# AEROSPACE MATERIAL SPECIFICATION

| AMS5644™ | REV. E |
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Issued 1954-05
Revised 1964-06
Noncurrnet 1982-10
Reaf. Nonc. 2012-04
Stabilized 2017-04

Superseding AMS5644D


Steel, Bars and Forgings, Corrosion Resistant
17Cr - 7Ni - 1Al

UNS S17700

RATIONALE

AMS5644E stabilizes this document because it contains mature technology that is not expected to change and thus no further revisions are anticipated.

STABILIZED NOTICE

AMS5644E has been declared "STABILIZED" by the SAE AMS F Corrosion Heat Resistant Alloys Committee. This document was stabilized because this document contains mature technology that is not expected to change and thus no further revisions are anticipated. Previously this document was non-current. The last technical update of this document occurred in June, 1964. Users of this document should refer to the cognizant engineering organization for disposition of any issues with reports/certifications to this specification; including exceptions listed on the certification.

NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.






**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**


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1. ACKNOWLEDGMENT:

   A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. FORM:

   Bars, wire, forgings, and forging stock.

3. APPLICATION:

   Primarily for parts requiring corrosion resistance and high strength up to 600 F (315 C), and when such parts may require welding during fabrication.

4. COMPOSITION:

| | min | max |
|---|---|---|
| Carbon | -- | 0.09 |
| Manganese | -- | 1.00 |
| Silicon | -- | 1.00 |
| Phosphorus | -- | 0.040 |
| Sulfur | -- | 0.030 |
| Chromium | 16.00 | 18.00 |
| Nickel | 6.50 | 7.75 |
| Aluminum | 0.75 | 1.50 |

4.1 Check Analysis:

Composition variations shall meet the requirements of the latest issue of AMS 2248.

5. CONDITION:

5.1 Bars:

Solution heat treated at 1900 F ± 25 (1037.8 C ± 14) and water quenched, having hardness as indicated below when tested midway between center and surface.

5.1.1 Rounds: Unless otherwise specified, ground, turned, or polished, having hardness not higher than Brinell 229 or equivalent, except that rounds ordered cold drawn for size after solution heat treatment may have hardness not higher than Brinell 255 or equivalent.

5.1.2 Hexagons: Cold drawn for size after solution treatment, having hardness not higher than Brinell 255 or equivalent.

5.1.3 Flats: Unless otherwise specified, hot finished and descaled, having hardness not higher than Brinell 229 or equivalent, except that flats ordered cold drawn for size after solution heat treatment may have hardness not higher than 255 Brinell or equivalent.

5.2 Forgings:

Unless otherwise specified, solution heat treated at 1900 F ± 25 (1037.8 C ± 14) and water quenched, having hardness not higher than Brinell 229 or equivalent.

5.3 Forging Stock:

As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Bars and Forgings:

Material shall conform to the following requirements after heating to 1400 F ± 25 (760 C ± 14), for 1-1/2 hr, cooling to 55 F ± 5 (12.8 C ± 2.8) within 1 hr, holding at that temperature for not less than 30 min., followed by heating rapidly to 1050 F ± 10 (565.6 C ± 5.6), holding at that temperature for 1-1/2 hr, and cooling.

6.1.1 Hardness: Shall be not lower than Brinell 363 or equivalent.

6.1.2 Longitudinal Tensile Properties: Specimens taken in the longitudinal direction from bars 3 in. and under in diameter or distance between parallel sides and from forgings 3 in. and under in section thickness with the axis approximately parallel to the grain direction shall conform to the following requirements:

| | |
|---|---|
| Tensile Strength, psi | 170,000 min |
| Yield Strength at 0.2% Offset or at 0.0137 in. in 2 in. Extension Under Load (E = 29,000,000), psi | 140,000 min |
| Elongation, % in 2 in. or 4D | 6 min |
| Reduction of Area, % | 25 min |

6.1.2.1 Tensile properties of sizes over 3 in. in diameter or distance between parallel sides shall be as agreed upon by purchaser and vendor.

6.2 Forging Stock:

When a sample of stock is forged to a test coupon and heat treated as in 5.1 and 6.1, specimens taken from the heat treated coupon shall conform to the requirements of 6.1.1 and 6.1.2. If specimens taken from the stock after heat treatment as in 5.1 and 6.1 conform to the requirements of 6.1.1 and 6.1.2, the test shall be accepted as equivalent to tests of the forged coupon.

7. QUALITY:

Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

8. TOLERANCES:

Unless otherwise specified, tolerances for bars shall conform to all applicable requirements of the latest issue of AMS 2241. Tolerances for sizes not covered by AMS 2241 shall be as agreed upon by purchaser and vendor.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each size from each heat to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number, size, and quantity from each heat. If forgings are supplied, the part number and size of stock used to make the forgings shall also be included.

9.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

10. IDENTIFICATION:

10.1 Bars and Wire:

Unless otherwise specified, individual pieces or bundles shall have attached a metal or plastic tag embossed with the purchase order number, AMS 5644E, nominal size, and heat number, or shall be boxed and the box marked with the same information. In addition to the above identification, flats 2 x 1 in. and larger and other bars 1 in. and over in diameter or distance between parallel sides shall be stamped with the heat number within 2 in. of one end.