

AWS A5.29/A5.29M:2021
An American National Standard

Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding



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An American National Standard**

**Approved by the
American National Standards Institute
September 11, 2020**

Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding

5th Edition

Revises AWS A5.29/A5.29M:2010

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 prescribes the requirements for classification of low-alloy steel electrodes for flux cored arc welding. The requirements include chemical composition and mechanical properties of the weld metal and certain usability characteristics. Optional supplemental designators are also included for improved toughness and diffusible hydrogen. Additional requirements are included for standard sizes, marking, manufacturing, and packaging. A guide is appended to the specification as a source of information concerning the classification system employed and the intended use of low-alloy steel flux cored 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 It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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.

Foreword

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

This document is the third of the A5.29 specifications which uses both U.S. Customary Units and the International System of Units (SI) throughout. 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 and Fluxes—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, provide for interchangeability of products in both the U.S. Customary and SI Units.

The current document is the fourth revision of the initial ANSI/AWS document issued in 1980. The evolution took place as follows:

ANSI/AWS A5.29-80	<i>Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding</i>
ANSI/AWS A5.29:1998	<i>Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding</i>
AWS A5.29/A5.29M:2005	<i>Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding</i>
AWS A5.29/A5.29M:2010	<i>Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding</i>

Substantive changes in this document are shown in Italic font and include:

(1) *A requirement is included to report the boron level of the weld deposit if intentionally added or known to be present at levels greater than 0.0010%.*

(2) *The maximum % Mn requirement for the Ni1 alloy type has been raised from 1.50% to 1.75%.*

(3) *Five new low-alloy types (B92, K10, K11, K12, and K13) have been added.*

(4) *The B9 alloy type has been renamed to B91 type to reflect current practice, and two supplemental designators are included for low Mn +Ni content. Refer to Figure 1, Clause 15.3, and A8.3 in Annex A.*

(5) *Two 20% Mn types (Mn1 and Mn2) have been included in this document.*

(6) *Added Computed Radiology and Digital Radiology methods.*

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.

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 Low-Alloy Steel Electrodes for Flux Cored Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of low-alloy steel electrodes for flux cored arc welding (FCAW) either with or without shielding gas. *With two exceptions, the 20% manganese types “Mn1” and “Mn2,” iron is the only element whose content exceeds 10.5% in undiluted weld metal deposited by these electrodes.*

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 A5.29 uses U.S. Customary Units. The specification A5.29M 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 the A5.29 and A5.29M 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 Clauses A5 and A11 in Annex A.

Safety and health information is available from the following sources:

American Welding Society:

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

AWS Safety and Health Fact Sheets

Other safety and health information on AWS website

Material or Equipment Manufacturers:

Safety Data Sheets supplied by material manufacturers

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 or revisions of the publications may not apply since the relevant requirements may have changed.

American Welding Society (AWS) documents:

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