Abstract

This specification prescribes requirements for the classification of bare, wrought, and cast aluminum-alloy electrodes and rods for use with the gas metal arc, gas tungsten arc, oxyfuel gas, and plasma arc welding processes.

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.
Statement on the Use of American Welding Society Standards

All standards (codes, specifications, recommended practices, methods, classifications, and guides) of the American Welding Society (AWS) are voluntary consensus standards that have been developed in accordance with the rules of the American National Standards Institute (ANSI). When AWS American National Standards are either incorporated in, or made part of, documents that are included in federal or state laws and regulations, or the regulations of other governmental bodies, their provisions carry the full legal authority of the statute. In such cases, any changes in those AWS standards must be approved by the governmental body having statutory jurisdiction before they can become a part of those laws and regulations. In all cases, these standards carry the full legal authority of the contract or other document that invokes the AWS standards. Where this contractual relationship exists, changes in or deviations from requirements of an AWS standard must be by agreement between the contracting parties.

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Official interpretations of any of the technical requirements of this standard may only be obtained by sending a request, in writing, to the appropriate technical committee. Such requests should be addressed to the American Welding Society, Attention: Managing Director, Standards Development, 8669 NW 36 St, # 130, Miami, FL 33166 (see Annex B). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. These opinions are offered solely as a convenience to users of this standard, and they do not constitute professional advice. Such opinions represent only the personal opinions of the particular individuals giving them. These individuals do not speak on behalf of AWS, nor do these oral opinions constitute official or unofficial opinions or interpretations of AWS. In addition, oral opinions are informal and should not be used as a substitute for an official interpretation.

This standard is subject to revision at any time by the AWS A5 Committee on Filler Metals and Allied Materials. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are requested and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS A5 Committee on Filler Metals and Allied Materials and the author of the comments will be informed of the Committee's response to the comments. Guests are invited to attend all meetings of the AWS A5 Committee on Filler Metals and Allied Materials to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.
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Foreword

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

This is the second edition of this specification with modified adoption of ISO 18273:2004, Welding Consumables — Wire Electrodes, Wires and Rods for Welding of Aluminum and Aluminum-Alloys — Classification. Classification in accordance with this document requires prescribed weld testing which is not a requirement of ISO 18273:2004. Therefore, classification in accordance with ISO 18273:2004 does not provide classification in accordance with this document unless this weld testing is successfully conducted.

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 values in any way. For selecting rational metric units, AWS A1.1, Metric Practice Guide for the Welding Industry, is used where suitable. 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.

ISO uses comma (,) for decimal, but AWS uses period (.) for decimal. Decimal commas have been changed to decimal periods.

Classifications ER4943 and R4943 are subject to a pending patent application.

NOTE: 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.

Changes in this edition include the following:

Added Clause A10, “Mechanical Properties of Weld Metal”

Added Table A.2—Typical Historical Properties of Aluminum Filler Metals (as-welded condition)

Added Table A.3—Weld Metal Test Results (All weld-metal—as welded)—developed by the methodology of Clause A10 herein

Added Table A.4—Weld Metal Test Results (All weld-metal—PWHT)—developed by the methodology of Clause A10 herein

Added Figure A.1, “Preparation of Test Piece”

This specification developed as follows:

- ASTM B285-54T, Tentative Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes
- AWS A5.10-54T
- ASTM B285-57T, Tentative Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes
- AWS A5.10-57T
- AWS A5.10-61T, Tentative Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes
- ASTM B285-61T
- AWS A5.10-69, Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes
- ANSI W5.10-1973
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.
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Welding Consumables—Wire Electrodes, Wires and Rods for Welding of Aluminum and Aluminum Alloys—Classification

1. Scope

1.1 This standard specifies requirements for classification of solid wires and rods for fusion welding of aluminum and aluminum alloys. The classification of the solid wires and rods is based on their chemical composition.

1.2 Safety and health issues and concerns are beyond the scope of this standard and are therefore not fully addressed herein. Some safety and health information can be found in the nonmandatory Annex A Clauses A6 and A13. 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.

1.3 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 weld metal properties. The specification A5.10 uses U.S. Customary Units. The specification with the designation A5.10M 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 the sizing of electrodes or packaging or both under specification A5.10 or A5.10M.

2. Normative References

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

2.1 The following AWS standards1 are referenced in the mandatory clauses of this document:

AWS A1.1, Metric Practice Guide for the Welding Industry
AWS A3.0M/A3.0, Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying
AWS A5.01M/A5.01 (ISO 14344 MOD), Welding Consumables—Procurement of Filler Metals and Fluxes
AWS A5.02/A5.02M:2007, Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes
AWS B4.0 or AWS B4.0M, Standard Methods for Mechanical Testing of Welds
AWS F3.2M/F3.2, Ventilation Guide for Weld Fume

2.2 The following ANSI standard is referenced in the mandatory clauses of this document:

ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes2

1 AWS standards are published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.
2 This ANSI standard is published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.