



Designation: B483/B483M – 03

Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Pipe for General Purpose Applications¹

This standard is issued under the fixed designation B483/B483M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This specification covers aluminum and aluminum-alloy drawn tube and pipe in straight lengths and tube in coils for general purpose applications in the alloys (Note 2), and tempers shown in Tables 1 and 2. Coiled tubes are generally available only as round tubes with a wall thickness not exceeding 0.083 in. [2.00 mm] and only in non-heat-treatable alloys.

NOTE 1—For drawn seamless tubes, see Specifications B210 and B210M, for tubes to be used in condensers and heat exchangers, Specifications B234 and B234M, and for seamless pipe, Specification B241/B241M. For extruded structural tube and pipe, see Specification B429/B429M.

NOTE 2—Throughout this specification use of the term *alloy* in the general sense includes aluminum as well as aluminum alloy.

1.2 Alloy and temper designations are in accordance with ANSI H35.1 and H35.1M. The equivalent Unified Number System alloy designations are those of Table 3 preceded by A9, for example A91060 for aluminum 1060 in accordance with Practice E527.

1.3 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A2.

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

2. Referenced Documents

2.1 The following documents of the issue in effect on date of order acceptance form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:²

- B210 Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
- B210M Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric)
- B234 Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers
- B234M Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers (Metric)
- B241/B241M Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
- B429/B429M Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
- B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products
- B557M Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)
- B597 Practice for Heat Treatment of Aluminum Alloys³
- B660 Practices for Packaging/Packing of Aluminum and Magnesium Products
- B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys
- E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition
- E215 Practice for Standardizing Equipment for Electromagnetic Testing of Seamless Aluminum-Alloy Tube
- E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

¹ This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard.

