



Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube for Gas and Oil Transmission and Distribution Piping Systems¹

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1. Scope*

1.1 This specification covers seamless pipe and seamless extruded tube in the aluminum and aluminum alloys (**Note 1**) and tempers listed in **Table 1** and **Table 2**, respectively. Seamless pipe and seamless tube are intended for use in applications involving internal pressure.

NOTE 1—Throughout this specification use of the term *alloy* in the general sense includes aluminum as well as aluminum alloy.

NOTE 2—For drawn seamless tubes, see Specifications **B210** and **B210M**; for extruded tubes, Specifications **B221** and **B221M**; for drawn seamless tubes for condensers and heat exchangers, Specifications **B234** and **B234M**; for seamless pipe and seamless extruded tube, **B241/B241M**; for round welded tubes, Specification **B313/B313M**; for seamless condenser and heat exchanger tubes with integral fins, Specification **B404/B404M**; for extruded structural pipe and tube, Specification **B429/B429M**; and for drawn tube for general purpose applications, Specification **B483/B483M**.

1.2 Alloy and temper designations are in accordance with ANSI H35.1 [H35.1M]. The equivalent Unified Numbering System alloy designations are those of **Table 3** preceded by A9, for example, A93003 for aluminum alloy 3003 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 are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

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. Referenced Documents

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

2.2 *ASTM Standards*:

B210 Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes²

B210M Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric)²

B221 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes²

B221M Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)²

B234 Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers²

B234M Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers (Metric)²

B241/B241M Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube²

B313/B313M Specification for Aluminum and Aluminum-Alloy Round Welded Tubes²

B404/B404M Specification for Aluminum and Aluminum-Alloy Seamless Condenser and Heat-Exchanger Tubes with Integral Fins (Withdrawn 2006)³

B429/B429M Specification for Aluminum-Alloy Extruded Structural Pipe and Tube²

B483/B483M Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications²

B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products²

B557M Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)²

B647 Test Method for Indentation Hardness of Aluminum

² *Annual Book of ASTM Standards*, Vol 02.02.

³ 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

TABLE 1 Tensile Property Limits for Extruded Seamless Pipe^{A,B}

Alloy	Temper	Pipe Size, in.	Strength, min, ksi [MPa]		Elongation ^{C,D}	
			Tensile	Yield (0.2 % Offset)	in 2 in. [50 mm] or 4x Diameter, min, %	in 5 × D (5.65 √A)
3003	H18	under 1	27.0 [185]	24.0 [165]	4	4
	H112	1 and over	14.0 [95]	5.0 [35]	25	22
6061	T6	under 1	38.0 [260]	35.0 [240]	8	...
		1 and over	38.0 [260]	35.0 [240]	10 ^E	9
6063	T6	all	30.0 [205]	25.0 [170]	8	7
6351	T5	all	38.0 [260]	35.0 [240]	10 ^E	9
	T6	all	42.0 [290]	37.0 [255]	10 ^F	9

^A The basis for establishment of mechanical property limits is given in Annex A1 of this specification.

^B To 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.

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

^D Elongations in 50 mm apply for pipe tested in full sections and for sheet-type specimens machined from material up through 12.5 mm in thickness having parallel surfaces. Elongations in $5 \times D$ (at $5.65 \sqrt{A}$), where D and A are diameter and cross-sectional area of the specimen, respectively, apply to round test specimens machined from thicknesses over 6.30 mm.

^E The minimum elongation for a wall thickness up through 0.249 in. [6.3 mm] is 8 %.

^F For wall thickness 0.124 in. [3.20 mm] and less, the minimum elongation is 8 %.

Alloys by Means of a Webster Hardness Gage²

B648 Test Method for Indentation Hardness of Aluminum

Alloys by Means of a Barcol Impressor²

B660 Practices for Packaging/Packing of Aluminum and Magnesium Products²

B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products²

B807/B807M Practice for Extrusion Press Solution Heat Treatment for Aluminum Alloys

B918 Practice for Heat Treatment of Wrought Aluminum Alloys²

E18 Test Methods for Rockwell Hardness of Metallic Materials⁴

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁵

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys⁶

E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition⁶

E227 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique⁶ (Withdrawn 2002)⁶

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)⁷

E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere⁶ (Withdrawn 2011)⁷

E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis⁶

E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry⁶

2.3 ANSI Standards:

B2.1 Pipe Threads (except Dryseal)⁸

B36.10 Wrought Steel and Wrought Iron Pipe⁸

H35.1 Alloy and Temper Designation Systems for Aluminum²

H35.1M Alloy and Temper Designation Systems for Aluminum [Metric]²

H35.2 Dimensional Tolerances for Aluminum Mill Products²

H35.2M Dimensional Tolerances for Aluminum Mill Products²

2.4 American Welding Society Standard:

D 10.7 Recommended Practices for Gas Shielded Arc Welding of Aluminum and Aluminum-Alloy Pipe⁹

2.5 Military Standard:

MIL-STD-129 Marking for Shipment and Storage¹⁰

2.6 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)¹⁰

3. Terminology

3.1 Definitions:

3.1.1 *extruded seamless pipe*—extruded seamless round tube with standardized sizes of outside diameter and wall thickness commonly designated by “Nominal Pipe Sizes” and American National Standards Institute (ANSI) “Schedule Numbers.”

3.1.2 *extruded seamless clad tube*—a composite tube product composed of an aluminum alloy core having on either the inside or outside surface a metallurgically bonded aluminum or aluminum alloy coating that is anodic to the core, thus electrolytically protecting the core against corrosion.

⁸ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

⁹ Available from the American Welding Society, 2501 Northwest 7th St., Miami, FL 33125.

¹⁰ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁴ Annual Book of ASTM Standards, Vol 03.01.

⁵ Annual Book of ASTM Standards, Vol 14.02.

⁶ Annual Book of ASTM Standards, Vol 03.05.

⁷ Annual Book of ASTM Standards, Vol 01.01.