



Designation: B 179 – 03

# Standard Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes<sup>1</sup>

This standard is issued under the fixed designation B 179; 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 commercial aluminum alloys in ingot form for remelting and molten form for the manufacture of castings. The specific gravity of these alloys does not exceed 3.0 and they are designated as shown in Tables 1 and 2.

NOTE 1—Throughout this specification the use of “ingot” in a general sense includes sow, T-bar, T-ingot, and pig.

1.2 Alloy designations are in accordance with ANSI H35.1. The equivalent Unified Numbering System alloy designations are in accordance with Practice E 527.

NOTE 2—Supplementary data pertaining to the alloys covered by this specification when used in the form of castings are given in Specifications B 26/B 26M, B 85, B 108, B 618, and B 686.

1.3 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A1.

1.4 The values stated in inch-pound units are to be regarded as the standard.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- B 26/B26M Specification for Aluminum-Alloy Sand Castings<sup>2</sup>
- B 85 Specification for Aluminum-Alloy Die Castings<sup>2</sup>
- B 108 Specification for Aluminum-Alloy Permanent Mold Castings<sup>2</sup>
- B 275 Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought<sup>2</sup>
- B 618 Specification for Aluminum-Alloy Investment Castings<sup>2</sup>
- B 666/B 666M Practice for Identification Marking of Aluminum and Magnesium Products<sup>2</sup>

- B 686 Specification for Aluminum Alloy Castings, High-Strength<sup>2</sup>
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>3</sup>
- E 34 Test Methods for Chemical Analysis of Aluminum and Aluminum Base Alloys<sup>4</sup>
- E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition<sup>4</sup>
- E 101 Test Method for Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique<sup>5</sup>
- E 527 Practice for Numbering Metals and Alloys (UNS)<sup>6</sup>
- E 607 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere<sup>4</sup>
- E 716 Practices for Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis<sup>4</sup>
- E 1251 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge<sup>4</sup>
- 2.2 ANSI Standard:
  - H35.1 Alloy and Temper Designation Systems for Aluminum<sup>2</sup>

## 3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

- 3.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable),
- 3.1.2 Alloy (Section 6, Tables 1 and 2), and
- 3.1.3 The quantity in pieces or pounds.

<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 B07.01 on Aluminum Alloy Ingots and Castings.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 02.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 14.02.

<sup>4</sup> Annual Book of ASTM Standards, Vol 03.05.

<sup>5</sup> Discontinued. See 1995 Annual Book of ASTM Standards, Vol 03.05.

<sup>6</sup> Annual Book of ASTM Standards, Vol 01.01.

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

**TABLE 1 Chemical Composition Limits for Alloys Normally Used in Sand and Permanent Mold Casting Processes**

NOTE 1—Where single units are shown, these indicate the maximum amounts permitted.

NOTE 2—Analysis shall be made for the elements for which limits are shown in this table.

NOTE 3—The following applies to all specified limits in this table: For purposes of determining conformance to these limits, an observed value or a calculated value obtained 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-off method of Practice E 29.

