


AWS A5.02/A5.02M:2007
An American National Standard



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



American Welding Society



second printing, April 2008

**AWS A5.02/A5.02M:2007
An American National Standard**

**Approved by the
American National Standards Institute
November 6, 2006**

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

1st Edition

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 all types of welding filler metals, allowing these physical attributes to be incorporated by reference into the individual specification. The annex lists the manner by which the filler metal specification may refer to appropriate requirements in this 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

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

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Foreword

This foreword is not part of AWS A5.02/A5.02M:2007, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*, but is included for informational purposes only.

This specification incorporates the provisions which historically have appeared in previous filler metal specifications. It takes into account the requirements of ISO 544, *Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and markings*.

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

This document is the first edition of A5.02/A5.02M:2007.

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.

Erratum

The following Erratum has been identified and incorporated into the current reprint of this document.

Page 3, left hand column: Change subclause numbers 4.2.1 and 4.2.2 to 4.1.1 and 4.1.2, respectively. Corrected subclause numbers are shown in italic font on page 3.

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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.

1.2 This specification applies to covered electrodes with both solid and tubular core wires; bare solid and tubular wires on spools, coils, and drums, or in straight lengths; and solid and sintered strip electrodes. It applies to all fusion welding processes, except brazing, braze welding, and thermal spraying, or granular metallic or mineral products, such as submerged arc fluxes, or other such products used in fusion welding processes.

1.3 Safety and health issues and concerns are beyond the scope of this standard and are, therefore, not fully addressed herein. 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.

1.4 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.

2. Normative References

The following ANSI¹ standard is referenced in the normative sections of this document.

¹ ANSI Z49.1 is published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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

The following ISO² standard is referenced in the mandatory sections of this document.

1. ISO 544 *Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and markings*.

3. Covered Electrodes

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

3.1.1 The diameter of the core wire shall not vary more than ± 0.002 in [± 0.05 mm] from the diameter specified. The length shall not vary more than $\pm 1/4$ [± 10 mm] from that specified.

3.2 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], and

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

Concentricity may be measured by any suitable means.

² ISO standards are published by the International Organization for Standardization, 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland.

Table 1
Standard Sizes and Lengths
of Covered Electrodes

| Standard Size | | Standard Length ^{a, b} | |
|-------------------|---------------------|---------------------------------|------------------|
| in | mm | in | mm |
| 1/16 ^c | 1.6 ^c | 9 | 230 |
| 5/64 ^c | 2.0 ^c | 9 or 12 | 230 or 300 |
| 3/32 ^c | 2.4 ^{c, d} | 9, 12, or 14 | 230, 300, or 350 |
| | 2.5 ^c | — | 300 or 350 |
| 1/8 | 3.2 | 12, 14, or 18 | 300, 350, or 450 |
| 5/32 | 4.0 | 14 or 18 | 350 or 450 |
| 3/16 | 4.8 ^d | 14 or 18 | 350 or 450 |
| | 5.0 | 14 or 18 | 350 or 450 |
| | 5.6 ^{c, d} | 14 or 18 | 350 or 450 |
| 7/32 ^c | 6.0 | 14 or 18 | 350 or 450 |
| | 6.4 ^c | 14 or 18 | 450 |
| 5/16 ^c | 8.0 ^c | 18 | 450 |

^a Lengths other than these shall be as agreed upon between purchaser and supplier.

^b In all cases, end-gripped electrodes are standard.

^c These diameters are not standard sizes for all classifications.

^d These metric sizes are not shown in ISO 544.

3.3 Exposed Core

3.3.1 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.

3.3.2 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.

3.4 Electrode Identification. All electrodes shall be identified as follows:

3.4.1 At least one imprint of the electrode designation (classification plus any optional designators) shall be applied to the electrode covering starting within 2-1/2 in

[65 mm] of the grip end of the electrode. The prefix letter E in the classification may be omitted from the imprint.

3.4.2 The numbers and letters of the imprint shall be of bold block type of a size large enough to be legible.

3.4.3 The ink used for imprinting shall provide sufficient contrast with the electrode covering so that, in normal use, the numbers and letters are legible both before and after welding.

3.4.4 When an electrode is classified as meeting the requirements of A5.X and A5.XM, both electrode designations shall be applied.

3.4.5 If allowed by the specific A5 specification, in lieu of imprinting, electrodes may be identified by:

1. Attaching securely to the bare grip end of each electrode a tag bearing the classification number, or
2. Embossing the classification number on the bare grip end of each electrode. In this case a slight flattening of the grip end will be permitted in the area of the embossing.

3.5 Packaging

3.5.1 Electrodes shall be suitably packaged to protect them from damage during shipment and storage under normal conditions.

3.5.2 Standard package weights shall be as agreed upon between purchaser and supplier.

3.5.3 Hermetically Sealed Containers. When specified for one or more classifications, such as low hydrogen types requiring protection against atmospheric moisture absorption during shipment and storage, electrodes shall be packaged in one of the following manners.

3.5.3.1 Rigid Metal Package. The container may be of either steel or aluminum. Each steel container shall have its sides lock-seamed and soldered or seam welded and the top and bottom mechanically seamed containing a suitable organic sealant. Aluminum containers shall be tubes formed in two sections, one flared slightly for a friction fit and the closure seam shall be sealed with a suitable pressure sensitive tape. Metal containers after loading at ambient pressure and sealing shall be capable of passing the leak test as follows:

Unit containers shall be immersed in water that is at a temperature of at least 50°F [10°C] above that of the packaged material (room temperature). The container shall be immersed so that the surface under observation is 1 in [25 mm] below the water surface and the greatest basic dimension of the container is parallel to the surface of the water. A *leaker* is indicated by a steady stream of

air bubbles emanating from the container. A container with a stream that lasts for 30 seconds or more does not meet the requirements of this specification.

3.5.3.2 Vacuum Package. High density plastic pouches laminated with a suitable foil vapor barrier shall be heat sealed after filling and evacuating. The pouches shall be overpacked with an outer container to protect it from damage that will cause loss of vacuum. Packages which show the contents to be loose within the pouch do not meet the requirements of this specification.

3.5.3.3 Other Package Construction As agreed upon between purchaser and supplier, alternate packaging for protection of electrode coverings from absorption of moisture in excess of that specified by the classification shall be demonstrated by suitable tests, such as those described above.

3.6 Marking of Packages

3.6.1 The following product information (as a minimum) shall be legibly marked on the outside of each unit package:

1. AWS specification and classification designations along with applicable optional designators (year of issue may be excluded)
2. Supplier's name and trade designation
3. Size and net weight
4. Lot, control, or heat number

3.6.2 The appropriate precautionary information,³ as given in ANSI Z49.1, latest edition, (as a minimum) or its equivalent, shall be prominently displayed in legible print on all packages of electrodes, including individual unit packages enclosed within a larger package.

4. Bare Solid and Tubular Electrodes and Rods

4.1 Standard Sizes and Shapes

4.1.1 Standard sizes of filler metal (except strip electrodes) and straight lengths of rods and their tolerances are shown in Table 2.

4.1.2 Standard sizes for strip electrodes in coils are shown in Table 3.

³ Typical examples of "warning labels" are shown in figures in ANSI Z49.1 for some common or specific consumables used with certain processes.

4.2 Finish and Uniformity

4.2.1 All filler metal shall have a smooth finish that is free from slivers, depressions, scratches, scale, seams, laps (exclusive of the longitudinal joint in flux cored or metal cored filler metal), and foreign matter that would adversely affect the welding characteristics or the properties of the weld metal.

4.2.2 Each continuous length of filler metal shall be from a single heat or lot of material, and welds, when present, shall have been made so as not to interfere with the uniform, uninterrupted feeding of the filler metal on automatic and semiautomatic equipment.

4.2.3 The core ingredients in flux cored and metal cored filler metal shall be distributed with sufficient uniformity throughout the length of the electrode so as not to adversely affect the performance of the electrode or the properties of the weld metal or deposited weld overlay.

4.2.4 A suitable protective coating may be applied to any filler metal except as specifically restricted by the classification in the filler metal specification.

4.3 Packaging

4.3.1 Filler metals shall be suitably packaged to protect them from damage during shipment and storage under normal conditions.

4.3.2 Standard package forms are straight lengths, coils with support, coils without support, spools, and drums. Standard package dimensions for each form are given in Table 4. Dimensions for standard spools are given in Figures 1A through 1D. Package forms and sizes other than these shall be as agreed upon between purchaser and supplier.

4.3.3 The liners in coils with support shall be designed and constructed to prevent distortion of the coil during normal handling and use, and shall be clean and dry enough to maintain the cleanliness of the filler metal.

4.3.4 Spools shall be designed and constructed to prevent distortion of the spool and the filler metal during normal handling and use, and shall be clean and dry enough to maintain the cleanliness of the filler metal.

4.3.5 As agreed upon between purchaser and supplier, alternate packaging for protection of filler metals from environmental or other conditions may be specified. This packaging may include, but not be limited to, hermetically sealed packaging as specified in 3.5.3.