**B483/B483M – 03****TABLE 1 Tensile Property Limits, Tube^{A,B}**

Temper	Specified Wall Thickness, ^C in. [mm]	Tensile Strength, ksi [MPa]		Yield Strength ^D (0.2% Offset), ksi [MPa], min	Elongation in 2 in. [50 mm] or 4× Diameter, ^E min, %		
		min	max		Full-Section Specimen	Cut-Out Specimen	
						in 50 mm	In 5 × Diameter (5.65 √A) ^F
Aluminum 1060							
O	0.018–0.500 [0.45–12.50]	8.5 [60]	13.5 [95]	2.5 [15]	...	...	...
H12	0.018–0.500 [0.45–12.50]	10.0 [70]	...	4.0 [30]	...	...	...
H14	0.018–0.500 [0.45–12.50]	12.0 [85]	...	10.0 [70]	...	...	...
H18	0.018–0.500 [0.45–12.50]	16.0 [110]	...	13.0 [90]	...	...	...
H113 ^G	0.018–0.500 [0.45–12.50]	8.5 [60]	...	2.5 [15]	...	...	...
Aluminum 1100							
O	0.018–0.500 [0.45–12.50]	11.0 [75]	15.5 [105]	3.5 [25]	...	...	...
H12	0.018–0.500 [0.45–12.50]	14.0 [95]	...	11.0 [75]	...	...	...
H14	0.018–0.500 [0.45–12.50]	16.0 [110]	...	14.0 [85]	...	...	...
H16	0.018–0.500 [0.45–12.50]	19.0 [130]	...	17.0 [115]	...	...	...
H18	0.018–0.500 [0.45–12.50]	22.0 [150]	...	20.0 [140]	...	...	...
H113 ^G	0.018–0.500 [0.45–12.50]	11.0 [75]	...	3.5 [25]	...	...	...
Aluminum 1435 ^H							
O	0.018–0.500 [0.45–12.50]	9.5 [65]	14.0 [100]	3.0 [20]	...	...	...
H12	0.018–0.500 [0.45–12.50]	12.0 [85]	...	7.0 [50]	...	...	...
H14	0.018–0.500 [0.45–12.50]	14.0 [95]	...	12.0 [85]	...	...	...
H16	0.018–0.500 [0.45–12.50]	16.0 [110]	...	14.0 [95]	...	...	...
H18	0.018–0.500 [0.45–12.50]	19.0 [135]	...	16.0 [110]	...	...	...
Alloy 3003							
O	0.018–0.500 [0.45–12.50]	14.0 [95]	19.0 [130]	5.0 [35]	...	...	...
H12	0.018–0.500 [0.45–12.50]	17.0 [120]	...	12.0 [85]	...	...	...
H14	0.018–0.500 [0.45–12.50]	20.0 [140]	...	17.0 [115]	...	...	...
H16	0.018–0.500 [0.45–12.50]	24.0 [165]	...	21.0 [145]	...	...	...
H18	0.018–0.500 [0.45–12.50]	27.0 [185]	...	24.0 [165]	...	...	...
H113 ^G	0.018–0.500 [0.45–12.50]	14.0 [95]	...	5.0 [35]	...	...	...
Alloy 3102 ^H							
O	0.018–0.049 [0.63–1.20]	11.0 [75]	17.0 [115]	3.5 [25]	30 ^I	20 ^I	...
	0.050–0.065 [1.20–1.70]	11.0 [75]	17.0 [115]	3.5 [25]	35	25	...
Alloy 5005 ^H							
O	0.018–0.500 [0.45–12.50]	15.0 [105]	21.0 [145]	5.0 [35]	...	...	...
Alloy 5050 ^H							
O	0.018–0.500 [0.45–12.50]	18.0 [125]	24.0 [165]	6.0 [40]	...	...	...
H32	0.018–0.500 [0.45–12.50]	22.0 [150]	...	16.0 [110]	...	...	...
H34	0.018–0.500 [0.45–12.50]	25.0 [170]	...	20.0 [140]	...	...	...
H36	0.018–0.500 [0.45–12.50]	27.0 [185]	...	22.0 [150]	...	...	...
H38	0.018–0.500 [0.45–12.50]	29.0 [200]	...	24.0 [165]	...	...	...
Alloy 5052 ^H							
O	0.018–0.450 [0.45–11.50]	25.0 [170]	35.0 [240]	10.0 [70]	...	...	...
H32	0.018–0.450 [0.45–11.50]	31.0 [215]	...	23.0 [160]	...	...	...
H34	0.018–0.450 [0.45–11.50]	34.0 [235]	...	26.0 [180]	...	...	...
H36	0.018–0.450 [0.45–11.50]	37.0 [355]	...	29.0 [200]	...	...	...
H38	0.018–0.450 [0.45–11.50]	39.0 [270]	...	31.0 [215]	...	...	...
Alloy 6061							
O	0.018–0.500 [0.45–12.50]	...	22.0 [150]	14.0 [95] max	15	15	13
T4	0.025–0.049 [0.63–1.20]	30.0 [205]	...	16.0 [110]	16	14	...
	0.050–0.259 [1.20–6.30]	30.0 [205]	...	16.0 [110]	18	16	...
	0.260–0.500 [6.30–12.50]	30.0 [205]	...	16.0 [110]	20	18	16
T42 ^J	0.025–0.049 [0.63–1.20]	30.0 [205]	...	14.0 [95]	16	14	...
	0.050–0.259 [1.20–6.30]	30.0 [205]	...	14.0 [95]	18	16	...
	0.260–0.500 [6.30–12.50]	30.0 [205]	...	14.0 [95]	20	18	16
T6, T62 ^J	0.025–0.049 [0.63–1.20]	42.0 [290]	...	35.0 [240]	10	8	...
	0.050–0.259 [1.20–6.30]	42.0 [290]	...	35.0 [240]	12	10	...
	0.260–0.500 [6.30–12.50]	42.0 [290]	...	35.0 [240]	14	12	10



TABLE 1 Continued

Temper	Specified Wall Thickness, ^c in. [mm]	Tensile Strength, ksi [MPa]		Yield Strength ^d (0.2% Offset), ksi [MPa], min	Full-Section Specimen	Elongation in 2 in. [50 mm] or 4× Diameter, ^e min, %	
		min	max			Cut-Out Specimen	
						in 50 mm	In 5 × Diameter (5.65 √A) ^f
Alloy 6063							
O	0.018–0.500 [0.45–12.50]	... [...]	19.0 [130]	... [...]	...	...	...
T4, T42 ^g	0.025–0.049 [0.63–1.20]	22.0 [150]	...	10.0 [70]	16	14	...
	0.050–0.259 [1.20–6.30]	22.0 [150]	...	10.0 [70]	18	16	...
	0.260–0.500 [6.30–12.50]	22.0 [150]	...	10.0 [70]	20	18	16
T6, T62 ^g	0.025–0.049 [0.63–1.20]	33.0 [230]	...	28.0 [195]	12	8	...
	0.050–0.259 [1.20–6.30]	33.0 [230]	...	28.0 [195]	14	10	...
	0.260–0.500 [6.30–2.50]	33.0 [230]	...	28.0 [195]	16	12	10
T83	0.025–0.259 [0.63–6.30]	33.0 [230]	...	30.0 [205]	5	...	...
T831	0.025–0.259 [0.63–6.30]	28.0 [195]	...	25.0 [170]	5	...	...
T832	0.025–0.049 [0.63–1.20]	41.0 [285]	...	36.0 [250]	8	5	...
	0.050–0.259 [1.20–6.30]	40.0 [275]	...	35.0 [240]	8	5	...
Alloy 6262							
T6, T62 ^g	0.025–0.049 [0.63–1.20]	42.0 [290]	...	35.0 [240]	10	8	...
	0.050–0.259 [1.20–6.30]	42.0 [290]	...	35.0 [240]	12	10	...
	0.260–0.500 [6.30–12.50]	42.0 [290]	...	35.0 [240]	14	12	10
T9	0.025–0.375 [0.63–10.00]	48.0 [330]	...	44.0 [305]	5	4	3