Alloy <sup>A</sup>		Use <sup>B</sup>	Composition, %												Others <sup>C</sup>		Aluminum
			Silicon	Iron	Copper	Manganese	Magnesium	Chromium	Nickel	Zinc	Tin	Titanium	Each	Total <sup>D</sup>			
201.2	A02012	S	0.10	0.10	4.0–5.2	0.20–0.50	0.20–0.55	...	...	...	...	0.15–0.35	0.05 <sup>F</sup>	0.10	remainder		
204.2	A02042	S,P	0.15	0.10–0.20	4.2–4.9	0.05	0.20–0.35	...	0.03	0.05	0.05	0.15–0.25	0.05	0.15	remainder		
242.1	A02421	S,P	0.7	0.8	3.5–4.5	0.35	1.3–1.8	0.25	1.7–2.3	0.35	...	0.25	0.05	0.15	remainder		
242.2	A02422	S,P	0.6	0.6	3.5–4.5	0.10	1.3–1.8	...	1.7–2.3	0.10	...	0.20	0.05	0.15	remainder		
A242.1	A12421	S	0.6	0.6	3.7–4.5	0.10	1.3–1.7	0.15–0.25	1.8–2.3	0.10	...	0.07–0.20	0.05	0.15	remainder		
A242.2	A12422	S	0.35	0.6	3.7–4.5	0.10	1.3–1.7	0.15–0.25	1.8–2.3	0.10	...	0.07–0.20	0.05	0.15	remainder		
295.1	A02951	S	0.7–1.5	0.8	4.0–5.0	0.35	0.03	...	...	0.35	...	0.25	0.05	0.15	remainder		
295.2	A02952	S	0.7–1.2	0.8	4.0–5.0	0.30	0.03	...	...	0.30	...	0.20	0.05	0.15	remainder		
296.1	...	P	2.0–3.0	0.9	4.0–5.0	0.35	0.05	...	0.35	0.50	...	0.25	...	0.35	remainder		
296.2	...	P	2.0–3.0	0.8	4.0–5.0	0.30	0.03	...	...	0.30	...	0.20	0.05	0.15	remainder		
308.1	A03081	P	5.0–6.0	0.8	4.0–5.0	0.50	0.10	...	...	1.0	...	0.25	...	0.50	remainder		
308.2	A03082	P	5.0–6.0	0.8	4.0–5.0	0.30	0.10	...	...	0.50	...	0.20	...	0.50	remainder		
319.1	A03191	S,P	5.5–6.5	0.8	3.0–4.0	0.50	0.10	...	0.35	1.0	...	0.25	...	0.50	remainder		
319.2	A03192	S,P	5.5–6.5	0.6	3.0–4.0	0.10	0.10	...	0.10	0.10	...	0.20	...	0.20	remainder		
328.1	A03281	S	7.5–8.5	0.8	1.0–2.0	0.20–0.6	0.25–0.6	0.35	0.25	1.5	...	0.25	...	0.50	remainder		
332.1 <sup>F</sup>	A03321	P	8.5–10.5	0.9	2.0–4.0	0.50	0.6–1.5	0.50	1.0	1.0	...	0.25	...	...	remainder		
332.2 <sup>F</sup>	A03322	P	8.5–10.0	0.6	2.0–4.0	0.10	0.9–1.3	...	0.10	0.10	...	0.20	...	0.15	remainder		
333.1	A03331	P	8.0–10.0	0.8	3.0–4.0	0.50	0.10–0.50	...	0.50	1.0	...	0.25	...	0.50	remainder		
336.1 <sup>F</sup>	A03361	P	11.0–13.0	0.9	0.50–1.5	0.35	0.8–1.3	...	2.0–3.0	0.35	...	...	...	0.30	remainder		
336.2 <sup>F</sup>	A03362	P	11.0–13.0	0.9	0.50–1.5	0.10	0.9–1.3	...	2.0–3.0	0.10	...	...	...	0.50	remainder		
354.1	A03541	P	8.6–9.4	0.15	1.6–2.0	0.10	0.45–0.6	...	...	0.10	...	0.20	0.05	0.15	remainder		
355.1	A03551	S,P	4.5–5.5	0.50 <sup>G</sup>	1.0–1.5	0.50 <sup>G</sup>	0.45–0.6	0.25	...	0.35	...	0.25	0.05	0.15	remainder		
355.2	A03552	S,P	4.5–5.5	0.14–0.25	1.0–1.5	0.05	0.50–0.6	...	...	0.05	...	0.20	0.05	0.15	remainder		
C355.2	A33552	S,P	4.5–5.5	0.13	1.0–1.5	0.05	0.50–0.6	...	...	0.05	...	0.20	0.05	0.15	remainder		
356.1	A03561	S,P	6.5–7.5	0.50 <sup>G</sup>	0.25	0.35 <sup>G</sup>	0.25–0.45	...	...	0.35	...	0.25	0.05	0.15	remainder		
356.2	A03562	S,P	6.5–7.5	0.13–0.25	0.10	0.05	0.30–0.45	...	...	0.05	...	0.20	0.05	0.15	remainder		
A356.2	A13562	S,P	6.5–7.5	0.12	0.10	0.05	0.30–0.45	...	...	0.05	...	0.20	0.05	0.15	remainder		
357.1	A03571	P	6.5–7.5	0.12	0.05	0.03	0.45–0.6	...	...	0.05	...	0.20	0.05	0.15	remainder		
A357.2	A13570	P	6.5–7.5	0.12	0.10	0.05	0.45–0.7	...	...	0.05	...	0.04–0.20	0.03 <sup>H</sup>	0.10	remainder		
359.2	A03592	P	8.5–9.5	0.12	0.10	0.10	0.55–0.7	...	...	0.10	...	0.20	0.05	0.15	remainder		
443.1	A04431	S,P	4.5–6.0	0.6	0.6	0.50	0.05	0.25	...	0.50	...	0.25	...	0.35	remainder		
443.2	A04432	S,P	4.5–6.0	0.6	0.10	0.10	0.05	...	...	0.10	...	0.20	0.05	0.15	remainder		
B443.1	A24431	S,P	4.5–6.0	0.6	0.15	0.35	0.05	...	...	0.35	...	0.25	0.05	0.15	remainder		
A444.2	A14442	P	6.5–7.5	0.12	0.05	0.05	0.05	...	...	0.05	...	0.20	0.05	0.15	remainder		
513.2 <sup>F</sup>	A05132	P	0.30	0.30	0.10	0.10	3.6–4.5	...	...	1.4–2.2	...	0.20	0.05	0.15	remainder		
514.1	A05141	S	0.35	0.40	0.15	0.35	3.6–4.5	...	...	0.15	...	0.25	0.05	0.15	remainder		
514.2	A05142	S	0.30	0.30	0.10	0.10	3.6–4.5	...	...	0.10	...	0.20	0.05	0.15	remainder		
520.2	A05202	S	0.15	0.20	0.20	0.10	9.6–10.6	...	...	0.10	...	0.20	0.05	0.15	remainder		
535.2	A05352	S,P	0.10	0.10	0.05	0.10–0.25	6.6–7.5	...	...	...	...	0.10–0.25	0.05 <sup>I</sup>	0.15	remainder		
705.1	A07051	S,P	0.20	0.6	0.20	0.40–0.6	1.5–1.8	0.20–0.40	...	2.7–3.3	...	0.25	0.05	0.15	remainder		
707.1	A07071	S,P	0.20	0.6	0.20	0.40–0.6	1.9–2.4	0.20–0.40	...	4.0–4.5	...	0.25	0.05	0.15	remainder		
710.1 <sup>F</sup>	A07101	S	0.15	0.40	0.35–0.65	0.05	0.65–0.8	...	...	6.0–7.0	...	0.25	0.05	0.15	remainder		
711.1 <sup>F</sup>	A07111	P	0.30	0.7–1.1	0.35–0.65	0.05	0.30–0.45	...	...	6.0–7.0	...	0.20	0.05	0.15	remainder		
712.2 <sup>F</sup>	A07122	S	0.15	0.40	0.25	0.10	0.50–0.65	0.40–0.6	...	5.0–6.5	...	0.15–0.25	0.05	0.20	remainder		
713.1	A07131	S,P	0.25	0.8	0.40–1.0	0.6	0.25–0.50	0.35	0.15	7.0–8.0	...	0.25	0.10	0.25	remainder		
771.2	A07712	S	0.10	0.10	0.10	0.10	0.85–1.0	0.06–0.20	...	6.5–7.5	...	0.10–0.20	0.05	0.15	remainder		
850.1	A08501	S,P	0.7	0.50	0.7–1.3	0.10	0.10	...	0.7–1.3	...	5.5–7.0	0.20	...	0.30	remainder		
851.1 <sup>F</sup>	A08511	S,P	2.0–3.0	0.50	0.7–1.3	0.10	0.10	...	0.30–0.7	...	5.5–7.0	0.20	...	0.30	remainder		

