AWS A5.02/A5.02M:2025
An American National Standard

# Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes

American Welding Society®

**AWS A5.02/A5.02M:2025**
**An American National Standard**

**Approved by the**
**American National Standards Institute**
**October 1, 2024**

# Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes

**2nd Edition**

**Revises A5.02/A5.02M:2007**

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 standard sizes and packages of welding filler metals, allowing these physical attributes to be incorporated by reference into the individual specification.

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.




American Welding Society®

ISBN Print: 978-1-64322-346-9
ISBN PDF: 978-1-64322-347-6
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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 It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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 requested 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.

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# Foreword

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

This specification incorporates the provisions which historically appeared in filler metal specifications and is referenced by many of those specifications.

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, provides for interchangeability of products in both the U.S. Customary and SI Units.

The current document is the first revision of AWS A5.02/A5.02M:2007. Additional filler material sizes and winding requirements have been added. Substantive changes in this document are shown in *italic* font.

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 specification are welcome. They should be sent to the Secretary, 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 Filler Metal Standard Sizes, Packaging, and Physical Attributes

## 1. Scope

**1.1** This specification prescribes requirements for standard sizes and packages of welding filler metals and their physical attributes, such as product appearance and identification. *This specification does not apply to filler materials for brazing or braze welding or tungsten and oxide-dispersed tungsten electrodes.*

**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. The specification with the designation A5.02 uses U.S. Customary Units. The specification A5.02M 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 filler metal or packaging.

**1.3 Safety.** 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.

*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.*

American Welding Society:

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

American National Standards Institute (ANSI) document:

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

ASTM International (ASTM) document:

*ASTM E29*, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

International Organization for Standardization (ISO) document:

ISO 544 *Welding consumables — Technical Delivery Conditions for Welding Filler Materials — Type of Product, Dimensions, Tolerances and Markings.*

*ISO 80000-1:2022*, Quantities and units — Part 1: General.

## *3. Rounding Procedure*

*For the purpose of determining compliance with the requirements of this standard, the actual test values obtained shall be subjected to the rounding rules of ASTM E29 or Rule A in B.3 of ISO 80000-1 (the results are the same). If the measured values are obtained by equipment calibrated in units other than those of the specified limit, the measured values shall be converted to the units of the specified limit before rounding. If an average value is to be compared to the specified limit, rounding shall be done only after calculating the average. An observed or calculated value shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting values for that quantity. The rounded results shall fulfill the requirements.*

## *4.* Covered Electrodes

***4*.1 Standard Sizes and Lengths.** Standard sizes (diameter of the core wire) and lengths of electrodes are shown in Table 1.

***4*.1.1** The diameter of the core wire shall not vary more than ± 0.002 in *if measured in U.S. Customary units or more than* ± 0.05 mm *if measured in SI units* from the diameter specified.

***4*.1.2** The length shall not vary more than ± 1/4 in *if measured in U.S. Customary units or more than* ± 10 mm *if measured in SI units* from that specified.

***4*.2 Core Wire and Covering.** The core wire and covering shall be free of defects that would interfere with the uniform deposition of the electrode. The core and covering shall be concentric to the extent that the maximum core-plus-one-covering dimension shall not exceed the minimum core-plus-one-covering dimension by more than:

**(1)** 7% of the mean dimension in sizes of 3/32 in [2.5 mm] and smaller

**(2)** 5% of the mean dimension in sizes larger than 3/32 in [2.5 mm] and smaller than 3/16 in [5 mm]

**(3)** 4% of the mean dimension in sizes 3/16 in [5 mm] and larger.

Concentricity may be measured by any suitable means.

***4*.3 Exposed Core**

***4*.3.1** The grip end of each electrode shall be bare (free of covering) for a distance of not less than 1/2 in [12 mm] nor more than 1-1/4 in [30 mm] for electrodes 5/32 in [4.0 mm] and smaller, and not less than 3/4 in [20 mm] nor more than 1-1/2 in [40 mm] for electrodes 3/16 in [5 mm] and larger, to provide for electrical contact with the electrode holder.

***4*.3.2** The arc end of each electrode shall be sufficiently conductive, and the covering sufficiently tapered, to permit easy striking of the arc. The length of the conductive portion (measured from the end of the core wire to the location where the full cross section of the covering is obtained) shall not exceed 1/8 in [3 mm] or the diameter of the core wire, whichever is less. Electrodes with chipped coverings near the arc end, baring the core wire no more than the lesser of 1/4 in [6 mm] or twice the diameter of the core wire, meet the requirements of this specification provided no chip uncovers more than 50% of the circumference of the core.

***4*.4 Electrode Identification.** All electrodes shall be identified as follows: