# AEROSPACE MATERIAL SPECIFICATION

| AMS5629™/H1000 | REV. B |
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Issued 2014-12
Revised 2023-03

Superseding AMS5629/H1000A

# (R) Steel, Corrosion-Resistant, Bars, Wire, Forgings, Rings, and Extrusions
## 13Cr - 8.0Ni - 2.2Mo - 1.1Al
## Vacuum Induction Plus Consumable Electrode Melted
## Solution Heat Treated, Precipitation Hardened (H1000)
## (Composition similar to UNS S13800)

RATIONALE

AMS5629/H1000B is the result of a Five-Year Review and update of the specification. The revision aligns the document with the other precipitation hardened material specifications.

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel product 12 inches (305 mm) and under in nominal diameter, thickness, or for hexagons, least distance between parallel sides in the solution and precipitation heat treated (H1000) condition.

1.1.1 The aged product may be supplied directly by a mill or by a or by another entity performing the functions of a producer as defined in AS6279. The latter would be accomplished by precipitation heat treatment of solution treated material previously certified to AMS5629. The entity assuming responsibility for the aging operation is designated the producer of AMS5629/H1000.

1.2 Application

These products have been used typically for parts requiring corrosion resistance and high strength up to 600 °F (316 °C) with good ductility and strength in the transverse direction in large sections sizes, but usage is not limited to such applications (see 8.1).

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking after heat treatment. ARP1110 recommends practices to minimize such conditions, to the application section as a subparagraph.

1.3 Classification

Classification shall be in accordance with AMS5629.





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## 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

AMS2759/3 Heat Treatment, Precipitation-Hardening Corrosion-Resistant and Maraging Steel Parts

AMS2761 Heat Treatment of Steel Raw Materials

AMS5629 Steel, Corrosion-Resistant, Bars, Wire, Tubing, and Rings, 16Cr - 4.0Ni - 0.30Cb (Nb) - 4.0Cu, Solution Heat Treated, Precipitation Hardenable

ARP1110 Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys

AS6279 Industry Standard Practices for Production, Distribution, and Procurement of Metal Stock

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

### 2.3 Definitions

Terms used in AMS are defined in AS7766.

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall be in accordance with AMS5629.

### 3.2 Melting Practice and Delta Ferrite Class

Shall be in accordance with AMS5629.

### 3.3 Condition

Shall be in accordance with AMS5629 and the following:

3.3.1 The product shall be supplied in the precipitation hardened (H1000) heat treat condition.

3.3.2 Bar shall not be cut from plate (see 4.3.3).

3.4 Heat Treatment

Shall be in accordance with AMS5629 and the following:

3.4.1 Precipitation Heat Treatment

3.4.1.1 Shall be in accordance with the requirements applicable to either AMS2761 or AMS2759/3 at the producer's option, except acceptance testing and criteria shall be as specified in 3.5.3.1.

3.4.1.2 When product certified as AMS5629 (solution treated material) is precipitation heat treated to meet AMS5629/H1000 by an entity other than the producer of the original product, the heat treatment source shall be accredited by a recognized industry agency for stainless steel heat treatment acceptable to the purchaser.

3.4.2 Stress Relief Heat Treatment

3.4.2.1 A stress relief heat treatment when performed after precipitation heat treatment is optional. When performed, stress relief shall be accomplished by heating to 900 °F ± 25 °F (482 °C ± 14 °C) and soaking for at least 1 hour + 1 hour additional for each inch (25 mm) of thickness or fraction thereof greater than 1 inch (25 mm). When load thermocouples are used, the soaking time shall be at least 1 hour.

3.4.2.2 Stress relieving as above may be performed after straightening to meet dimensional tolerances of AMS2241 unless prohibited by purchaser or cognizant engineering organization (see 8.3) but must still meet all properties (see 3.5).

3.5 Properties

All products shall conform to the following requirements:

3.5.1 Macrostructure

Shall be in accordance with AMS5629.

3.5.2 Microstructure

Shall be in accordance with AMS5629.

3.5.3 Tensile Properties

Shall be in accordance with the following:

3.5.3.1 Bars

Product 12 inches (305 mm) and under in nominal diameter, thickness, or for hexagons, least distance between parallel sides, shall be as shown in Table 1. Tensile testing shall be performed in accordance with ASTM A370.

3.5.3.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (0.002 mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 in/in and 0.5 in/in (0.05 mm/mm and 0.5 mm/mm) of the length of the reduced parallel section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 in/in/min and 0.5 in/in/min (0.05 mm/mm/min and 0.5 mm/mm/min). The requirement for compliance becomes effective for material produced 1 year after the publication date of this specification.

***Table 1A - Tensile properties, inch/pound units[1]***

| Condition | Specimen Orientation | Tensile Strength ksi | Minimum Yield Strength at 0.2% Offset ksi | Minimum Elongation in 2 Inches or 4D % | Minimum Reduction of Area % |
|---|---|---|---|---|---|
| H1000 | Longitudinal | 205-235 | 190 | 10 | 50 |
| | Transverse | 205-235 | 190 | 10 | 40 |

(1) Properties have been taken from the response to heat treatment requirements of AMS5629 and were not independently substantiated using SAE/AMS statistical guidelines.

***Table 1B - Tensile properties, SI units[1]***

| Condition | Specimen Orientation | Tensile Strength MPa | Minimum Yield Strength at 0.2% Offset MPa | Minimum Elongation in 50 mm or 4D % | Minimum Reduction of Area % |
|---|---|---|---|---|---|
| H1000 | Longitudinal | 1413-1620 | 1310 | 10 | 50 |
| | Transverse | 1413–1620 | 1310 | 10 | 40 |

(1) Properties have been taken from the response to heat treatment requirements of AMS5629 and were not independently substantiated using SAE/AMS statistical guidelines.

3.5.3.1.2 Transverse tensile property requirements apply only to bars from which a test specimen not less than 2-1/2 inches (63.5 mm) long can be taken. If the cross-sectional dimensions of the product permit, the transverse testing shall be of the short-transverse (ST) direction; otherwise, the orientation shall be long transverse (LT). For rounds, align the samples at the centerline.

3.5.3.1.2.1 Bars tested in the transverse direction need not be tested in the longitudinal direction.

3.5.3.2 All Other Product Forms

The property requirements of 3.5.3.1 shall apply. Test plans shall be as agreed upon between producer and purchaser.

3.5.3.3 When the ultimate tensile strength exceeds 235 ksi (1620 MPa) one additional aging cycle may be performed. The set temperature for the additional aging may be higher than 1000 °F (538 °C), up to 25 °F (14 °C) higher. The soaking time shall be not more than the original precipitation heat treatment cycle.

3.5.3.4 When the tensile properties as specified in Table 1 are not met, it is permissible to again perform solution heat treatment in accordance with AMS5629 and precipitation heat treatment to the requirements specified in 3.4, and retest.

3.5.3.5 Tensile property requirements for product outside of the range covered by 1.1 shall be agreed upon between purchaser and producer (see 4.3.4).

3.5.3.6 Hardness

Not applicable.

3.6 Quality

Shall be in accordance with AMS5629.

3.7 Tolerances

Shall be in accordance with AMS5629 and the following:

3.7.1 If stress relieved after aging, the straightness tolerance of AMS2241 for heat treated product shall apply.