TABLE 1 Continued

Alloy <sup>A</sup>		Use <sup>B</sup>	Composition, %												Aluminum
ANSI <sup>A</sup>	UNS		Silicon	Iron	Copper	Manganese	Magnesium	Chromium	Nickel	Zinc	Tin	Titanium	Others <sup>C</sup>		
													Each	Total <sup>D</sup>	
852.1 <sup>F</sup>	A08521	S,P	0.40	0.50	1.7–2.3	0.10	0.7–0.9	...	0.9–1.5	...	5.5–7.0	0.20	...	0.30	remainder

<sup>A</sup> ASTM alloy designations are recorded in Practice B 275.

<sup>B</sup> S = sand cast. P = permanent mold cast.

<sup>C</sup> "Others" 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 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.

<sup>D</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>E</sup> Silver 0.40–1.0 %.

<sup>F</sup> 336.1 formerly A332.1, 336.2 formerly A332.2, 332.1 formerly F332.1, 332.2 formerly F332.2, 513.2 formerly A514.2, 710.1 formerly A712.1, 711.1 formerly C712.1, 712.2 formerly D712.2, 851.1 formerly A850.1, 852.1 formerly B850.1.

<sup>G</sup> If iron exceeds 0.45 %, manganese shall not be less than one half of the iron content.

<sup>H</sup> Beryllium 0.04–0.07 %.

<sup>I</sup> Beryllium 0.003–0.007 %, boron 0.002 % max.