

AWS A5.23/A5.23M:2025
An American National Standard

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



AWS A5.23/A5.23M:2025
An American National Standard

Approved by the
American National Standards Institute
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Specification for **Low-Alloy and High Manganese** **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, low-alloy steel, and high manganese 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.



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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 It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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 document is the fifth 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*, 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, provides for interchangeability of products in both the U.S. Customary and SI Units.

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.

There are no substantive changes in this edition. The layout and wording were modified to add clarity and bring them up to current practices. These changes are shown in *italic* font.

The welding terms used in this specification shall be interpreted in accordance with the definitions given in the latest edition of AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*.

The current document is the seventh revision of the initial joint ASTM/AWS document issued in 1976. The evolution of the AWS A5.23 specification took place as follows:

ANSI/AWS A5.23-76	<i>Specification for Bare Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.23-80	<i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.23-90	<i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.23/A5.23M:1997	<i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
AWS A5.23/A5.23M:2007	<i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
AWS A5.23/A5.23M:2011	<i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i>
AWS A5.23/A5.23M:2021	<i>Specification for Low-Alloy and High Manganese Steel Electrodes and Fluxes for Submerged Arc Welding</i>

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

1. Scope

1.1 This specification prescribes requirements for the classification of solid and composite carbon steel, low-alloy steel, and high manganese steel electrodes and flux-electrode combinations for submerged arc welding (SAW). This specification covers low-alloy and high manganese electrodes and low-alloy and high manganese multiple-pass flux-electrode classifications. This specification also addresses carbon steel, low-alloy steel, and high manganese steel two-run flux-electrode classifications. The multiple-pass classification of flux-electrode combinations for carbon steel SAW is not within the scope of this specification, but is covered in AWS A5.17/A5.17M.

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 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 [], in appropriate columns in tables and figures and in paragraphs numbered with an “M” suffix. Standard dimensions based on either system may be used for the sizing of electrodes, packaging, or both under specification A5.23 or A5.23M.

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 A Clauses A5 and A11. 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. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to or revisions of any of these publications do not apply.