

Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding



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An American National Standard

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American National Standards Institute
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Specification for Carbon Steel Electrodes and Rods for Gas Shielded 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 prescribes the requirements for classification of carbon steel electrodes and rods, including solid, composite stranded, and composite metal cored electrodes for gas shielded 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 mechanical properties of the weld metal for each. Additional requirements are included for usability, manufacturing, diameters, lengths, and packaging. 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.



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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 U.S. Customary and SI Units.

The current document is the seventh revision of the initial joint ASTM/AWS document issued in 1965.

This 2021 edition includes the following substantive changes, shown in italic font in this document.

(1) *The amperage, voltage, and travel speed requirements for testing solid electrodes have been replaced by a heat input requirement, and these are also applied to composite and metal cored electrodes.*

(2) *Allow the techniques of computed radiography or digital radiography to be used on welds in place of film radiography although still in conjunction with ASTM E1032.*

(3) *The addition of optional supplemental designators to indicate ranges of shielding gases for which an electrode meets the requirements for classification, including any optional, supplemental designators.*

(4) *The addition of an optional supplemental designator to indicate that an ER70S-6 electrode or R70S-6 rod meets the chemical composition requirements of ASME Boiler and Pressure Vessel Code, Section IX “A-No. 1.”*

Document Development

The evolution took place as below:

AWS A5.18-65T	<i>Tentative Specification for Mild Steel Electrodes for Gas Metal Arc Welding</i>
ASTM A559-65T	
AWS A5.18-69	<i>Specification for Mild Steel Electrodes for Gas Metal Arc Welding</i>
ANSI W3.18-1973	
AWS A5.18-79	<i>Specification for Carbon Steel Filler Metals for Gas Shielded Arc Welding</i>
AWS A5.18-93	<i>Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding</i>
AWS A5.18/A5.18M:2001	<i>Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding</i>
AWS A5.18/A5.18M:2005	<i>Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding</i>
AWS A5.18/A5.18M:2017	<i>Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding</i>

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 Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of carbon steel electrodes and rods (solid, composite stranded, and composite metal cored) for gas metal arc (GMAW), gas tungsten arc (GTAW), and plasma arc (PAW) welding. Rod is understood to include both cut lengths and spooled wires for GTAW or PAW.

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 A5.18 uses U.S. Customary Units. The specification A5.18M uses SI Units. The SI Units 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 A5.18 or A5.18M 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 non-mandatory Annex Clauses A5 and A10.

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. Unless otherwise defined in this document, welding terms are as defined in AWS A3.0M/A3.0. 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.