

AWS A5.18/A5.18M:2017
An American National Standard

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



second printing, July 2018

**AWS A5.18/A5.18M:2017
An American National Standard**

**Approved by the
American National Standards Institute
July 11, 2017**

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

**7th Edition
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Prepared by the
American Welding Society (AWS) A5 Committee on Filler Metals and Allied Processes

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 carbon steel electrodes and rods, composite stranded carbon steel electrodes, and composite metal cored carbon steel 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 the as-welded mechanical properties of the weld metal for each. Additional requirements are included for 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 is the third of the A5.18 specifications that 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 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, provides for interchangeability of products in both U.S. Customary and SI Units.

This current document is the sixth revision of the initial joint ASTM/AWS document issued in 1965.

This 2017 edition includes the following substantive changes which are shown in *Italic* font in this document.

- *A new solid electrode classification, ER70S-8 [ER49S-8], has been added for single and multiple pass applications. This electrode type has been adopted from ISO 14341 (class S11).*
- *Two new composite electrode classifications have been added: (1) the E70C-8X [E49C-8X] classification for DCEN welding and (2) the E70C-12X [E49C-12X] classification which has been added to meet ASME, Section IX, A-No. 1 weld metal chemical composition per QW-442.*
- *Packaging information has been replaced by the reference of AWS A5.02/A5.02M, Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes. The use of A5.02/A5.02M will now require positive identification of all cut length rods by imprinting, embossing, tagging, etc.*
- *Rounding Procedure has been revised to bring it in line with ISO procedure.*
- *The classification designator for the A5.18M specification was changed from ER48 and EC48 to ER49 and EC49, along with a corresponding change in the minimum tensile strength required from 480 MPa to 490 MPa.*
- *B (boron) reporting requirements have been added in Tables 1 and 2.*
- *The GTAW groove weld test has been moved from Annex A to the body of the specification.*

The composite metal cored electrodes classified in this revision of A5.18/A5.18M are also classified in the new AWS A5.36/A5.36M, Specification for Carbon and Low-Alloy Steel Electrodes for Flux Cored Arc Welding and Metal Cored Electrodes for Gas Metal Arc Welding. The A5.36/A5.36M specification utilizes a new open classification system. Combining the metal cored electrodes and flux cored electrodes into a single specification is consistent with the approach taken by ISO and other international code bodies. In addition, metal cored and flux cored electrode classifications are both based upon weld deposit composition, unlike solid GMAW electrodes which are classified based upon electrode composition.

Document Development

The evolution took place as below:

AWS A5.18-65T ASTM A559-65T	<i>Tentative Specification for Mild Steel Electrodes for Gas Metal Arc Welding</i>
AWS A5.18-69 ANSI W3.18-1973	<i>Specification for Mild Steel Electrodes for Gas Metal Arc Welding</i>
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>

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.

Erratum

The following Erratum has been identified and is incorporated in this reprint.

Page 12, Table 6, GMAW Groove Weld Assembly Test Conditions for Solid Electrodes

Travel speed for 0.045 in [1.2 mm] size electrodes, change as below in 2nd column:

“131 in/min \pm 1 in/min” to “13 in/min \pm 1 in/min”

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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 (solid, composite stranded, and composite metal cored) and rods (solid) 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 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 A5.18 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 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 AWS website

Material or Equipment Manufacturers:

- (1) Safety Data Sheets supplied by materials manufacturers
- (2) Operating Manuals supplied by equipment manufacturers
- (3) 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.

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.

2.1 AWS Standards

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

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

AWS A5.01M/A5.01 (ISO 14344 MOD), *Welding Consumables—Procurement of Filler Metals and Fluxes*

AWS A5.02/A5.02M:2007, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*