



AEROSPACE MATERIAL SPECIFICATION	AMS5825™	REV. J
	Issued 1962-01 Reaffirmed 2011-10 Revised 2022-12	
Superseding AMS5825H		
Steel, Corrosion-Resistant, Welding Wire 16.4Cr - 4.8Ni - 0.22Cb(Nb) - 3.6Cu (Composition similar to UNS S17480)		

RATIONALE

AMS5825J is the result of a Five-Year Review and update of the specification. The revision prohibits unauthorized exceptions (3.7, 8.5), updates composition testing (3.1, 3.1.1, 3.1.2), clarifies temper condition (3.2), adds country of origin to reports (4.4), and allows prior revisions (8.4).

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of welding wire.

1.2 Application

This wire has been used typically as bare wire filler metal for gas-tungsten-arc or gas-metal-arc welding of parts fabricated from steels having composition similar to that of this wire, 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.

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

AMS2813 Packaging and Marking of Packages of Welding Wire, Standard Method

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 © 2022 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
SAE WEB ADDRESS: <http://www.sae.org>

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS5825J/>

AMS2814	Packaging and Marking of Packages of Welding Wire, Premium Quality
AMS2816	Identification, Welding Wire, Tab Marking Method
AMS2819	Identification, Welding Wire, Direct Color Code System
AMS5643	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 16Cr - 4.0Ni - 0.30 (Cb+Ta) - 4.0Cu, Solution Heat Treated, Precipitation Hardenable
ARP1876	Weldability Test for Weld Filler Metal Wire
ARP4926	Alloy Verification and Chemical Composition, Inspection of Welding Wire
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 A751	Chemical Analysis of Steel Products
ASTM E18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
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 Wire Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM A751 or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	Min	Max
Carbon (3.1.1.1)	--	0.05
Manganese	0.25	0.75
Silicon	--	0.75
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	16.00	16.75
Nickel	4.50	5.00
Columbium (Niobium)	0.15	0.30
Copper	3.25	4.00
Molybdenum	--	0.75

3.1.1 Chemical analysis of initial ingot, bar or rod stock before drawing is acceptable provided the process used for drawing or rolling, annealing, and cleaning are controlled to ensure continued conformance to composition requirements.

3.1.1.1 Carbon shall also be determined periodically on finished wire (see 4.2.2).

3.1.2 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.

3.1.3 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

Cold worked, bright finished, in an as drawn temper and with a surface finish which will provide proper feeding of the wire in machine welding equipment.

3.3 Fabrication

3.3.1 Wire shall be formed from rod or bar descaled by a process which does not affect the composition of the wire. Surface irregularities inherent with a forming process that does not tear the wire surfaces are acceptable provided the wire conforms to the tolerances of 3.6.

3.3.2 Butt welding is permissible only at diameters larger than final finished product size provided both ends to be joined are alloy verified using a method capable of distinguishing the alloy from all other alloys processed in the facility, or the repair is made at the wire processing station. The butt weld shall not interfere with uniform, uninterrupted feeding of the wire in machine welding.

3.3.3 In-process annealing, if required, between cold rolling or drawing operations, shall be performed in a vacuum or a protective atmosphere to ensure freedom from surface oxidation and absorption of other extraneous elements.

3.3.4 Residual elements, drawing compounds, oxides, dirt, oil, dissolved gasses and other foreign materials picked up during wire processing that can adversely affect the welding characteristics, the operation of the equipment, or the properties of the weld metal, shall be removed by cleaning processes that will neither result in pitting nor cause gas absorption by the wire or deposition of substances harmful to welding operations.

3.4 Properties

Wire shall conform to the following requirements:

3.4.1 Weldability

Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds. ARP1876 may be used to resolve disputes.

3.4.2 Response to Heat Treatment

Weld metal, approximately 1/4 inch (6.4 mm) in thickness, deposited on AMS5643 steel shall attain hardness not lower than 38 HRC, or equivalent (see 8.2), determined in accordance with ASTM E18, after being solution heat treated by heating to 1900 °F ± 25 °F (1038 °C ± 14 °C), holding at heat for not less than 30 minutes, and cooling to below 60 °F (16 °C) and precipitation heat treated by heating to 900 °F ± 10 °F (482 °C ± 6 °C), holding at heat for 60 minutes ± 5 minutes, and cooling in air.

3.4.3 Spooled Wire

Shall conform to 3.4.3.1, 3.4.3.2, and 3.4.3.3.

3.4.3.1 Cast

Wire, wound on standard 12 inch (305 mm) diameter spools, shall have imparted to it a curvature such that a specimen sufficient in length to form one loop with a 1 inch (25 mm) overlap, when cut from the spool and laid on a flat surface, shall form a circle 15 to 50 inches (381 to 1270 mm) in diameter.

3.4.3.2 Helix

The specimen on which cast was determined, when laid on a flat surface and measured between adjacent turns, shall show a vertical separation not greater than 1 inch (25 mm).

3.4.3.3 Winding

Filler metal in coils and on spools shall be wound so that kinks, waves, sharp bends, overlapping, or wedging are not encountered, leaving the filler metal free to unwind without restriction. The outside end of the electrode (the end where welding is to begin) shall be identified so it can be located readily and shall be fastened to avoid unwinding. The winding on spools shall be level winding.

3.5 Quality

Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to welding operations, operation of welding equipment, or properties of the deposited weld metal.

3.6 Sizes and Tolerances

Wire shall be supplied in the sizes and to the tolerances shown in Table 2 and 3.6.2.

3.6.1 Diameter

Shall be as shown in Table 2.

Table 2A - Diameters and tolerances, inch/pound units

Form	Nominal Diameter Inches	Tolerance, Inches Plus and Minus
Cut Lengths	0.030, 0.035, 0.045	0.001
Cut Lengths	0.062, 0.078, 0.094, 0.125, 0.156, 0.187	0.002
Spools	0.007, 0.010, 0.015	0.0005
Spools	0.020, 0.030, 0.035, 0.045	0.001
Spools	0.062, 0.078, 0.094	0.002

Table 2B - Diameters and tolerances, SI units

Form	Nominal Diameter Millimeters	Tolerance, Millimeters Plus and Minus
Cut Lengths	0.76, 0.89, 1.14	0.025
Cut Lengths	1.57, 1.98, 2.39, 3.18, 3.96, 4.75	0.05
Spools	0.18, 0.25, 0.38	0.013
Spools	0.51, 0.76, 0.89, 1.14	0.025
Spools	1.57, 1.98, 2.39	0.05

3.6.2 Length

Cut lengths shall be furnished in 18, 27, or 36 inch (457, 686, or 914 mm) lengths, or other lengths when specified by purchaser, and shall not vary more than +0, -0.5 inch (+0, -13 mm) from the length ordered.

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.