AEROSPACE MATERIAL SPECIFICATION

AMS5645™ REV. T

Issued 1939-12
Reaffirmed 2006-04
Revised 2022-01

Superseding AMS5645S

Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Mechanical Tubing, Rings and Forging Stock
18Cr - 10Ni - 0.40Ti (321)
Solution Heat Treated
(Composition similar to UNS S32100)

RATIONALE

AMS5645T is the result of a Five-Year Review and update of the specification. The revision updates the title to match the scope, prohibits unauthorized exceptions (3.6, 4.4.4, 5.2.1.1, 8.7) updates composition testing (3.1), adds properties for small diameter bar (Table 2), adds cold and hot finished properties to Table 3, and therefore removes the limits on size that were introduced in the prior revision (1.1, 3.3.2.4, 4.4.2, 8.8). The revision also includes ASTM reference for forging properties, adds strain rate control (3.3.1.3), adds AS1182 (3.4.2, 8.5), and allows prior revisions (8.6).

1. SCOPE

1.1 Form

This specification covers a corrosion and heat resistant steel in the form of forgings, wire, bars, and mechanical tubing, flash welded rings, and stock of any size for forging or flash welded rings.

1.2 Application

These products have been used typically for parts requiring good corrosion resistance and which will be subjected to elevated temperatures during fabrication or in service and for parts requiring oxidation resistance up to 1500 °F (816 °C), 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.

AMS2241 Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire

AMS2243 Tolerances, Corrosion and Heat-Resistant Steel Tubing

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/AMS5645T/

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, Austenitic-Type Iron, Nickel, or Cobalt Alloys, or Precipitation-Hardenable Alloys

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

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	17.00	19.00
Nickel	8.00	12.00
Titanium	5x(C+N)	0.70
Molybdenum	--	0.75
Copper	--	0.75
Nitrogen	--	0.10

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, and other bars 2.750 inches (69.85 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 2.750 inches (69.85 mm) in nominal diameter or least distance between parallel sides shall be hot finished or cold finished.

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

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 Properties

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

3.3.1 Tensile Properties

3.3.1.1 Properties for Bars 0.50 Inch (12.7 mm) and under in Nominal Diameter or Least Distance Between Parallel Sides shall be as shown in Table 2. Properties for larger bars and all forgings shall be as shown in Table 3.

Table 2 - Minimum tensile properties bar up to 0.5 inch (12.7 mm) inclusive

Property	Value
Tensile Strength	90 ksi (620 MPa)
Yield Strength at 0.2% Offset	45.0 ksi (310 MPa)
Elongation in 4D or 2 inch (50 mm)	30%
Reduction of Area	40%

NOTE: Minimum tensile properties for bars and forgings have been taken directly from ASTM A276 and ASTM A473 and are not based on AMS Statistical Guidelines.