Table 2
Standard Sizes and Tolerances of Solid and Tubular Bare Wires^a

| Nominal Diameter | | Solid Wire Tolerance | | | | Tubular Cored Wire Tolerance | |
|------------------|------------------|------------------------|-------------|-------------|-------|------------------------------|-------------|
| | | GMAW/GTAW ^c | | SAW/EGW/ESW | | | |
| in ^b | mm | in | mm | in | mm | in | mm |
| 0.020 | 0.5 | ±0.001 | +0.01/-0.03 | — | — | — | — |
| | 0.6 | | | | | | |
| 0.025 | | | | | | | |
| 0.030 | | | | | | | |
| | 0.8 | ±0.002 | +0.01/-0.04 | — | ±0.04 | ±0.002 | +0.02/-0.05 |
| 0.035 | 0.9 | | | | | | |
| | 1.0 | | | | | | |
| 0.045 | | | | | | | |
| 3/64 | 1.2 | ±0.002 | +0.01/-0.04 | ±0.002 | ±0.04 | ±0.003 | +0.02/-0.06 |
| 0.052 | | | | | | | |
| | 1.4 | | | | | | |
| 1/16 | 1.6 | | | | | | |
| 0.068 | | ±0.003 | +0.01/-0.07 | ±0.003 | ±0.06 | ±0.004 | +0.02/-0.07 |
| 0.072 | 1.8 | | | | | | |
| 5/64 | 2.0 | | | | | | |
| 3/32 | 2.4, 2.5 | | | | | | |
| 7/64 | 2.8 | — | — | ±0.004 | ±0.06 | ±0.004 | +0.02/-0.08 |
| | 3.0 | | | | | | |
| 1/8 | 3.2 | | | | | | |
| 5/32 | 4.0 | | | | | | |
| 3/16 | 4.8 ^d | — | — | ±0.004 | ±0.06 | ±0.004 | +0.02/-0.08 |
| | 5.0 | | | | | | |
| 7/32 | 5.6 ^d | | | | | | |
| | 6.0 | | | | | | |
| 1/4 | 6.4 ^d | — | — | ±0.004 | ±0.06 | ±0.004 | +0.02/-0.08 |
| 5/16 | 8.0 | | | | | | |

^a Dimensions, tolerances, and package forms other than those shown shall be as agreed upon between purchaser and supplier.

^b To establish the nominal diameter for the tolerances, the fractions shall be converted to their decimal equivalents.

^c Bare straight lengths shall be 36 in +0, -1/2 in [900 mm +15, -0 mm].

^d These metric sizes are not shown in ISO 544.

Table 3
Standard Sizes of Strip Electrodes

| Width | | Thickness | |
|-------|-----|-----------|-----|
| in | mm | in | mm |
| 1.18 | 30 | 0.020 | 0.5 |
| 2.36 | 60 | 0.020 | 0.5 |
| 3.54 | 90 | 0.020 | 0.5 |
| 4.72 | 120 | 0.020 | 0.5 |

Notes:

- Other sizes shall be as agreed upon between purchaser and supplier.
- Strip electrodes shall not vary more than ± 0.008 in [± 0.2 mm] in width and more than ± 0.002 in [± 0.05 mm] in thickness.

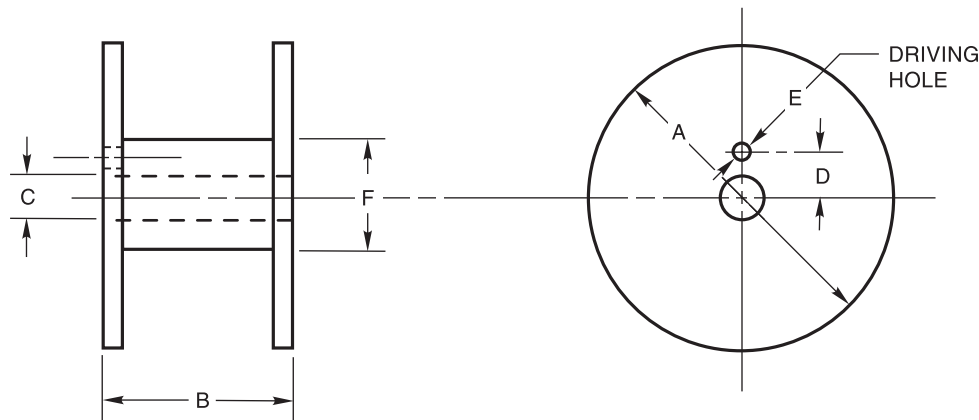
Table 4
Standard Packages^a

| Type of Package | Width | | Inside Diameter | | Outside Diameter, Max. | |
|-------------------------------|---|-----------------|-----------------|-----------------|------------------------|-----------------|
| | in | mm ^b | in | mm ^b | in | mm ^b |
| Coils with Support | 3 max. | 75 max. | 6-3/4 $\pm 1/8$ | 170 ± 3 | — | — |
| | 2-1/2 max. | 90, +0, -15 | 12 $\pm 1/8$ | 300, +15, -0 | 17 | 435 |
| | 4-5/8 max. | 100, +10, -5 | 12 $\pm 1/8$ | 300, +15, -5 | 18 | 450 |
| | 5 max. | 120, +10, -5 | 24 | 600, +20, -0 | 32 | 800 |
| Coils without support | As agreed upon between purchaser and supplier | | | | | |
| Spools | See Figures 1A, 1B, and 1C | | | | 4 | 100 |
| | | | | | 8 | 200 |
| | | | | | 12 | 300 |
| | | | | | 13.5 | 340 |
| | | | | | 14 | 350 |
| | | | | | 22 | 560 |
| | | | | | 24 | 610 |
| | | | | | 30 | 760 |
| Drums | Not applicable | | | | 15-1/2 | 400 |
| | | | | | 20 | 500 |
| | | | | | 23 | 600 |
| Straight Lengths ^c | Not applicable | | | | | |

^a Dimensions, tolerances, and package forms other than those shown shall be as agreed upon between purchaser and supplier.

