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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5827G

Issued JAN 1962
Revised OCT 1992
Cancelled SEP 2000

Superseding AMS 5827F

Steel, Corrosion Resistant, Covered Welding Electrodes
16.4Cr - 4.8Ni - 0.22Cb - 3.6Cu

UNS W37410

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of September 2000, and has been superseded by AWS A5.4 E630-15 or E630-16. The requirements of the latest issue of AWS A5.4 E630-15 shall be fulfilled whenever reference is made to the cancelled AMS 5827, Type A. The requirements of the latest issue of AWS A5.4 E630-16 shall be fulfilled whenever reference is made to the cancelled AMS 5827, Type B. When AMS 5827 is specified without reference to type, the requirements of AWS A5.4 E630-15 shall be fulfilled. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications noting that it is superseded by
AWS A5.4 E630.

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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 steels of similar composition, particularly when the weld zone is required to have strength and corrosion-resistance comparable to those of the parent metal.

1.3 Classification:

Electrodes covered by this specification are classified as follows:

Type A - DC (AWS E630-15)
Type B - DC-AC (AWS E630-16)

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

1.3.2 If no type is specified, Type A electrodes shall be supplied.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of purchase order.

2.1 SAE Publications:

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

AMS 5643 Steel Bars, Forgings, Tubing, and Rings, Corrosion-Resistant, 16Cr - 4.0Ni - 0.30(Cb + Ta) - 4.0Cu, Solution Heat Treated

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

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

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

2.4 AWS Publication:

Available form American Welding Society, Inc., P.O. Box 351040, Miami, FL 33135-1040.

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Weld metal deposited from electrodes 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	--	0.05
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	0.15	0.30
Copper	3.25	4.00
Molybdenum	--	0.75

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.

3.3 Properties:

Electrodes shall conform to the following requirements:

3.2.1 Weldability: Electrodes shall demonstrate good weldability, shall flow smoothly and evenly during welding under the conditions specified in 1.3, and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

3.2.2 Response to Heat Treatment: Weld metal, approximately 1/4 inch (6.4 mm) in thickness, deposited on AMS 5643 steel shall attain hardness not lower than 38 HRC, or equivalent, determined in accordance with ASTM E 18, after being solution heat treated by heating to 1900 °F ± 25 (1038 °C ± 14), 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 (482 °C ± 6), holding at heat for 60 minutes ± 5, and cooling in air.

3.2.3 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.

3.2.4 Grip Portion and Arc Ends: A portion of the electrode 0.75 to 1.25 inches (19.0 to 31.8 mm) long on end-grip rods and 1.5 to 2.0 inches (38 to 51 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 inch (3.2 mm).

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

3.3 Quality:

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

3.3.2 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.

3.4 Standard Sizes and Lengths:

The sizes and lengths shown in Table 2 are standard.

TABLE 2A - Standard Sizes and Lengths, Inch/Pound Units

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 2B - Standard Sizes and Lengths, SI Units

Nominal Diameter of Core Wire Millimeters	Length Millimeters
1.6, 2.0	229 and 457
2.4	229, 305, and 457
3.2, 4.0, 4.8, 6.4	356

3.4.1 End-grip electrodes shall be supplied in all lengths except 18 inches (457 mm) where center-grip electrodes are required.

3.5 Tolerances:

Shall be as follows:

3.5.1 Electrodes shall not vary in length more than ±1/4 inch (±6.4 mm) from the length ordered.

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

3.5.3 Overall diameter of the covered electrodes shall not vary more than 4% from that of the sample approved as in 4.4.1.

3.5.4 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 for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the electrodes conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), grip portion and arc ends (3.2.4), sizes (3.4), and tolerances (3.5) are acceptance tests and shall be performed to represent each control number of electrodes.

4.2.2 Periodic Tests: Tests for weldability (3.2.1), response to heat treatment (3.2.2), burn-off (3.2.3), and cleaning (3.2.5) are 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 for all technical requirements are preproduction tests and shall be performed prior to or on the first-article shipment of electrodes to a purchaser, when a change in material and/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, contracting officer, or request for procurement.

4.3 Sampling and Testing:

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 by purchaser.

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/or processing and, when requested, sample electrodes. Production electrodes incorporating the revised procedures shall not be shipped prior to receipt of reapproval.

4.5 Reports:

The vendor of electrodes shall furnish with each shipment a report stating that the electrodes conform to the technical requirements. This report shall include the purchase order number, AMS 5827G, 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.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the electrodes may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the electrodes represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 Individual Electrodes:

5.1.1.1 At least one legible imprint of the AWS classification "E630" shall be applied to the electrode covering as near as practical to the grip end of the core wire and within 2-1/2 inches (63.5 mm) of the grip end. In the case of center-grip electrodes, the imprint shall be applied to the electrode covering as above and upon both sides of the center-grip (bare core wire) area. The prefix letter "E" in the electrode classification may be omitted from the imprint on the electrode covering.

5.1.1.2 The numbers of the imprinted electrode classification shall be of bold block type and of sufficient size and color contrast to be legible before and after normal welding applications.

5.1.2 Electrode Packages: Each package or container shall be legibly marked with not less than the purchase order number, AMS 5827F, control number, size, quantity, type designation, recommended current value, and manufacturer's designation.

5.2 Packaging:

5.2.1 Packaging shall be accomplished to ensure that the electrodes, during shipment and storage, will be protected against mechanical injury and exposure to moisture. Such packaging shall protect the covering from changes in moisture content to the extent that use of the electrodes may be impaired.

5.2.2 The weight of the package shall be as agreed upon by purchaser and vendor.

5.2.3 Packages of electrodes shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the electrodes to ensure carrier acceptance and safe delivery.