



AEROSPACE MATERIAL SPECIFICATION

AMS5853™**REV. E**

Issued 1987-10
Reaffirmed 2012-04
Revised 2024-04

Superseding AMS5853D

Steel, Corrosion- and Heat-Resistant, Bars and Wire
15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V
Consumable Electrode Remelted
1800 °F (982 °C) Solution Heat Treated and Work-Strengthened
160 ksi (1103 MPa) Tensile Strength Capability
(Composition similar to UNS S66286)

RATIONALE

AMS5853E is the result of a Five-Year Review and update of the specification. The revision updates the Title to reflect the melt and condition, adds composition reporting information (see 3.1.1), updates finish requirements (see 3.3), prohibits bar from plate (see 3.3.3 and 4.4.2), adds strain rate control during tensile testing (see 3.5.3.1.1), aligns heat treatment with other material specifications for this alloy (see 3.4), updates the prohibition on exceptions (see 3.5.4 and 8.6), and adds quality requirements (see 3.6.1 and 8.5).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant steel in the form of work-strengthened bars and wire, 1-1/4 inches (31.8 mm) and under in nominal diameter or least distance between parallel sides.

1.2 Application

These products have been used typically for parts, such as fasteners, requiring room-temperature minimum tensile strength of 160 ksi (1103 MPa) after precipitation heat treatment, for use up to 1000 °F (538 °C) and having oxidation resistance up to 1200 °F (649 °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.

SAE Executive Standards Committee 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 revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2024 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

For more information on this standard, visit

<https://www.sae.org/standards/content/AMS5853E/>

SAE WEB ADDRESS:

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
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
AMS2750	Pyrometry
AMS2806	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels, and Corrosion and Heat-Resistant Steels and 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 A370	Mechanical Testing of Steel Products
ASTM A751	Chemical Analysis of Steel Products
ASTM E112	Determining Average Grain Size
ASTM E140	Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

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 the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	13.50	16.00
Nickel	24.00	27.00
Molybdenum	1.00	1.50
Titanium	1.90	2.35
Boron	0.003	0.010
Vanadium	0.10	0.50
Cobalt	--	1.00
Aluminum	--	0.35
Copper	--	0.50

3.1.1 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Melting Practice

Steel shall be produced by multiple melting using consumable electrode practice in the remelt cycle.

3.3 Condition

The product shall be supplied in the solution heat treated and suitably work-strengthened condition.

3.3.1 Bars shall be descaled to cold-finished tolerances (see 3.7).

3.3.2 Coiled bars and wire shall be cold worked to cold-finished tolerances (see 3.7).

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

3.4 Heat Treatment

Bars and wire, except as specified in 3.4.1, shall be solution heat treated by heating to 1800 °F ± 25 °F (982 °C ± 14 °C), holding at heat for a time commensurate with section thickness, and quenching in oil or water or at an equivalent rate, and work-strengthened as required to meet the requirements of 3.5. Pyrometry shall be in accordance with AMS2750.

3.4.1 Continuous Heat Treating of Wire

When continuous heat treating is used, process parameters (e.g., furnace temperature set points, heat input, travel rate, etc.) for continuous heat-treating lines shall be established by the material producer and validated by testing of product to the other requirements of 3.5.

3.5 Properties

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

3.5.2 As Solution Heat Treated and Work-Strengthened

3.5.2.1 Tensile Strength

Tensile strength shall be not higher than 120 ksi (827 MPa).

3.5.2.2 Average Grain Size

Average grain size shall be ASTM No. 5 or finer determined in accordance with ASTM E112.

3.5.3 Response to Precipitation Heat Treatment

Samples from product, 1-1/4 inches (31.8 mm) and under in nominal diameter or least distance between parallel sides, shall have the following properties after being precipitation heat treated by heating to a temperature within the range 1200 to 1300 °F (649 to 704 °C), holding at the selected temperature within ± 25 °F (± 14 °C) for not less than 8 hours, and cooling in air:

3.5.3.1 Tensile Properties

Tensile properties shall be as shown in Table 2.

Table 2 - Minimum tensile properties - response to heat treatment

Property	Value
Tensile Strength	160 ksi (1103 MPa)
Yield Strength at 0.2% Offset	120 ksi (827 MPa)
Elongation in 4D	12%
Reduction of Area	18%

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.

3.5.3.2 Hardness

Hardness should be not lower than 32 HRC, or equivalent (see 8.2), but the product shall not be rejected on the basis of hardness if the tensile properties of 3.5.3.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.5.4 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the producer and purchaser and reported per 4.4.1.

3.6 Quality

The product, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.