



## Standard Specification for Aluminum Bars for Electrical Purposes (Bus Bars) [Metric]<sup>1</sup>

This standard is issued under the fixed designation B 236M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

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

### 1. Scope\*

1.1 This specification covers Aluminum 1350 bar for electric conductors in the tempers shown in [Table 1](#).

1.2 Aluminum and temper designations are in accordance with ANSI H35.1M. The equivalent Unified Numbering System designation is A91350 in accordance with Practice [E 527](#).

NOTE 1—For Alloy 6101 bus conductors, refer to Specification [B 317/B 317M](#).

NOTE 2—Prior to 1975, Aluminum 1350 was designated as EC aluminum.

1.3 This specification is the metric counterpart of Specification B 236.

1.4 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see [Annex A1](#).

### 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*:<sup>2</sup>

[B 193](#) Test Method for Resistivity of Electrical Conductor Materials

[B 317/B 317M](#) Specification for Aluminum-Alloy Extruded Bar, Rod, Tube, Pipe, and Structural Profiles for Electrical Purposes (Bus Conductor)

[B 557M](#) Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products [Metric]

[B 660](#) Practices for Packaging/Packing of Aluminum and Magnesium Products

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Tensile Property Limits<sup>A,B</sup>

Temper	Specified Thickness, mm		Tensile Strength, min, MPa	Yield Strength, min, (0.2 % offset) MPa
	Over	Through		
H12	3.20	25.00	85	55
H112	3.20	12.50	75	40
	12.50	25.00	70	30
	25.00	40.00	60	25
H111	All		60	25

<sup>A</sup>For purposes of determining conformance with this specification, each value for tensile strength and yield strength shall be rounded to the nearest 1 MPa in accordance with the rounding-off method of Practice [E 29](#).

<sup>B</sup>See [Appendix X2](#).

[B 666/B 666M](#) Practice for Identification Marking of Aluminum and Magnesium Products

[B 881](#) Terminology Relating to Aluminum- and Magnesium-Alloy Products

[E 29](#) Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

[E 34](#) Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys

[E 55](#) Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition

[E 290](#) Test Methods for Bend Testing of Material for Ductility

[E 527](#) Practice for Numbering Metals and Alloys (UNS)

[E 607](#) Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere

[E 716](#) Practices for Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis

[E 1004](#) Practice for Determining Electrical Conductivity Using the Electromagnetic (Eddy-Current) Method

[E 1251](#) Test Method for Analysis of Aluminum and Aluminum Alloys by Atomic Emission Spectrometry

2.3 *ANSI Standards*:

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

[H35.2M](#) Dimensional Tolerances for Aluminum Mill Products

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

2.4 *Military Standard:*

**MIL-STD-129** Marking for Shipment and Storage<sup>3</sup>

2.5 *Federal Standard:*

**Fed. Std. No. 123** Marking for Shipment (Civil Agencies)<sup>3</sup>

### 3. Terminology

3.1 *Definitions:* Refer to Terminology **B 881** for definitions of product terms used in this specification.

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 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 kilograms,

4.1.3 Temper (**8.1**),

4.1.4 Edge contour (Section **12**),

4.1.5 Diameter for rounds; distance across flats for square-cornered squares, hexagons, or octagons; width and depth for square-cornered rectangles,

4.1.6 Length (specific or stock) (Section **14**),

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

4.2.1 Whether inspection or witness of inspection and tests by the purchaser's representative is required prior to material shipment (**16.1**),

4.2.2 Whether marking for identification is required (**18.1**),

4.2.3 Whether Practices **B 660** applies and, if so, the levels of preservation, packaging, and packing required (**19.3**), and

4.2.4 Whether certification of the material by the producer is required (Section **20**).

### 5. Manufacture

5.1 The products covered by this specification shall be produced by extruding or rolling, at the option of the producer, provided that the production method results in material that meets all requirements of this specification.

5.2 Bars in the H12 temper shall be furnished with a rolled mill finish; bars in the H111 temper, with an as-extruded mill finish; and bars in the H112 temper, with a rolled mill finish except that the edges shall be as sawed.

### 6. Responsibility for Quality Assurance

6.1 *Responsibility for Inspection and Tests*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract or order, the producer may use his own or any

other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to assure that material conforms to prescribed requirements.

6.2 *Lot Definition*—An inspection lot shall consist of an identifiable quantity of material of the same aluminum designation, temper, and thickness subjected to inspection at one time.

### 7. Chemical Composition Requirements

7.1 The material shall conform to the composition in **Table 2**. Conformance shall be determined by the producer by analyzing samples taken at the time the ingots or continuously cast bars are poured, or samples taken from the finished or semifinished product. If the producer has determined the composition of the material during the course of manufacture, he shall not be required to sample and analyze the finished product.

NOTE 3—It is standard practice in the United States aluminum industry to determine conformance to the composition limits prior to further processing of ingots into wrought products. Due to the continuous nature of the process, it is not practical to keep a specific ingot analysis identified with a specific quantity of finished material.

7.2 *Number of Samples*—The number of samples taken for determination of chemical composition shall be as follows:

7.2.1 When samples are taken at the time the ingots are poured, at least one sample shall be taken for each group of ingots poured simultaneously from the same source of molten metal.

7.2.2 When samples are taken from the finished or semifinished product, a sample shall be taken to represent each 2000 kg or fraction thereof, in the shipment, except that not more than one sample shall be required per piece.

**TABLE 2 Chemical Requirements<sup>A</sup>**

Element	Composition, %
Silicon, max	0.10
Iron, max	0.40
Copper, max	0.05
Manganese, max	0.01
Chromium, max	0.01
Zinc, max	0.05
Boron, max	0.05
Gallium, max	0.03
Vanadium + titanium, total, max	0.02
Other elements, each, <sup>B</sup> max	0.03
Other elements, total, <sup>B,C</sup> max	0.10
Aluminum, <sup>D</sup> min	99.50

<sup>A</sup>Analysis shall be made for the elements for which limits are shown in this table.

<sup>B</sup>*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 non-conforming.

<sup>C</sup>*Other Elements*—Total shall be the sum of unspecified metallic elements 0.010 % or more, rounded to the second decimal before determining the sum.

<sup>D</sup>The aluminum content shall be calculated by subtracting from 100.00 % the sum of all metallic elements present in amounts of 0.010 % or more each, rounded to the second decimal before determining the sum.

<sup>3</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.