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SUPERSEDING
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MILITARY SPECIFICATION

ELECTRODE, WELDING, COPPER, SILICON-DEOXIDIZED SOLID, BARE

1. SCOPE

1.1 This specification covers one class of bare, solid, silicon deoxidized copper base alloy electrode for use with the inert-gas metal-arc (consummable electrode) welding process.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATION

MILITARY

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

STANDARDS

FEDERAL

Fed. Std. No. 146 - Tolerances for Copper and Copper Base Alloy Mill Products
Fed. Test Method Std. No. 151 - Metals; Test Methods

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage

FSC 3439

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

E8-68 - Tension Testing of Metallic Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa., 19103).

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.

3. REQUIREMENTS

3.1 Materials. The electrode shall be of homogeneous composition throughout and shall have a smooth finish.

3.2 Chemical composition. The chemical composition shall be in accordance with table I.

Table I. Chemical composition

Element	Percent
Copper	Rem.
Tin	0.65-0.90
Silicon	0.15-0.40
Manganese	0.10-0.30
Zinc, max.	0.005[a]
Iron	a
Nickel	a
Lead, max.	0.02[a]
Phosphorus, max.	0.005[a]
Aluminum, max.	0.01[a]
Others, max.	0.10

[a]The sum of the elements shall not exceed 0.50 percent

3.3 Dimensions and tolerances.

3.3.1 Dimensions. The electrodes shall be furnished in the following diameters as designated by the procuring activity (see 6.2): 0.035, 0.045, 1/16, 5/64, 3/32, and 1/8 inch.

3.3.2 Tolerances. Reference 24a(1) of Fed. Std. No. 146 shall apply.

3.4 Mechanical properties. The tensile strength of the electrode shall be as shown in table II.

Table II. Mechanical properties

Nominal diameter, inch	Tensile strength, psi min.	max.
0.035, 0.045, 1/16	75,000	95,000
5/64, 3/32, 1/8	65,000	85,000

3.5 Spools and coils. The electrode shall be wound (a) on spools, or (b) in coils on drums so as to lay flat. The electrodes on spools shall conform to class 3b and in coils shall conform to class 4 of MIL-W-10430. In either case, the electrode shall be of one continuous length.

3.5.1 Spools. The electrode shall be wound on spools in such a manner as to be free to unwind without binding or other restrictions.

3.6 Workmanship. The electrode shall be clean and free from non-metallic inclusions, slivers, depressions, laps, scratches, scale, drawing compound, kinks, bends, or other defects which would have a deleterious effect on weld quality and deposition or arc stability, or which would interfere with the smooth and uninterrupted feeding through the welding equipment.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Lot. A lot shall consist of material of the same temper and diameter, made by the same manufacturing process, submitted for inspection at one time.

4.3 Sampling.

4.3.1 For chemical analysis. The number of samples specified in table III shall be selected from a different piece in each lot. From each sample, not less than 2 ounces of clean millings, drillings, or clippings shall be obtained for chemical analysis.

Table III. Sampling for chemical analysis

Pounds of material in lot	Number of samples[a]
Up to 5,000	2
Over 5,000	4

[a] If the number of original bar, billets or cakes from which the material is processed is less than the number of samples specified, not more than one sample need be taken from each piece.

4.3.2 For visual and dimensional examination. From each lot, a representative sample of material shall be selected in accordance with MIL-STD-105, inspection level II, with an acceptable quality level (AQL) of 1.5 percent. The samples selected for dimensional examination may be the same as those selected for visual examination, but shall be evaluated separately.

4.3.2.1 The sample for examination shall be taken from within 10 feet of the outer end. If the sample is rejected due to handling marks, an additional 20 feet shall be selected for examination.

4.3.3 Weight. Each spool or coil selected for visual and dimensional examination shall also be weighed to verify the weight claimed by the contractor.

4.3.4 Mechanical properties. A minimum of two tension tests shall be made from each lot.

4.4 Examination.

4.4.1 Visual and dimensional. Each sample selected in accordance with 4.3.2 shall be visually examined to determine compliance with the requirements for spooling (see 3.5) and workmanship (see 3.6), and shall be measured for compliance with the dimensional requirements (see 3.3).

4.4.2 Preparation for shipment. Examination of the preservation, packaging, packing and marking for shipment shall be made for conformance with the requirements of section 5.

4.5 Tests.

4.5.1 Chemical analysis. The samples selected in accordance with 4.3.1 shall be analyzed by the wet chemical method in accordance with method 111 of Fed. Test Method Std. No. 151 or spectrochemical method in accordance with method 112 of Fed. Test Method Std. No. 151 to determine conformance with 3.2. In case of dispute, chemical analysis by the wet method (method 111) shall be the basis of acceptance.

4.5.2 Tension tests. Tension tests shall be conducted on full-size specimens in accordance with ASTM Method E8-68.

4.6 Rejection.

4.6.1 Examination. Any sample unit having one or more defects shall be rejected. If the number of nonconforming sample units in the sample exceeds the acceptance number specified for that sample size, the entire lot shall be rejected subject to the provisions of the section on "Acceptance and Rejection" of MIL-STD-105.

4.6.2 Tests. A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.5 subject to the provisions of the section on "Rejection and Retests" of Fed. Test Method Std. No. 151.

5. PREPARATION FOR DELIVERY

5.1 Packaging.

5.1.1 Level A. The electrodes on spools shall be packaged in class 3b containers in accordance with MIL-W-10430. The electrodes in coils shall be packaged in class 4 containers in accordance with MIL-W-10430.

5.1.2 Level C. Packaging shall be in accordance with level C requirements of MIL-W-10430.

5.2 Packing. Electrodes shall be packed in accordance with level A or C (see 6.2) requirements of MIL-W-10430.

5.3 Marking. In addition to any special marking required by the contract or order, interior and exterior containers shall be marked in accordance with MIL-STD-129, and, in addition, shall include the following:

Specification number and electrode size
Lot, batch or control number

6. NOTES

6.1 Intended use. This copper base alloy electrode is intended for use for welded overlay rotating band applications employing the inert-gas-metal arc (consummable electrode) welding process. The electrode covered by this specification also may be used as the non-electrode auxiliary filler metal in depositing overlays for rotating bands.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification.
(b) Size (diameter) required (see 3.3).
(c) Spools or coils required and container net weight (see 3.5).
(d) Whether packaging shall be by level A or C and packing by level A or C. (Electrodes purchased for delivery to, and used at, the first receiving activity, are packaged by level C.) (See 5).

Custodian:
Army - MU

Preparing activity:
Army - MU

Review activities:
Army - MU, MR

Project No. 3439-A010

User activities:
Army - MI, EL, WC