

AWS A5.28/A5.28M:2022
An American National Standard

Specification for Low-Alloy Steel Electrodes and Rods For Gas Shielded Arc Welding



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An American National Standard

Approved by the
American National Standards Institute
September 13, 2022

Specification for

Low-Alloy Steel Electrodes and Rods

For Gas Shielded Arc Welding

5th Edition

Revises AWS A5.28/A5.28M:2020

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 solid low-alloy steel electrodes and rods, composite stranded low-alloy steel electrodes and rods, and composite metal cored low-alloy steel electrodes and rods for gas shielded welding processes including gas metal arc welding, gas tungsten arc welding, and plasma arc welding. Classification is based on chemical composition of the electrode for solid electrodes and rods, chemical composition of weld metal for composite stranded and composite metal cored electrodes and rods and the as-welded or postweld heat treated mechanical properties of the weld metal for each. Additional requirements are included for manufacture, sizes, lengths and packaging. Optional supplemental designators are also included for lower temperature toughness requirements, diffusible hydrogen limits, reduced Mn + Ni levels in Cr-Mo compositions, and shielding gas ranges. A guide is appended to the specification as a source of information concerning the classification system employed and the intended use of the electrodes and rods.

This specification makes use of both U.S. Customary Units and the International System of Units (SI). Since these units are not equivalent, each system must be used independently of the other.



ISBN Print: 978-1-64322-247-9

ISBN PDF: 978-1-64322-248-6

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Foreword

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

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. 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, provide for interchangeability of products in both the U.S. Customary and SI Units.

This current document is the fourth revision of the initial AWS document issued in 1979. The evolution took place as follows:

AWS A5.28-79 Specification for Low Alloy Steel Filler Metals for Gas Shielded Metal Arc Welding

AWS A5.28-96 Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding

AWS A5.28/A5.28M:2005, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding

AWS A5.28/A5.28M:2005 (R2015), Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding

AWS A5.28/A5.28M:2020, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding

Substantive changes included in this revision include:

- Optional supplemental designators to indicate ranges of shielding gases for which an electrode meets the requirements for classification, including any optional diffusible hydrogen (“HX”), low temperature toughness (“J”) or reduced Mn + Ni supplemental designators.
 - The maximum manganese limit for the E80C-Ni1 classification has been raised to 1.75%.
 - Added new classification ER90S-B115 [ER62S-B115]
 - Added new classification E90C-K14 [E62C-K14]
 - Added allowance for an electrode to be classified with both a “-G” chemical composition designator as well as with a defined chemical composition designator. This is being done at the request of the end user community to ease the transition from “-G” classification to a defined composition classification and to prevent burdensome requalification for long-entrenched products with “-G” classifications.

These substantive changes are shown in *italic font*.

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 specification are welcome. They should be sent to the Secretary, Committee on Filler Metals and Allied Materials, American Welding Society, 8669 NW 36th 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 and Rods for Gas Shielded Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of low-alloy steel electrodes (solid, composite stranded and composite metal cored) for gas metal arc welding (GMAW) and low-alloy steel rods (solid, composite stranded and composite metal cored) for gas tungsten arc welding (GTAW) and plasma arc welding (PAW). 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 or rods, as applicable.

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 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 U.S. Customary and SI Units. The specification with the designation A5.28 uses U.S. Customary Units. The specification A5.28M 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 electrodes or packaging or both under the A5.28 or A5.28M 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 the nonmandatory annex, Clauses B5 and B10.

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 AWS website

Material or Equipment Manufacturers:

- (1) Safety Data Sheets supplied by material manufacturers
- (2) Operating Manuals supplied by equipment manufacturers

Applicable federal and state regulations.

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.