


**AWS A5.28/A5.28M:2005**  
**An American National Standard**



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



**American Welding Society**

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**Key Words**—Filler metal specifications, low-alloy steel welding electrodes, gas metal arc welding, gas tungsten arc welding, metal cored electrodes, plasma arc welding, stranded electrodes, low-alloy steel welding rods, solid electrodes

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**Approved by the**  
**American National Standards Institute**  
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# **Specification for** **Low-Alloy Steel Electrodes and Rods** **for Gas Shielded Arc Welding**

**3rd Edition**

**Supersedes ANSI/AWS A5.28-96**

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 composite metal cored low-alloy 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 or postweld heat treated mechanical properties of the weld metal for each. Additional requirements are included for manufacture, sizes, 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.



**American Welding Society**

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## Foreword

This foreword is not part of AWS A5.28/A5.28M:2005, *Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding*, but is included for informational purposes only.

This document is the first of the A5.28 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* and ISO 544, *Welding consumables—Technical delivery conditions for welding filler materials—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 current document is the second revision of the initial AWS document issued in 1979.

The history of A5.28 may be summarized 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*

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, 550 N.W. LeJeune Road, Miami, FL 33126.

## Errata

The following Errata have been identified and incorporated into the current reprint of this document.

Page 26—Figure A2, Optional GTAW Groove Weld Test Assembly for Mechanical Properties and Soundness

Change dimensions in the Dimension table as shown below:

|   |                                  | DIMENSIONS     |     |                |     |
|---|----------------------------------|----------------|-----|----------------|-----|
|   |                                  | in             |     | mm             |     |
| C | Specimen Center                  | <del>3/8</del> | 1/4 | <del>9.5</del> | 6.5 |
| L | Length, min.                     | 10             |     | 250            |     |
| P | Point of Temperature Measurement | 1              |     | 25             |     |
| R | Root Opening                     | <del>1/2</del> | 1/4 | <del>13</del>  | 6.5 |
| S | Backup Strip Overlap, min.       | <del>1/4</del> | 3/8 | <del>6</del>   | 9   |
| T | Thickness                        | <del>3/4</del> | 1/2 | <del>19</del>  | 13  |
| V | Backup Strip Thickness, min.     | <del>3/8</del> | 1/4 | <del>9</del>   | 6.5 |
| W | Width, min.                      | 5              |     | 125            |     |
| X | Backup Strip Width, min.         | 1              |     | 25             |     |
| Z | Discard, min.                    | 1              |     | 25             |     |

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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) and rods (solid) for gas metal arc (GMAW), gas tungsten arc (GTAW), and plasma arc (PAW) welding.

**1.2** Safety and health issues and concerns are beyond the scope of this standard and therefore are not fully addressed herein. Some safety and health information can be found in the nonmandatory Annex Sections A5 and A10. Safety and health information is available from other sources, including but not limited to ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, and applicable federal and state regulations.

**1.3** 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 A5.28 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.

## **Part A** **General Requirements**

## 2. Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this AWS standard. For dated references, subsequent

amendments to, or revisions of, any of these publications do not apply. However, parties to agreement based on this AWS standard are encouraged to investigate the possibility of applying the most recent editions of the documents shown below. For undated references, the latest edition of the standard applies.

### 2.1 ASTM Standards<sup>1</sup>

(1) A 36/A 36M, *Specification for Carbon Structural Steel*

(2) A 203/A 203M, *Specification for Pressure Vessel Plates, Alloy Steel, Nickel*

(3) A 285/A 285M, *Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength*

(4) A 387/A 387M, *Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum*

(5) A 515/A 515M, *Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service*

(6) A 516/A 516M, *Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service*

(7) A 537/A 537M, *Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel*

(8) E 29, *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

(9) E 350, *Standard Test Method for Chemical Analysis of Carbon Steel, Low Alloy Steel, Silicon Electrical Steel, Ingot Iron and Wrought Iron*

(10) E 1032, *Standard Test Method for Radiographic Examination of Weldments*.

1. ASTM standards are published by the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.