^aSee Annex A1.

^bTo determine conformance to this specification each value for tensile strength and for yield strength shall be rounded to the nearest 0.1 ksi [MPa] and each value for elongation to the nearest 0.5 %, both in accordance with the rounding method of Practice E29.

^cCoiled tube is generally available with a maximum wall thickness of 0.083 in. [2.00 mm] and only in nonheat-treatable alloys.

^dYield strength to be determined only on straight tube.

^eElongation of full-section and cut-out sheet-type specimens is measured in 2 in.; of cut-out round specimens, in 4 × specimen diameter.

^fElongations in 50 mm apply for tube tested in full-section, for sheet type specimens for tubes having a flat wall, and for similar curved specimens for tubes having a curved wall up to a maximum wall thickness of 12.50 mm. Elongations in 5D (5.65 √A), where D and A are diameter and cross-sectional area specimens, respectively, apply to round test specimens machined from wall thickness over 6.30 mm.

^gThe H113 temper applies to other than round tube which is fabricated from annealed round tube.

^hIn this alloy tube other than round is produced only in the F (as drawn) and O tempers. Properties for F temper are not specified or guaranteed.

ⁱFor specified wall thickness under 0.025 in. [0.63 mm] elongation is not required.

^jMaterial in the T42 or T62 tempers is not available from the material producers.

TABLE 2 Tensile Property Limits, Pipe^{a, b, c}

Temper	Pipe Size, Designation	Tensile Strength, ksi [MPa]		Yield Strength ^c (0.2% Offset), ksi [MPa], min	Elongation, min, %		
		min	max		Elongation in 2 in. or 4x Diameter, D _{min} , %	In 50 mm	In 5x Diameter (5.65 √A) ^e
Alloy 3003							
H18	Under 1	27.0 [185]	...	24.0 [165]	4	[4]	...
H112	1 and over	14.0 [95]	...	5.0 [35]	25	[25]	[22]

^aThe basis for establishment of tensile property limits is shown in Annex A1.

^bFor purposes of determining conformance with this specification, each value for tensile strength and yield strength shall be rounded to the nearest 0.1 ksi, and each value for elongation shall be rounded to the nearest 0.5 %, both in accordance with the rounding-off method of Practice E29.

^cElongation of full-section and cut-out sheet-type specimens is measured in 2 in.; of round specimens, in 4 x specimen diameter.

^dFor purposes of determining conformance with this specification, each value for ultimate strength and yield strength shall be rounded to the nearest 1 MPa, and each value for elongation shall be rounded to the nearest 0.5%, both in accordance with the rounding-off method of Practice E29.

^eElongation in 50 mm apply for pipe tested in full-section and to sheet type specimens taken from pipes having a wall up to 12.50 mm thick. Elongation in 5D (5.65 √A) where D and A are diameter and cross-sectional area of the specimens respectively, apply to round test specimens machined from wall thicknesses over 6.30 mm.

