



Designation: B317/B317M – 23

Standard Specification for Aluminum-Alloy Extruded Bar, Rod, Tube, Pipe, Structural Profiles, and Profiles for Electrical Purposes (Bus Conductor)¹

This standard is issued under the fixed designation B317/B317M; 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 reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers 6101 aluminum-alloy extruded bar, rod, tube, pipe, (Schedules 40 and 80), structural profiles, and profiles in selected tempers for use as electric conductors as follows:

1.1.1 *Type B*—Hot-finished bar, rod, tube, pipe, structural profiles and profiles in T6, T61, T63, T64, T65, and H111 tempers with Type B tolerances, as shown in the “List of ANSI Tables of Dimensional Tolerances.”

1.1.2 *Type C*—Hot-finished rectangular bar in T6, T61, T63, T64, T65, and H111 tempers with Type C tolerances as listed in the tolerances and permissible variations tables.

1.2 Alloy and temper designations are in accordance with ANSI H35.1. The equivalent Unified Numbering System alloy designation in accordance with Practice E527 is A96101 for Alloy 6101.

NOTE 1—Type A material, last covered in the 1966 issue of this specification, is no longer available; therefore, requirements for cold-finished rectangular bar have been deleted.

1.3 The values stated in either SI or inch-pound units are to be regarded separately as standard. 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 non-conformance with the standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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.

Current edition approved Nov. 1, 2023. Published December 2023. Originally approved in 1957. Last previous edition approved in 2015 as B317/B317M – 07 (2015)^{ε1}. DOI: 10.1520/B0317_B0317M-23.

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*:²

B193 Test Method for Resistivity of Electrical Conductor Materials

B253 Guide for Preparation of Aluminum Alloys for Electroplating

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)

B660 Practices for Packaging/Packing of Aluminum and Magnesium Products

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

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

B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products

B918/B918M Practice for Heat Treatment of Wrought Aluminum Alloys

B985 Practice for Sampling Aluminum Ingots, Billets, Castings and Finished or Semi-Finished Wrought Aluminum Products for Compositional Analysis

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

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

E290 Test Methods for Bend Testing of Material for Ductility

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

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.

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



E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spark Atomic Emission Spectrometry

E1004 Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy Current) Method

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

E3061 Test Method for Analysis of Aluminum and Aluminum Alloys by Inductively Coupled Plasma Atomic Emission Spectrometry (Performance Based Method)

2.3 *ANSI Standards*.³

H35.1/H35.1 (M) Alloy and Temper Designation Systems for Aluminum

H35.2 Dimensional Tolerances for Aluminum Mill Products

H35.2 (M) Dimensional Tolerances for Aluminum Mill Products (Metric)

2.4 *CEN Standard*.⁴

CEN EN 14242 Aluminium and aluminium alloys – Chemical analysis – Inductively coupled plasma optical emission spectrometric analysis

2.5 *Federal Standard*.⁵

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

2.6 *Military Standard*.⁵

MIL-STD-129 Marking for Shipment and Storage

3. Terminology

3.1 Definitions:

3.1.1 Refer to Terminology **B881** for definition of product terms used in this specification.

3.1.1.1 *Discussion*—Tees, Zees, I-beams, and H-sections are rarely used as conductors.

3.2 Definitions of Terms 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 subsequent 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 (kilograms),

4.1.3 Type (**1.1.1** and **1.1.2**),

4.1.4 Temper (Section 9, Table 2),

4.1.5 Type of section (Section 3),

4.1.6 *Cross-Sectional Dimensions*:

4.1.6.1 *Bar*—Thickness and width, or distance across flats, and edge contour (Section 13);

TABLE 1 Chemical Composition Limits^{A,B,C,F}

Element	Alloy Designation 6101 Composition, %
Silicon	0.30–0.7
Iron	0.50
Copper	0.10
Manganese	0.03
Magnesium	0.35–0.8
Chromium	0.03
Zinc	0.10
Boron	0.06
<i>Other elements^D</i>	
Each, max	0.03
Total ^E , max	0.10
Aluminum, min	Rem.

^A Limits are in weight percent maximum unless shown as a range.

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

^C To determine conformance to these limits, an observed value or a calculated value obtained from analysis shall be rounded off to the nearest unit in the last right-hand place of the figures used in expressing the specified limit, in accordance with the rounding-off method of Practice **E29**.

^D *Others* includes all unlisted metallic elements. The producer may analyze samples for trace elements not specified in the 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.

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

^F In case of any discrepancy in the values listed in this table when compared to those listed in the “Teal Sheets” (International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys), the composition limits registered with The Aluminum Association and published in the “Teal Sheets” shall be considered the controlling composition. The “Teal Sheets” are available at <http://www.aluminum.org/tealsheets>.

4.1.6.2 *Rod*—Diameter;

4.1.6.3 *Pipe*—Nominal pipe size and schedule number (40 or 80);

4.1.6.4 *Structural Profile*—Nominal dimensions and type of section;

4.1.6.5 *Round Tube*—Outside or inside diameter and wall thickness;

4.1.6.6 *Square or Sharp-Cornered Tube*—Distance across flats and wall thickness;

4.1.6.7 *Round-Cornered Tube Other than Round*—A drawing is required,

4.1.7 Length.

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

4.2.1 Whether solution heat treatment at the extrusion press is unacceptable (**8.2**),

4.2.2 Whether witness of inspection by the purchaser’s representative is required prior to material shipment (Section 16),

4.2.3 Whether marking for identification is required (Section 18),

4.2.4 Whether certification is required (Section 20), and

4.2.5 Whether Practices **B660** apply and, if so, the levels of preservation, packaging, packing, and marking required (Section 19).

4.2.6 Whether pipe or tube produced through porthole or bridge dies is acceptable (Section 5), and

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ CEN Standards: Available from European Committee for Standardization (CEN), Rue de la Science 23, B-1000, Brussels, Belgium, <http://www.cen.eu>.

⁵ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.