

# AEROSPACE MATERIAL SPECIFICATION



AMS 5817E

Issued JAN 1961  
Revised OCT 2000

Superseding AMS 5817D

## Steel, Corrosion and Heat Resistant, Welding Wire 13Cr - 2.0Ni - 3.0W

UNS S41800

### 1. SCOPE:

#### 1.1 Form:

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

#### 1.2 Application:

This wire has been typically used as filler metal for gas-tungsten-arc or gas-metal-arc welding of corrosion-resistant steels of similar composition where the weld area is required to have strength and corrosion resistance comparable to those of the parent metal, 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

#### 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2248	Chemical Check Analysis Limits, Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2813	Packaging and Marking Packages of Welding Wire, Standard Method
AMS 2814	Packaging and Marking Packages of Welding Wire, Premium Quality
AMS 2816	Identification, Welding Wire, Tab Marking Method

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 2000 Society of Automotive Engineers, Inc.  
All rights reserved.

Printed in U.S.A.

QUESTIONS REGARDING THIS DOCUMENT:  
TO PLACE A DOCUMENT ORDER:  
SAE WEB ADDRESS:

(724) 772-7161  
(724) 776-4970  
<http://www.sae.org>

FAX: (724) 776-0243  
FAX: (724) 776-0790

## 2.1 (Continued):

AMS 2819	Identification, Welding Wire, Direct Color Code System
AMS 5508	Steel, Corrosion and Heat Resistant, Sheet, Strip, and Plate 13Cr - 2.0Ni - 3.0W Annealed
AMS 5616	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings 13Cr - 2.0Ni - 3.0W Annealed
ARP1876	Weldability Test for Weld Filler Metal Wire
ARP4926	Alloy Verification and Chemical Composition Inspection of Welding Wire

## 2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

## 3. TECHNICAL REQUIREMENTS:

## 3.1 Composition:

Wire shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	0.15	0.20
Manganese	--	0.50
Silicon	--	0.50
Phosphorus	--	0.04
Sulfur	--	0.03
Chromium	12.00	14.00
Nickel	1.80	2.20
Tungsten	2.50	3.50
Molybdenum	--	0.50
Aluminum	--	0.15
Copper	--	0.50
Tin	--	0.05

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

- 3.1.2 Chemical analysis of initial ingot, bar, or rod stock before drawing is acceptable provided the processes used for drawing or rolling, annealing, and cleaning, are controlled to ensure continued conformance to chemical composition requirements.
- 3.2 Condition:
- Cold worked, annealed, descaled, and bright finished in a 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 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 vacuum or protective atmospheres 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 deposits, approximately 1/4 inch (6.4 mm) thick, on AMS 5508 or AMS 5616 steel shall have hardness not lower than 45 HRC, or equivalent (See 8.2), determined in accordance with ASTM E 18, after being heated to 1800 °F ± 10 (982 °C ± 6), held at heat for 15 to 30 minutes, and cooled in air.
- 3.4.3 Spooled Wire: Shall conform to 3.4.3.1 and 3.4.3.2.

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 within 1 inch (25 mm) overlap when cut from the spool and laid on a flat surface, shall form a circle 15 to 50 inches (281 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).

### 3.5 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 standard sizes and to the tolerances shown in 3.6.1 and 3.6.2.

#### 3.6.1 Diameter: Shall be as shown in Table 2.

TABLE 2A - Sizes and Tolerances, Inch/Pound Units

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

TABLE 2B - Sizes and Tolerances, SI Units

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