AWS A5.6/A5.6M:2026
An American National Standard

Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding

American Welding Society®

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An American National Standard

Approved by the
American National Standards Institute
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Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding

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Prepared by the
American Welding Society (AWS) A5 Committee on Filler Metal and Allied Materials

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification prescribes the requirements for classifications of copper and copper-alloy electrodes for shielded metal arc welding. Classification is based on chemical composition, mechanical properties, and usability of the electrodes. Additional requirements are included for manufacture, sizes, lengths, and packaging. A guide is appended to the specification as a source of information concerning the classification system employed and intended use of the electrodes.

This specification makes use of both U.S. Customary Units and the International System of Units (SI). Since these are not equivalent, each system must be used independently of the other.



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Foreword

This foreword is not part of this standard but is included for informational purposes only.

This document makes use of both U.S. Customary Units and the International System of Units (SI). The measurements are not exact equivalents; therefore, each system must be used independently of the other, without combining in any way. In selecting rational metric units the AWS A1.1, *Metric Practice Guide for the Welding Industry*, and ISO 544, *Welding Consumables — Technical Delivery Conditions for Filler Materials and Fluxes — Type of Product, Dimensions, Tolerances and Markings*, are used as guides. Tables and figures make use of both U.S. Customary and SI Units, which, with the application of the specified tolerances, provide for interchangeability of products in both U.S. Customary and SI Units.

This document is the ninth revision of AWS A5.6, first published in 1948. The revision was prepared by the Subcommittee on Copper and Copper-Alloy Filler Metals. This specification describes the most common copper and copper-alloy electrodes for shielded metal arc welding. Since the applications for copper and copper-alloy electrodes are so diverse, i.e., surfacing and joining, discussion on intended uses and suggested welding parameters are included. The reader will find the data describing weld deposit hardness particularly useful when selecting an electrode for surfacing a wear-resistant bearing surface.

Substantive changes included in this revision include revisions to Subclause 1.3; Clause 2. Normative References; Clause 6. Rounding Procedure; Clause 8. Retest; Clause 11. Radiographic Test; and Table 1, Chemical Composition Requirements for Undiluted Weld Metal. These substantive changes are shown in *italic* font.

Document Development

ASTM B225-48T AWS A5.6-48T	*Tentative Specifications for Copper and Copper-Alloy Metal-Arc-Welding Electrodes*
ASTM B225-53T AWS A5.6-53T	*Tentative Specifications for Copper and Copper-Alloy Welding Electrodes*
ASTM B225-57T AWS A5.6-57T	*Tentative Specifications for Copper and Copper-Alloy Arc-Welding Electrodes*
AWS A5.6-66T ASTM B225-66T	*Tentative Specifications for Copper and Copper-Alloy Arc-Welding Electrodes*
AWS A5.6-69 ANSI W3.6-73	*Specifications for Copper and Copper Alloy Arc-Welding Electrodes*
ANSI/AWS A5.6-74 (Addendum)	*Specifications for Covered Copper and Copper Alloy Arc-Welding Electrodes*
AWS A5.6-76	*Specification for Copper and Copper Alloy Covered Electrodes*
ANSI/AWS A5.6-84 ANSI/AWS A5.6-84R	*Specification for Covered Copper and Copper Alloy Arc Welding Electrodes* Reaffirmed March 10, 2000
AWS A5.6/A5.6M:2008	*Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding*
AWS A5.6/A5.6M:2008 (R2017)	*Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding*

The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the standards developer.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS A5 Committee on Filler Metals and Allied Materials, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

All errata to a standard shall be published in the *Welding Journal* and posted on the AWS website.

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Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of covered copper and copper-alloy electrodes for shielded metal arc welding. It includes compositions in which the copper content exceeds that of any other element.[1]

1.2 This specification makes use of both U.S. Customary Units and the International System of Units (SI). The measurements are not exact equivalents; therefore, each system must be used independently of the other without combining in any way when referring to material properties. The specification with the designation A5.6 uses U.S. Customary Units. The specification A5.6M uses SI Units. The latter are shown within brackets [ ] or in appropriate columns in tables and figures. Standard dimensions based on either system may be used for sizing of filler metal or packaging or both under A5.6 or A5.6M specifications.

1.3 Safety and health issues and concerns are beyond the scope of this standard; some safety and health information *is provided, but such issues are not fully addressed herein. Some safety and health information* can be found in Annex Clauses A5 and A10. *Safety and health information is available from the following sources:*

American Welding Society:

(1) ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes

(2) AWS Safety and Health Fact Sheets

(3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

(1) Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.

2. Normative References

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. Unless otherwise defined in this document, welding terms are as defined in AWS A3.0M/A3.0. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments or revisions of the publications may not apply since the relevant requirements may have changed.

[1] No attempt has been made to provide for the classification of all grades of copper and copper-alloy welding electrodes. Only the more commonly used grades have been included.

American Welding Society (AWS) documents:

AWS A3.0M/A3.0, Standard Welding Terms and Definitions, Including Terms for Additive Manufacturing, Adhesive Bonding, Brazing, Soldering, Thermal Cutting, Thermal Spraying, and Nondestructive Examination

AWS A5.01M/A5.01 (ISO 14344 MOD), *Welding and Brazing Consumables—Procurement of Filler Metals and Fluxes*

AWS B4.0, *Standard Methods for Mechanical Testing of Welds*

American National Standards Institute (ANSI) document:

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

ASTM International (ASTM) documents:

ASTM B96/B96M, *Standard Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels*

ASTM B103/B103M, *Standard Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar*

ASTM B122/B122M, *Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar*

ASTM B148, *Standard Specification for Aluminum-Bronze Sand Castings*

ASTM B152/B152M, *Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar*

ASTM B169/B169M, *Standard Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar*

ASTM DS-56/SAE HS-1086, Metals & Alloys in the Unified Numbering System

ASTM E29*, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

ASTM E75*, Standard Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys*

ASTM E478*, Standard Test Methods for Chemical Analysis of Copper Alloys*

ASTM E1032*, Standard Practice for Radiographic Examination of Weldments Using Industrial X-Ray Film*

ASTM E2033, Standard Practice for Computed Radiology (Photostimulable Luminescence Method)

ASTM E2698, Standard Practice for Radiological Examination Using Digital Detector Arrays

International Organization for Standardization (ISO) documents:

ISO 544*, Welding consumables — Technical delivery conditions for filler materials and fluxes — Type of product, dimensions, tolerances and markings*

ISO 80000-1:2022, Quantities and units — Part 1: General

3. Classification

3.1 The welding materials covered by the A5.6/A5.6M specification are classified using a system that is independent of U.S. Customary Units and the International System of Units (SI). Classifications are according to the chemical composition of the undiluted weld metal as specified in Table 1.

3.2 Material classified under one classification shall not be classified under any other classification in this specification. However, material may be classified under both A5.6 and A5.6M.

3.3 The materials classified under this specification are intended for shielded metal arc welding, but that is not to prohibit their use with any other process for which they are found suitable.