AWS A5.23/A5.23M:2011
An American National Standard

Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

American Welding Society®

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Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

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

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification provides requirements for the classification of solid and composite carbon steel and low-alloy steel electrodes and fluxes for submerged arc welding. Electrode classification is based on chemical composition of the electrode for solid electrodes, and chemical composition of the weld metal for composite electrodes. Fluxes may be classified using a multiple pass classification system or a two-run classification system, or both, under this specification. Multiple pass classification is based on the mechanical properties and the deposit composition of weld metal produced with the flux and an electrode classified herein. Two-run classification is based upon mechanical properties only. Additional requirements are included for sizes, marking, manufacturing and packaging. The form and usability of the flux are also included. A guide is appended to the specification as a source of information concerning the classification system employed and the intended use of submerged arc fluxes and 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.

American Welding Society®
550 N.W. LeJeune Road, Miami, FL 33126

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American Welding Society
550 N.W. LeJeune Road, Miami, FL 33126

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Foreword

This foreword is not part of AWS A5.23/A5.23M:2011, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*, but is included for informational purposes only.

This document is the third of the A5.23/A5.23M 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 values in any way. In selecting rational metric units, 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 where suitable. Tables and figures make use of both U.S. Customary and SI Units, which, with the application of the specified tolerances, provides for interchangeability of products in both U.S. Customary and SI Units.

This is the fifth revision of the document originally issued in 1976. That document was issued jointly by the American Welding Society and the American Society for Testing and Materials. The practice of issuing filler metal specifications as joint AWS/ASTM documents was discontinued shortly after the original version of this specification was issued. The 1976 version, published by AWS, was accepted by the American National Standards Institute as an ANSI standard. Subsequent revisions have become ANSI/AWS standards. *This revision includes new classifications EB23, B23, EB24, B24, ENi6 and Ni6. Classifications Ni3, Ni5, EA1TiB, EA2TiB and B9 have been modified. EB9 has been renamed as EB91 and B9 has been renamed to B91. The dual classification restriction has been deleted. Boron (B) reporting requirement has been added if intentionally added or found at a level greater than 0.0010%. Substantive changes are shown in italics font. The evolution took place as follows:*

ANSI/AWS A5.23–76, *Specification for Bare Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*; ANSI/AWS A5.23–80, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*; ANSI/AWS A5.23–90, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*; ANSI/AWS A5.23/A5.23M:1999, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*; and AWS A5.23/A5.23M:2007, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*.

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.

The welding terms used in this specification shall be interpreted in accordance with the definitions given in the latest edition of AWS A3.0, *Standard Welding Terms and Definitions*.

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Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of carbon steel and low-alloy steel electrodes (both solid and composite) and fluxes for submerged arc welding. Multiple pass flux–electrode classifications include requirements for low-alloy weld metal composition. Two-run flux–electrode classifications, which are also permitted under this specification, have no requirements for weld metal composition. The multiple pass classification of flux–electrode combinations for carbon steel submerged arc welding is not within the scope of this specification but remains with AWS A5.17/A5.17M, *Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.*

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 nonmandatory 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.

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 with the designation A5.23 uses U.S. Customary Units. The specification A5.23M 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 A5.23 or A5.23M.

2. Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this AWS standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreement based on this AWS standard are encouraged to investigate the possibility of applying the most recent editions of the documents shown below. For undated references, the latest edition of the referenced standard applies.

2.1 The following AWS standards[1] 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*

AWS A4.3, *Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding*

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