AWS A5.6/A5.6M:2008
An American National Standard

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

American Welding Society

Approved American National Standard
ANSI

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

9th Edition

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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 AWS A5.6/A5.6M:2008, *Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding*, but is included for informational purposes only.

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.

This document is the first of the A5.6 specifications which 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 welding filler materials — 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 revision makes adjustments in the chemical composition ranges for classifications ECu, ECuAl-A2, ECuAl-B, ECuNiAl, and ECuMnNiAl to meet with current industry practice. These modified ranges are shown in *Italic* font in Table 1. It also eliminates the bend test requirements for ECuAl-B, ECuNiAl, and ECuMnNiAl whose elongation in the all-weld metal tension test is less than 20%. The nomograph in the previous document intended to allow bend tests of these classifications has also been removed.

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

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, 550 N.W. LeJeune Road, Miami, FL 33126.

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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 Safety and health issues and concerns are beyond the scope of this standard and therefore are not fully addressed herein. Some safety and health information can be found in the Informative Annex Clauses A5 and A10. Safety and health information is available from other sources, including, but not limited to, ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, and applicable federal and state regulations.

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.

2. Normative References

2.1 The following AWS standards[2] are referenced in the mandatory sections of this document:

AWS A5.01, *Filler Metal Procurement Guidelines*

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

2.2 The following ANSI standard[3] is referenced in the mandatory sections of this document:

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

2.3 The following ASTM standards[4] are referenced in the mandatory sections of this document:

ASTM B 96/B 96M, *Standard Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels*

ASTM B 103/B 103M, *Standard Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar*

ASTM B 122/B 122M, *Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar*

ASTM B 148, *Standard Specification for Aluminum-Bronze Sand Castings*

ASTM B 152/B 152M, *Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar*

ASTM B 169/B 169M, *Standard Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar*

ASTM E 29, *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

ASTM E 75, *Standard Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys*

[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.

[2] AWS standards are published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

[3] This ANSI standard is published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

[4] ASTM standards are published by the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.