

AEROSPACE MATERIAL SPECIFICATION

SAE AMS5644

REV. D

Issued 1954-05
Revised 1964-06
Noncurrent 1982-10
Reaf Nonc 2012-04

Superseding AMS5644C

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

UNS S17700

RATIONALE

AMS5644D has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of October 1, 1982. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2012 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

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
<http://www.sae.org>

SAE WEB ADDRESS:

**SAE values your input. To provide feedback
on this Technical Report, please visit
<http://www.sae.org/technical/standards/AMS5644D>**

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 $\pm$ 25 (1037.8 C $\pm$ 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 $1900\text{ F} \pm 25$ ($1037.8\text{ C} \pm 14$) 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 $1400\text{ F} \pm 25$ ($760\text{ C} \pm 14$), for 1-1/2 hr, cooling to $55\text{ F} \pm 5$ ($12.8\text{ C} \pm 2.8$) within 1 hr, holding at that temperature for not less than 30 min., followed by heating rapidly to $1050\text{ F} \pm 10$ ($565.6\text{ C} \pm 5.6$), 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 5644D, 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.