^b Shaded values in the metric columns are as specified in ISO 544 for coils both with and without supports.

^c Standard lengths shall be 36, +0, -1/2 in [900, +15, -0 mm].



| | | DIMENSIONS | | | | | | | |
|----------------------|-------------------------|----------------------|--------|----------------------|----------|-----------------------|----------|-----------------------|----------|
| | | 4 in [100 mm] Spools | | 8 in [200 mm] Spools | | 12 in [300 mm] Spools | | 14 in [350 mm] Spools | |
| ISO 544 Denomination | | S 100 | | S 200 | | S 300 | | S 350 | |
| | | in | mm | in | mm | in | mm | in | mm |
| A | Diameter, max. (Note 4) | 4.0 | 102 | 8.0 | 203 | 12 | 305 | 14 | 355 |
| B | Width | 1.75 | 45 | 2.16 | 55 | 4.0 | 103 | 4.0 | 103 |
| | Tolerance | ±0.03 | +0, -2 | ±0.03 | +0, -3 | ±0.06 | +0, -3 | ±0.06 | +0, -3 |
| C | Diameter | 0.63 | 16.5 | 2.03 | 50.5 | 2.03 | 50.5 | 2.03 | 50.5 |
| | Tolerance | +0.01, -0 | +1, -0 | +0.06, -0 | +2.5, -0 | +0.06, -0 | +2.5, -0 | +0.06, -0 | +2.5, -0 |
| D | Distance Between Axes | — | — | 1.75 | 44.5 | 1.75 | 44.5 | 1.75 | 44.5 |
| | Tolerance | — | — | ±0.02 | ±0.5 | ±0.02 | ±0.5 | ±0.02 | ±0.5 |
| E | Diameter (Note 3) | — | — | 0.44 | 10 | 0.44 | 10 | 0.44 | 10 |
| | Tolerance | — | — | +0, -0.06 | +1, -0 | +0, -0.06 | +1, -0 | +0, -0.06 | +1, -0 |

Notes:

1. Outside diameter of barrel, dimension F, shall be such as to permit proper feeding of the electrode.
2. Inside diameter of the barrel shall be such that swelling of the barrel or misalignment of the barrel and flanges will not result in the inside of the diameter of the barrel being less than the inside diameter of the flanges.
3. Holes are provided on each flange, but they need not be aligned. No driving holes required for 4 in [100 mm] spools.
4. Metric dimensions and tolerances conform to ISO 544, except that "A" specifies \pm tolerances on the nominal diameter, rather than a plus tolerance only, which is shown here as a maximum.

Figure 1A—Dimensions of 4 in, 8 in, 12 in, and 14 in [100 mm, 200 mm, 300 mm, and 350 mm] Spools

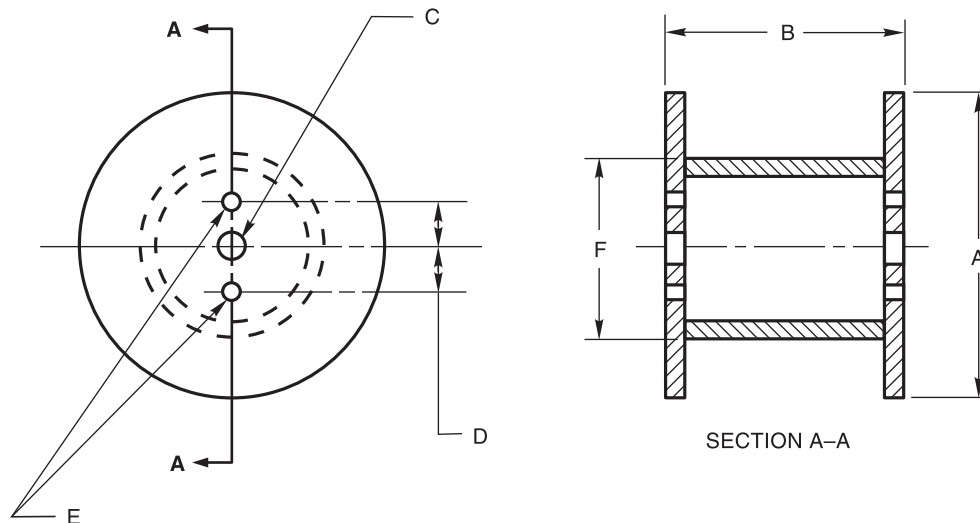
4.4 Winding Requirements

4.4.1 Filler metal on spools and in coils (including drums) shall be wound so that kinks, waves, sharp bends, overlapping, or wedging are not encountered, leaving the filler metal free to unwind without restriction. The outside end of the filler metal (the end with which welding is to begin) shall be identified so it can be located readily and shall be fastened to avoid unwinding.

4.4.2 The cast and helix of filler metal in coils, spools, and drums shall be such that the filler metal will feed in an uninterrupted manner in automatic and semiautomatic equipment.

4.5 Filler Metal Identification

4.5.1 Each bare straight length filler rod shall be durably marked with identification traceable to the unique product type of the manufacturer or supplier. Suitable



| | | DIMENSIONS | | | | | |
|----------------------|----------------------------|-----------------------|------|-----------------------|------|-----------------------|------|
| | | 22 in [560 mm] Spools | | 24 in [610 mm] Spools | | 30 in [760 mm] Spools | |
| ISO 544 Denomination | | S 560 | | S 610 | | S 760 | |
| | | in | mm | in | mm | in | mm |
| A | Diameter, max. (Note 4) | 22 | 560 | 24 | 610 | 30 | 760 |
| B | Width, max. | 12 | 305 | 13.5 | 345 | 13.5 | 345 |
| C | Diameter | 1.31 | 35.0 | 1.31 | 35.0 | 1.31 | 35.0 |
| | Tolerance | +0.13, -0 | ±1.5 | +0.13, -0 | ±1.5 | +0.13, -0 | ±1.5 |
| D | Distance, Center-to-Center | 2.5 | 63.5 | 2.5 | 63.5 | 2.5 | 63.5 |
| | Tolerance | ±0.1 | ±1.5 | ±0.1 | ±1.5 | ±0.1 | ±1.5 |
| E | Diameter (Note 3) | 0.69 | 16.7 | 0.69 | 16.7 | 0.69 | 16.7 |
| | Tolerance | +0, -0.06 | ±0.7 | +0, -0.06 | ±0.7 | +0, -0.06 | ±0.7 |

Notes:

1. Outside diameter of barrel, dimension F, shall be such as to permit proper feeding of the electrode.
2. Inside diameter of barrel shall be such that swelling of the barrel or misalignment of the barrel and flanges will not result in the inside diameter of the barrel being less than the inside diameter of the flanges.
3. Two holes are provided on each flange and shall be aligned on both flanges with the center hole.
4. Metric dimensions and tolerances conform to ISO 544, except that "A" specifies \pm tolerances on the nominal diameter, rather than a plus tolerance only, which is shown here as a maximum..

Figure 1B—Dimensions of 22 in, 24 in, and 30 in [560 mm, 610 mm, and 760 mm] Spools (Reels)

methods of identification could include stamping, coining, embossing, imprinting, flag-tagging, or color coding. (If color-coding is used, the choice of color shall be as agreed upon between the purchaser and supplier, and the color shall be identified on the packaging.) When the AWS classification designation is used, the ER may be omitted; for example, "308L" for classification "ER308L." Additional identification shall be as agreed upon between purchaser and supplier.

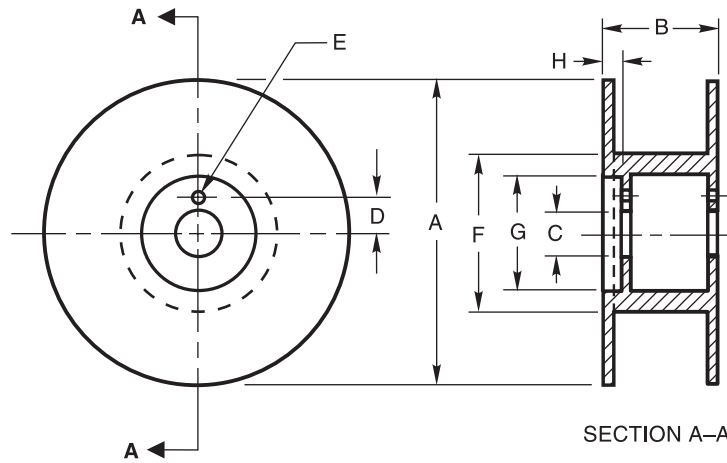
4.5.2 The product information and the precautionary information required in 4.6 for marking each package shall also appear on each coil, spool, and drum.

4.5.3 Coils without support shall have a tag containing this information securely attached to the filler metal at the inside end of the coil.

4.5.4 Coils with support shall have the information securely affixed in a prominent location on the support.

4.5.5 Spools shall have the information securely affixed in a prominent location on the outside of at least one flange of the spool.

4.5.6 Drums shall have the information securely affixed in a prominent location on the side of the drum.



| DIMENSIONS | | | |
|------------|------------------------------------|--------------------|------------------|
| | | in | mm |
| A | Diameter Tolerance | 13.50 +0, -0.06 | 342 ±2 |
| B | Width Tolerance | 5.13 ±0.06 | 130 ±2 |
| C | Diameter Tolerance | 2.03 +0.06, -0 | 50.5 +2.5, -0 |
| D | Distance Between Axes Tolerance | 1.75 ±0.02 | 44.5 ±0.5 |
| E | Diameter Tolerance | 0.44 +0, -0.06 | 10 +1, -0 |
| F | Diameter Tolerance | 7.0 ±0.03 | 177.5 ±1.0 |
| G | Diameter Tolerance | 5.0 ±0.03 | 127 ±0.8 |
| H | Recess Tolerance | 1.13 +0.12, -0 | 31 ±2 |

Note: Holes are provided on each flange, but they need not be aligned.

**Figure 1C—Dimensions of Standard 13-1/2 in [340 mm] Standard Spools
(for Al and Mg Alloys Only)**

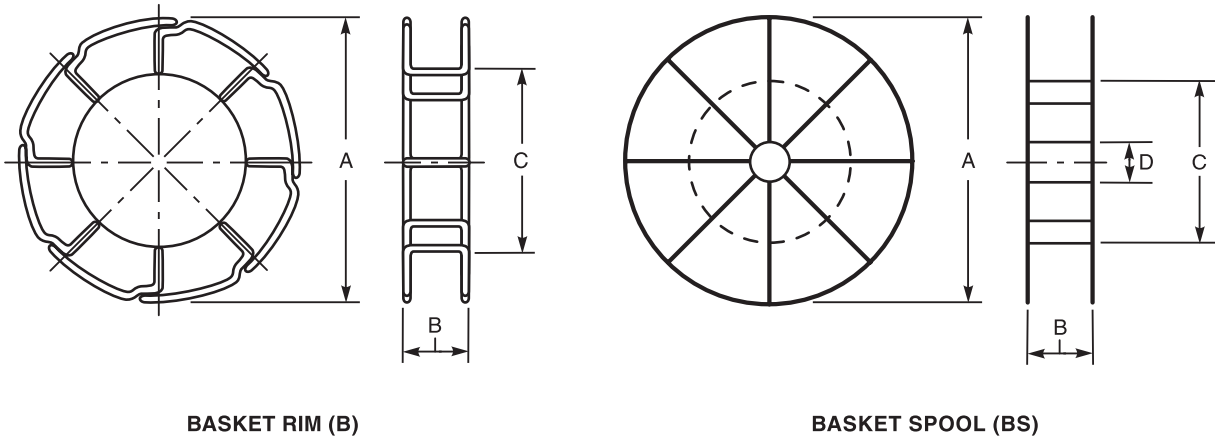
4.6 Marking of Packages

4.6.1 The following product information (as a minimum) shall be legibly marked so as to be visible from the outside of each unit package:

1. AWS specification and classification designations along with applicable optional designators (year of issue may be excluded),
2. Supplier's name and trade designation,
3. Size and net weight or other suitable measure of quantity,
4. Lot, control, or heat number.

4.6.2 The appropriate precautionary information,⁴ as given in ANSI Z49.1, latest edition, (as a minimum) or its equivalent, shall be prominently displayed in legible print on all packages of electrodes, including individual unit packages enclosed within a larger package.

⁴Typical examples of “warning labels” are shown in figures in ANSI Z49.1 for some common or specific consumables used with certain processes.



BASKET RIM (B)

BASKET SPOOL (BS)

| DIMENSIONS | | | | | | | |
|----------------------|-----------|------------------|--------|------------------|----------|---------------------|----------|
| ISO 544 Denomination | | Basket Rim B 300 | | Basket Rim B 450 | | Basket Spool BS 300 | |
| | | in | mm | in | mm | in | mm |
| A | Diameter | 11.7 | 300 | 17.7 max. | 450 max. | 12.0 | 300 |
| | Tolerance | ±0.1 | +0, -5 | | | +0, -0.4 | ±5 |
| B | Width | 4.0 | 103 | 4 | 100 | 4.0 | 103 |
| | Tolerance | ±0.06 | +0, -3 | +0.06, -0.18 | ±3 | ±0.06 | +0, -3 |
| C | Diameter | 7.0 | 180 | 12.0 | 300 | 7.44 | 189 |
| | Tolerance | +0.2, -0 | ±2 | +0, -0.4 | ±5 | ±0.02 | ±0.5 |
| D | Bore | — | — | — | — | 2.03 | 50.5 |
| | Diameter | | | | | +0.06, -0 | +2.5, -0 |

Figure 1D—Dimensions of Basket Rims and Basket Spools

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Annex A (Informative)

Guide to AWS Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes

This annex is not part of AWS A5.02/A5.02M:2007, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*, but is included for informational purposes only.

A1. Clause 3 of this standard may be applied to any of the following specifications for covered electrodes:

A5.1/A5.1M, *Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding*

A5.3/A5.3M, *Specification for Aluminum and Aluminum Alloy Electrodes for Shielded Metal Arc Welding*

A5.4/A5.4M, *Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding*

A5.5/A5.5M, *Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding*

A5.6, *Specification for Covered Copper and Copper-Alloy Arc Welding Electrodes*

A5.11/A5.11M, *Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding*

A5.13, *Specification for Surfacing Electrodes for Shielded Metal Arc Welding*

A2. Clause 4 of this standard may be applied to any of the following specifications for bare and tubular electrodes and rods:

A5.2/A5.2M, *Specification for Carbon and Low Alloy Steel Rods for Oxyfuel Gas Welding*

A5.7, *Specification for Copper and Copper Alloy Bare Welding Rods and Electrodes*

A5.9/A5.9M, *Specification for Bare Stainless Steel Welding Electrodes and Rods*

A5.10/A5.10M, *Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods*

A5.14/A5.14M, *Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods*

A5.16/A5.16M, *Specification for Titanium and Titanium Alloy Welding Electrodes and Rods*

A5.17/A5.17M, *Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding*

A5.18/A5.18M, *Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding*

A5.19, *Specification for Magnesium Arc Welding Electrodes and Rods*

A5.20/A5.20M, *Specification for Carbon Steel Electrodes for Flux Cored Arc Welding*

A5.22, *Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding*

A5.23/A5.23M, *Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*

A5.24/A5.24M, *Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods*

A5.25/A5.25M, *Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding*

A5.26/A5.26M, *Specification for Carbon and Low-Alloy Steel Electrodes for Electrogas Welding*

A5.28/A5.28M, *Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding*

A5.29/A5.29M, *Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding*

A3. Both Clauses 3 and 4 may be applied to the following specifications:

A5.15, *Specification for Welding Electrodes and Rods for Cast Iron*

A5.21, *Specification for Bare Electrodes and Rods for Surfacing*

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Annex B (Informative)

Guidelines for the Preparation of Technical Inquiries

This annex is not part of AWS A5.02/A5.02M: 2007, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*, but is included for informational purposes only.

B1. Introduction

The American Welding Society (AWS) Board of Directors has adopted a policy whereby all official interpretations of AWS standards are handled in a formal manner. Under this policy, all interpretations are made by the committee that is responsible for the standard. Official communication concerning an interpretation is directed through the AWS staff member who works with that committee. The policy requires that all requests for an interpretation be submitted in writing. Such requests will be handled as expeditiously as possible, but due to the complexity of the work and the procedures that must be followed, some interpretations may require considerable time.

B2. Procedure

All inquiries shall be directed to:

Managing Director
 Technical Services Division
 American Welding Society
 550 N.W. LeJeune Road
 Miami, FL 33126

All inquiries shall contain the name, address, and affiliation of the inquirer, and they shall provide enough information for the committee to understand the point of concern in the inquiry. When the point is not clearly defined, the inquiry will be returned for clarification. For efficient handling, all inquiries should be typewritten and in the format specified below.

B2.1 Scope. Each inquiry shall address one single provision of the standard unless the point of the inquiry involves two or more interrelated provisions. The provision(s) shall be identified in the scope of the inquiry

along with the edition of the standard that contains the provision(s) the inquirer is addressing.

B2.2 Purpose of the Inquiry. The purpose of the inquiry shall be stated in this portion of the inquiry. The purpose can be to obtain an interpretation of a standard's requirement or to request the revision of a particular provision in the standard.

B2.3 Content of the Inquiry. The inquiry should be concise, yet complete, to enable the committee to understand the point of the inquiry. Sketches should be used whenever appropriate, and all paragraphs, figures, and tables (or annex) that bear on the inquiry shall be cited. If the point of the inquiry is to obtain a revision of the standard, the inquiry shall provide technical justification for that revision.

B2.4 Proposed Reply. The inquirer should, as a proposed reply, state an interpretation of the provision that is the point of the inquiry or provide the wording for a proposed revision, if this is what the inquirer seeks.

B3. Interpretation of Provisions of the Standard

Interpretations of provisions of the standard are made by the relevant AWS technical committee. The secretary of the committee refers all inquiries to the chair of the particular subcommittee that has jurisdiction over the portion of the standard addressed by the inquiry. The subcommittee reviews the inquiry and the proposed reply to determine what the response to the inquiry should be. Following the subcommittee's development of the response, the inquiry and the response are presented to the entire committee for review and approval. Upon approval by the committee, the interpretation is an official

interpretation of the Society, and the secretary transmits the response to the inquirer and to the *Welding Journal* for publication.

B4. Publication of Interpretations

All official interpretations will appear in the *Welding Journal* and will be posted on the AWS web site.

B5. Telephone Inquiries

Telephone inquiries to AWS Headquarters concerning AWS standards should be limited to questions of a general nature or to matters directly related to the use of the standard. The *AWS Board Policy Manual* requires that all AWS staff members respond to a telephone request for an official interpretation of any AWS standard with the information that such an interpretation can be

obtained only through a written request. Headquarters staff cannot provide consulting services. However, the staff can refer a caller to any of those consultants whose names are on file at AWS Headquarters.

B6. AWS Technical Committees

The activities of AWS technical committees regarding interpretations are limited strictly to the interpretation of provisions of standards prepared by the committees or to consideration of revisions to existing provisions on the basis of new data or technology. Neither AWS staff nor the committees are in a position to offer interpretive or consulting services on (1) specific engineering problems, (2) requirements of standards applied to fabrications outside the scope of the document, or (3) points not specifically covered by the standard. In such cases, the inquirer should seek assistance from a competent engineer experienced in the particular field of interest.



