished.

3.2.1.3 Flash Welded Rings

Shall not be supplied unless specified or permitted on purchaser’s part drawing. When supplied, rings shall be manufactured in accordance with AMS7490.

3.2.2 Stock for Forging or Flash Welded Rings

As ordered by the forging or flash welded ring manufacturer.

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

3.3.1 Tensile Properties

3.3.1.1 Bars and Forgings over 0.50 Inch (12.7 mm) in Nominal Diameter or Least Distance Between Parallel Sides

Shall be as shown in Table 2.