

AWS A5.20/A5.20M:2021
An American National Standard

Specification for Carbon Steel Electrodes for Flux Cored Arc Welding



**AWS A5.20/A5.20M:2021
An American National Standard**

**Approved by the
American National Standards Institute
June 1, 2021**

Specification for Carbon Steel Electrodes for Flux Cored Arc Welding

6th Edition

Revises AWS A5.20/A5.20M:2005

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 for flux cored arc welding. The requirements include chemical composition and mechanical properties of the weld metal and certain usability characteristics. It also includes optional supplemental designators for lower temperature toughness requirements, diffusible hydrogen limits, *and shielding gas range designators*. 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 carbon 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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Foreword

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

This document uses 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.

The current document is the fourth revision of the initial joint ASTM/AWS document issued in 1969.

This revision includes the following substantive changes, shown in *italic* font in this document:

- (1) *The “Q” optional supplemental designator has been removed due to lack of use.*
- (2) *The “D” optional supplemental designator has been removed, which will allow consistent rules to be published and updated in the AWS D1.8 specification.*
- (3) *A boron reporting requirement has been added.*
- (4) *Fillet weld testing references the procedures of AWS A4.5, and requirements have changed accordingly.*
- (5) *An alternate configuration similar to type 1.3 per ISO 15792-1:2020 has been added as an option for the groove weld shown in Figure 2.*
- (6) *Optional supplemental designators have been added to indicate ranges of shielding gases for which an electrode meets the requirements for classification, including any optional diffusible hydrogen (“HX”) or low temperature toughness (“J”) supplemental designators.*
- (7) *The EXXT-13 classification was removed due to lack of use.*
- (8) *Allows 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.*

Additionally, the format of this document has been modified for better clarity. The optional supplemental designators with their requirements now appear in a Normative Annex (Annex A). These include the “H” designators for diffusible hydrogen, the “J” designator to indicate enhanced impact properties, and the “OE” designators to indicate shielding gas ranges.

The document evolution took place as follows:

| | |
|-----------------------|---|
| AWS A5.20-69 | <i>Specifications for Mild Steel Electrodes for Flux Cored Arc Welding</i> |
| ANSI W3.20-1973 | |
| ANSI/AWS A5.20-79 | <i>Specification for Carbon Steel Electrodes for Flux Cored Arc Welding</i> |
| ANSI/AWS A5.20-95 | <i>Specification for Carbon Steel Electrodes for Flux Cored Arc Welding</i> |
| AWS A5.20/A5.20M:2005 | <i>Specification for Carbon Steel Electrodes for Flux Cored 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 for Flux Cored Arc Welding

1. Scope

1.1 This specification prescribes requirements for the classification of carbon steel electrodes for flux cored arc welding (FCAW), either with or without shielding gas.

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 A5.20 uses U.S. Customary Units. The specification A5.20M 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 A5.20 and A5.20M 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 B5 and B9.

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 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.

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*