

**AWS A5.17/A5.17M:2019**  
**An American National Standard**

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# **Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding**



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An American National Standard**

**Approved by the  
American National Standards Institute  
February 05, 2019**

# **Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding**

**7th Edition**

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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 provides requirements for the classification of solid and composite carbon steel electrodes and fluxes for submerged arc welding. Electrode classification is based on chemical composition of the electrode for solid electrodes, and chemical composition of the weld metal for composite electrodes. Flux classification is based on the mechanical properties of weld metal produced with the flux and an electrode classified herein. Additional requirements are included for sizes, marking, manufacturing, and packaging. The form and usability of the flux are also included. A guide is appended to the specification as a source of information concerning the classification system employed and the intended use of submerged arc fluxes and 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 It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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 required 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 information purposes only.

This document is the second of the A5.17/A5.17M specifications which 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, provides for interchangeability of products in both the U.S. Customary and SI Units.

The current document is the sixth revision of the initial joint ASTM/AWS document issued in 1965. There are no additions or deletions of alloys, classifications, or tests in this revision. It has been revised to bring it up to date with the current practices and rules of the AWS A5 Committee on Filler Metals and Allied Materials. The document evolution took place as follows:

### Document Evolution

AWS A5.17-65T ASTM A558-65T	<i>Tentative Specifications for Bare Mild Steel Electrodes and Fluxes for Submerged-Arc Welding</i>
AWS A5.17-69 ANSI W3.17-1973	<i>Specification for Bare Mild Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.17-77	<i>Specification for Bare Carbon Mild Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.17-80	<i>Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.17-89	<i>Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding</i>
ANSI/AWS A5.17/A5.17M-97	<i>Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding</i>

Comments and suggestions for 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.

# Table of Contents

	<b>Page No.</b>
<i>Personnel</i> .....	v
<i>Foreword</i> .....	vii
<i>List of Tables</i> .....	xi
<i>List of Figures</i> .....	xi
1. Scope .....	1
2. Normative References .....	1
2.1 American Welding Society (AWS) Documents .....	1
2.2 American National Standards Institute (ANSI) Document .....	2
2.3 ASTM International (ASTM) Documents .....	2
2.4 International Organization for Standardization (ISO) Document .....	2
3. Classification .....	3
4. Acceptance .....	6
5. Certification .....	6
6. Rounding Procedure .....	6
7. Summary of Tests .....	6
8. Retest .....	7
9. Weld Test Assemblies .....	7
9.1 Requirements for Classification .....	7
9.2 Weld Test Assemblies .....	7
9.3 Weld Pad .....	8
9.4 Groove Weld for Mechanical Properties and Soundness .....	8
9.5 Diffusible Hydrogen .....	10
10. Chemical Analysis .....	11
11. Radiographic Test .....	12
12. Tension Test .....	14
13. Impact Test .....	14
14. Diffusible Hydrogen Test .....	15
15. Method of Manufacture .....	16
16. Electrode Requirements .....	16
16.1 Standard Sizes .....	16
16.2 Finish and Uniformity .....	16
16.3 Standard Package Forms .....	16
16.4 Winding Requirements .....	16
16.5 Electrode Identification .....	17
16.6 Packaging .....	17
16.7 Marking of Packaging .....	17

	<b>Page No.</b>
17. Flux Requirements .....	17
17.1 Form and Particle Size .....	17
17.2 Usability .....	17
17.3 Packaging .....	17
17.4 Marking of Packages .....	17
Annex A (Informative)—Guide to AWS Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.....	19
Annex B (Informative)—Requesting an Official Interpretation on an AWS Standard .....	29
AWS Filler Metal Specifications Listed by Material and Welding Process .....	31
AWS List of Filler Metal Specifications and Related Documents .....	33

## List of Tables

<b>Table</b>	<b>Page No.</b>
1	Chemical Composition Requirements for Solid Electrodes .....5
2	Chemical Composition Requirements for Composite Electrode Weld Metal .....5
3	Tests Required for Classification .....7
4	Base Metals for Test Assemblies ..... 10
5	Welding Parameters for Groove Weld Test Assembly ..... 11
6	A5.17 Tension Test Requirements ..... 14
6M	A5.17M Tension Test Requirements ..... 14
7	A5.17/A5.17M Impact Test Requirements ..... 15
8	Diffusible Hydrogen Requirements ..... 16
A.1	Comparison of Electrode Designations.....22

## List of Figures

<b>Figure</b>	<b>Page No.</b>
1	A5.17 Classification System for U.S. Customary Units .....3
1M	A5.17M Classification System for the International System of Units (SI).....4
2	Weld Pad for Chemical Analysis of Weld Metal from Composite Electrodes .....8
3	Groove Weld Test Assembly .....9
4	Radiographic Standards for Rounded Indications ..... 13



# Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding

## 1. Scope

**1.1** This specification prescribes requirements for the classification of carbon steel electrodes (both solid and composite) and flux-electrode combinations for submerged arc welding. Two-run flux-electrode classification is not addressed in this specification, but is addressed in AWS A5.23/A5.23M.

**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 A5.17 uses U.S. Customary Units. The specification A5.17M uses SI units. The latter are shown within brackets [ ], in appropriate columns in tables and figures and in paragraphs numbered with an “M” suffix. Standard dimensions based on either system may be used for the sizing of electrodes, packaging or both under A5.17 or A5.17M 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 A, Clauses A5 and A9. 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. 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 American Welding Society (AWS) Documents:**

- (1) AWS A1.1, *Metric Practice Guide for the Welding Industry*
- (2) AWS A4.3, *Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding*