Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5827B
Superseding AMS 5827A
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STEEL WELDING ELECTRODES, COVERED, CORROSION RESISTANT
16.4Cr - 4.8Ni - 0.22(Cb + Ta) - 3.6Cu

1. SCOPE:

1.1 Form: This specification covers a corrosion-resistant steel in the form of covered welding electrodes.

1.2 Application: Primarily for shielded-metal-arc welding of parts fabricated from material of similar composition, particularly when the weld zone is required to have strength and corrosion-resistance comparable to those of the parent metal.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 5643 - Steel Bars, Forgings, Tubing, and Rings, Corrosion-Resistant, 16Cr - 4.0Ni - 0.30(Cb + Ta) - 4.0Cu

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Specifications:

MIL-W-10430 - Welding Rods and Electrodes; Preparation for Delivery of

2.4 AWS Publications: Available from American Welding Society, Inc., 2501 North West 7th Street, Miami, FL 33125.

AWS A5.4 - Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding Electrodes

Printed in U.S.A.

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Weld metal deposited from electrodes shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.05
Manganese	0.25	0.75
Silicon	--	0.75
Phosphorus	--	0.04
Sulfur	--	0.03
Chromium	16.00	16.75
Nickel	4.50	5.00
Columbium + Tantalum	0.15	0.30
Copper	3.25	4.00

3.1.1 Weld Pads for Chemical Analysis: The referee procedure for making pads of weld metal and removing samples for chemical analysis shall be AWS A5.4.

3.2 Type: Coverings shall be suitable for the following usability characteristics:

Type Designation	AWS Designation	Weld Position	Current
A	-15	All	DC
B	-16	All	DC - AC

3.2.1 When DC is specified, reverse polarity (electrode positive) is required.

3.2.2 Type A electrodes shall be supplied, unless otherwise specified.

3.3 Properties: Electrodes shall conform to the following requirements:

3.3.1 Weldability: Electrodes shall demonstrate good weldability and shall flow smoothly and evenly when used under the conditions specified in 3.2.

3.3.2 Response to Heat Treatment: Weld metal deposits approximately 1/4 in. (6.5 mm) in thickness deposited on AMS 5643 steel shall attain hardness not lower than 38 HRC or equivalent, determined in accordance with ASTM E18, after being solution heat treated by heating to 1900°F ± 25 (1040°C ± 15), holding at heat for not less than 30 min., and cooling below 60°F (15°C) and precipitation heat treated by heating to 900°F ± 10 (480°C ± 5), holding at heat for 60 min. ± 5, and cooling in air.

3.3.3 Burn-Off: The covering shall be consumed uniformly all around and shall not burn back from the core wire under proper welding conditions. Heating of the electrode during welding shall not cause injurious blistering of the covering within the ranges of current values recommended by the manufacturer.

3.3.4 Grip Portion and Arc Ends: A portion of the electrode 0.75 - 1.25 in. (20 - 30 mm) long on end-grip rods and 1.5 - 2.0 in. (40 - 50 mm) long on center-grip rods shall be bare to permit good electrical contact with the electrode holder. The arc end of the electrodes shall be sufficiently bare to permit easy striking of the arc but the length of this bare section, measured from the end of the electrode to the point where the full cross-section of the covering begins, shall not exceed the diameter of the bare wire, and in no case shall it exceed 1/8 in. (3 mm).

3.3.5 Cleaning: Slag produced during welding shall be readily removable with hand tools.

3.4 Quality:

3.4.1 Core Wire: Shall be uniform in quality and condition, cylindrical, clean, sound, and free from foreign materials and from imperfections detrimental to weld quality.

3.4.2 Covering: Shall be uniform in quality, tightly adherent, and free from abnormal scabs, blisters, pockmarks, bruises, and other surface defects and shall withstand normal handling without damage. It shall not be harmfully hygroscopic and shall not adversely affect weld quality.

3.5 Standard Sizes and Lengths: The sizes and lengths in Table I are standard.

TABLE I

Nominal Diameter of Core Wire Inch	Length Inches
1/16, 5/64	9 and 18
3/32	9, 12, and 18
1/8, 5/32, 3/16, 1/4	14

TABLE I (SI)

Nominal Diameter of Core Wire Millimetres	Length Millimetres
1.5, 2.0	230 and 455
2.5	230, 305, and 455
3.0, 4.0, 5.0, 6.5	355

3.5.1 End-grip electrodes shall be supplied in all lengths except 18 in. (455 mm) where center-grip electrodes are required, unless otherwise specified.

3.6 Tolerances: Shall be as follows, unless otherwise specified.

Ø 3.6.1 Electrodes shall not vary in length more than ±1/4 in. (±6.5 mm) from the length ordered.

3.6.2 Electrode core wire shall not vary in diameter more than ±0.002 in. (±0.05 mm) from the size Ø ordered.

3.6.3 Overall diameter of the covered electrodes shall not vary more than 4% from that of the approved sample.

3.6.4 Covering shall be concentric with the core wire to the extent that the maximum core-plus-one-covering dimension shall not exceed the minimum core-plus-one-covering dimension by more than 5% of the minimum core-plus-one-covering dimension.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of electrodes shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the electrodes conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), grip portion and arc ends (3.3.4), sizes (3.5), and tolerances (3.6) are classified as acceptance tests and shall be performed on each control number of electrodes.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for weldability (3.3.1), response to heat treatment (3.3.2), burn-off (3.3.3), and cleaning (3.3.5) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproducation tests and shall be performed on the first-article shipment of electrodes to a purchaser, when a change in material or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as agreed upon by purchaser and vendor; a control number shall be a designation indicating batch processing and core wire heat number.

4.4 Approval:

4.4.1 Sample electrodes shall be approved by purchaser before electrodes for production use are supplied, unless such approval be waived.

4.4.2 Vendor shall use materials, manufacturing procedures, processes, and methods of inspection on production electrodes which are essentially the same as those used on the approved sample electrodes. If necessary to make any change in covering formulation or in manufacturing procedures, processes, or methods of inspection, vendor shall submit for reapproval a statement of the proposed changes in material and processing and, when requested, sample electrodes. Production electrodes incorporating the revised procedures shall not be shipped prior to receipt of reapproval.

4.5 Reports:

4.5.1 The vendor of electrodes shall furnish with each shipment three copies of a report stating that the electrodes conform to the technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, control number, size, and quantity. When requested by purchaser, the vendor shall also include in the report the composition of the deposited weld metal for each heat in the shipment.