E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere³
E716 Practices for Sampling and Sample Preparation of

Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis
E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry

TABLE 3 Chemical Composition Limits^{A,B,C}

Alloy	Composition, %										
	Silicon	Iron	Copper	Manganese	Magnesium	Chromium	Zinc	Titanium	Other Elements ^D		Aluminum
									Each	Total ^E	
1060	0.25	0.35	0.05	0.03	0.03	...	0.05	0.03	0.03 ^F	...	99.60 min ^G
1100	0.15	0.30–0.50	0.05–0.20	0.05	...	...	0.10	...	0.05	0.15	99.00 min ^G
1435	0.15	0.30–0.50	0.05–0.20	0.05	0.05	...	0.10	0.03	0.03 ^F	...	99.35 min ^G
3003	0.6	0.7	0.05–0.20	1.0–1.5	...	...	0.10	...	0.05	0.15	remainder
3102	0.40	0.7	0.10	0.05–0.40	...	...	0.30	0.10	0.05	0.15	remainder
5005	0.30	0.7	0.20	0.20	0.50–1.1	0.10	0.25	...	0.05	0.15	remainder
5050	0.40	0.7	0.20	0.10	1.1–1.8	0.10	0.25	...	0.05	0.15	remainder
5052	0.25	0.40	0.10	0.10	2.2–2.8	0.15–0.35	0.10	...	0.05	0.15	remainder
6061	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.35	0.25	0.15	0.05	0.15	remainder
6063	0.20–0.6	0.35	0.10	0.10	0.45–0.9	0.10	0.10	0.10	0.05	0.15	remainder
6262	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.14	0.25	0.15	0.05 ^H	0.15	remainder

^ALimits are in percent maximum unless shown as a range or otherwise stated.

^BAnalysis shall be made for the elements for which limits are shown in this table.

^CFor purposes of determining conformance to these limits, an observed value or a calculated value attained from analysis shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the specified limit, in accordance with the rounding method of Practice E29.

^DOthers includes listed elements for which no specific limit is shown as well as unlisted metallic elements. The producer may analyze samples for trace elements not specified in this specification. However, such analysis is not required and may not cover all metallic Others elements. Should any analysis by the producer or the purchaser establish that an Others element exceeds the limit of Each or that the aggregate of several Others elements exceeds the limit of Total, the material shall be considered nonconforming.

^EOther Elements—Total shall be the sum of unspecified metallic elements 0.010 % or more, rounded to the second decimal before determining the sum.

^FVanadium 0.05 %, maximum.

^GThe aluminum content shall be calculated by subtracting from 100.00 % the sum of all the metallic elements present in amounts of 0.010 % or more, rounded to the second decimal before determining the sum.

^HBismuth and lead each 0.40–0.7 %.

2.3 ANSI Standards:

H35.1 Alloy and Temper Designation Systems for Aluminum⁴

H35.1M Alloy and Temper Designation Systems for Aluminum [Metric]⁴

H35.2 Dimensional Tolerances for Aluminum Mill Products⁴

H35.2M Dimensional Tolerances for Aluminum Mill Products [Metric]⁴

2.4 Military Standard:

MIL-STD-129 Marking for Shipment and Storage⁵

2.5 Military Specification:

MIL-H-6088 Heat Treatment of Aluminum Alloys⁵

2.6 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁵

3. Terminology

3.1 Definitions:

3.1.1 *tube*—a hollow wrought product that is long in relation to its cross section, that is round, a regular hexagon, a regular octagon, elliptical, or square or rectangular with sharp or rounded corners, and that has uniform wall thickness except as may be affected by corner radii.

3.1.2 *drawn tube*—a tube brought to final dimensions by drawing through a die.

3.1.3 *producer*—the primary manufacturer of the material.

3.1.4 *supplier*—includes only the category of jobbers and distributors as distinct from producers.

3.2 Definition of Term Specific to This Standard:

3.2.1 *capable of*—The term *capable of* as used in this specification means that the test need not be performed by the producer of the material. However, should testing by the purchaser establish that the material does not meet these requirements, the material shall be subject to rejection.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable),

4.1.2 Quantity in pieces or pounds,

4.1.3 Alloy (7.1),

4.1.4 Temper (8.1),

4.1.5 Size and schedule number for pipe, cross-sectional dimensions for tube (outside diameter and wall thickness, or inside diameter and wall thickness for round tube; for tube other than round, square, rectangular, hexagonal, or octagonal with sharp corners, a drawing is required),

4.1.6 Length (straight or coiled),

4.1.7 Nominal inside diameter of coils and weight or maximum outside diameter, if applicable,

4.2 Additionally, orders for materials to this specification shall include the following information when required by the purchaser:

4.2.1 Whether heat treatment shall be in accordance with Practice B597 (9.2),

4.2.2 Whether testing for leaks is required (11.1),

4.2.3 Whether specified number of leaks are allowed, and the manner of marking leaks (11.1.3.2),

4.2.4 Whether inside cleanliness test is required on coiled tubes (12.2), and frequency of testing required,

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.