AWS Filler Metal Specifications by Material and Welding Process

| | OFW | SMAW | GTAW GMAW PAW | FCAW | SAW | ESW | EGW | Brazing |
|---------------------------|-------|-------|---------------------|-------|-------|-------|-------|-------------|
| Carbon Steel | A5.2 | A5.1 | A5.18 | A5.20 | A5.17 | A5.25 | A5.26 | A5.8, A5.31 |
| Low-Alloy Steel | A5.2 | A5.5 | A5.28 | A5.29 | A5.23 | A5.25 | A5.26 | A5.8, A5.31 |
| Stainless Steel | | A5.4 | A5.9, A5.22 | A5.22 | A5.9 | A5.9 | A5.9 | A5.8, A5.31 |
| Cast Iron | A5.15 | A5.15 | A5.15 | A5.15 | | | | A5.8, A5.31 |
| Nickel Alloys | | A5.11 | A5.14 | | A5.14 | A5.14 | | A5.8, A5.31 |
| Aluminum Alloys | | A5.3 | A5.10 | | | | | A5.8, A5.31 |
| Copper Alloys | | A5.6 | A5.7 | | | | | A5.8, A5.31 |
| Titanium Alloys | | | A5.16 | | | | | A5.8, A5.31 |
| Zirconium Alloys | | | A5.24 | | | | | A5.8, A5.31 |
| Magnesium Alloys | | | A5.19 | | | | | A5.8, A5.31 |
| Tungsten Electrodes | | | A5.12 | | | | | |
| Brazing Alloys and Fluxes | | | | | | | | A5.8, A5.31 |
| Surfacing Alloys | A5.21 | A5.13 | A5.21 | A5.21 | A5.21 | | | |
| Consumable Inserts | | | A5.30 | | | | | |
| Shielding Gases | | | A5.32 | A5.32 | | | A5.32 | |

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AWS Filler Metal Specifications and Related Documents

| Designation | Title |
|-----------------------------------|--|
| FMC | <i>Filler Metal Comparison Charts</i> |
| IFS | <i>International Index of Welding Filler Metal Classifications</i> |
| UGFM | <i>User's Guide to Filler Metals</i> |
| A4.2M (ISO 8249:2000 MOD) | <i>Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Ferritic-Austenitic Stainless Steel Weld Metal</i> |
| A4.3 | <i>Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding</i> |
| A4.4M | <i>Standard Procedures for Determination of Moisture Content of Welding Fluxes and Welding Electrode Flux Coverings</i> |
| A5.01M/A5.01 (ISO 14344:2002 MOD) | <i>Procurement Guidelines for Consumables—Welding and Allied Processes—Flux and Gas Shielded Electrical Welding Processes</i> |
| A5.02/A5.02M | <i>Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes</i> |
| A5.1/A5.1M | <i>Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding</i> |
| A5.2/A5.2M | <i>Specification for Carbon and Low Alloy Steel Rods for Oxyfuel Gas Welding</i> |
| A5.3/A5.3M | <i>Specification for Aluminum and Aluminum-Alloy Electrodes for Shielded Metal Arc Welding</i> |
| A5.4/A5.4M | <i>Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding</i> |
| A5.5/A5.5M | <i>Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding</i> |
| A5.6/A5.6M | <i>Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding</i> |
| A5.7/A5.7M | <i>Specification for Copper and Copper-Alloy Bare Welding Rods and Electrodes</i> |
| A5.8/A5.8M | <i>Specification for Filler Metals for Brazing and Braze Welding</i> |
| A5.9/A5.9M | <i>Specification for Bare Stainless Steel Welding Electrodes and Rods</i> |
| A5.10/A5.10M | <i>Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods</i> |
| A5.11/A5.11M | <i>Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding</i> |
| A5.12/A5.12M | <i>Specification for Tungsten and Tungsten-Alloy Electrodes for Arc Welding and Cutting</i> |
| A5.13 | <i>Specification for Surfacing Electrodes for Shielded Metal Arc Welding</i> |
| A5.14/A5.14M | <i>Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods</i> |
| A5.15 | <i>Specification for Welding Electrodes and Rods for Cast Iron</i> |
| A5.16/A5.16M | <i>Specification for Titanium and Titanium Alloy Welding Electrodes and Rods</i> |
| A5.17/A5.17M | <i>Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding</i> |
| A5.18/A5.18M | <i>Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding</i> |
| A5.19 | <i>Specification for Magnesium Alloy Welding Electrodes and Rods</i> |
| A5.20/A5.20M | <i>Specification for Carbon Steel Electrodes for Flux Cored Arc Welding</i> |
| A5.21 | <i>Specification for Bare Electrodes and Rods for Surfacing</i> |
| A5.22 | <i>Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding</i> |
| A5.23/A5.23M | <i>Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding</i> |
| A5.24/A5.24M | <i>Specification for Zirconium and Zirconium Alloy Welding Electrodes and Rods</i> |
| A5.25/A5.25M | <i>Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding</i> |
| A5.26/A5.26M | <i>Specification for Carbon and Low-Alloy Steel Electrodes for Electrode Gas Welding</i> |
| A5.28/A5.28M | <i>Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding</i> |
| A5.29/A5.29M | <i>Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding</i> |
| A5.30/A5.30M | <i>Specification for Consumable Inserts</i> |
| A5.31 | <i>Specification for Fluxes for Brazing and Braze Welding</i> |
| A5.32/A5.32M | <i>Specification for Welding Shielding Gases</i> |
| A5.34/A5.34M | <i>Specification for Nickel-Alloy Electrodes for Flux Cored Arc Welding</i> |

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