



Designation: B179 – 14

# 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 B179; 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 U.S. 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 [Table 1](#).

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/H35.1(M). The equivalent Unified Numbering System alloy designations are in accordance with Practice [E527](#).

NOTE 2—Supplementary data pertaining to the alloys covered by this specification when used in the form of castings are given in Specifications [B26/B26M](#), [B85/B85M](#), [B108/B108M](#), [B618/B618M](#), [B686/B686M](#), and [B955/B955M](#).

1.3 Unless the order specifies the “M” specification designation, the material shall be furnished to the inch-pound units.

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

1.5 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

<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> 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.

[B26/B26M Specification for Aluminum-Alloy Sand Castings](#)

[B85/B85M Specification for Aluminum-Alloy Die Castings](#)

[B108/B108M Specification for Aluminum-Alloy Permanent Mold Castings](#)

[B618/B618M Specification for Aluminum-Alloy Investment Castings](#)

[B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products](#)

[B686/B686M Specification for Aluminum Alloy Castings, High-Strength](#)

[B985 Practice for Sampling Aluminum Ingots, Billets, Castings and Finished or Semi-Finished Wrought Aluminum Products for Compositional Analysis](#)

[B955/B955M Specification for Aluminum-Alloy Centrifugal Castings](#)

[B969 Specification for Aluminum-Alloy Castings Produced by the Squeeze Casting, Thixocast and Rheocast Semi-Solid Casting Processes](#)

[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](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

[E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere \(Withdrawn 2011\)<sup>3</sup>](#)

[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](#)

### 2.2 ANSI Standard:

[H35.1/H35.1\(M\) American National Standard Alloy and Temper Designation Systems for Aluminum<sup>4</sup>](#)

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

<sup>4</sup> Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, http://www.aluminum.org.

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

**TABLE 1 Chemical Composition Limits of Aluminum Alloys in Ingot and Molten Forms for All Casting Processes<sup>A,B</sup>**  
**This Table has been reprinted by the permission of the Aluminum Association, Inc.**  
**Only composition limits which are identical to those listed herein or are registered with the Aluminum Association should be designated as “AA” alloys.**

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

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

NOTE 3—The following applies to all specified limits in the table: For purposes of acceptance or rejection an observed value or a calculated value obtained from analysis should 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 E29.

Registered Alloys in the Form of XXX.1 Ingot and XXX.2 Ingot

| AA No.             | Designation  | Registered Date | Products <sup>C</sup> | Composition, %    |                   |         |                  |           |           |          |     |     |      |                             | Aluminum Minimum |                    |      |                    |
|--------------------|--------------|-----------------|-----------------------|-------------------|-------------------|---------|------------------|-----------|-----------|----------|-----|-----|------|-----------------------------|------------------|--------------------|------|--------------------|
|                    |              |                 |                       | Si                | Fe                | Cu      | Mn               | Mg        | Cr        | Ni       | Zn  | Ti  | Sn   | Others <sup>D</sup><br>Each |                  | Total <sup>E</sup> |      |                    |
| 100.1*             | ...          | 06/30/70        | Ingot                 | 0.15              | 0.6-0.8           | 0.10    | ... <sup>F</sup> | ...       | ...       | ...      | ... | ... | 0.05 | ... <sup>F</sup>            | ...              | 0.03 <sup>F</sup>  | 0.10 | 99.00 <sup>G</sup> |
| 130.1*             | ...          | 06/30/70        | Ingot                 | ... <sup>H</sup>  | ... <sup>H</sup>  | 0.10    | ... <sup>F</sup> | ...       | ...       | ...      | ... | ... | 0.05 | ... <sup>F</sup>            | ...              | 0.03 <sup>F</sup>  | 0.10 | 99.30 <sup>G</sup> |
| 150.1*             | ...          | 06/30/70        | Ingot                 | ... <sup>I</sup>  | ... <sup>I</sup>  | 0.05    | ... <sup>F</sup> | ...       | ...       | ...      | ... | ... | 0.05 | ... <sup>F</sup>            | ...              | 0.03 <sup>F</sup>  | 0.10 | 99.50 <sup>G</sup> |
| 160.1              | ...          | 01/28/76        | Ingot                 | 0.10 <sup>I</sup> | 0.25 <sup>I</sup> | ...     | ... <sup>F</sup> | ...       | ...       | ...      | ... | ... | 0.05 | ... <sup>F</sup>            | ...              | 0.03 <sup>F</sup>  | 0.10 | 99.60 <sup>G</sup> |
| 170.1*             | ...          | 06/30/70        | Ingot                 | ... <sup>J</sup>  | ... <sup>J</sup>  | ...     | ... <sup>F</sup> | ...       | ...       | ...      | ... | ... | 0.05 | ... <sup>F</sup>            | ...              | 0.03 <sup>F</sup>  | 0.10 | 99.70 <sup>G</sup> |
| 201.2              | ...          | 04/17/68        | Ingot                 | 0.10              | 0.10              | 4.0-5.2 | 0.20-0.50        | 0.20-0.55 | ...       | ...      | ... | ... | ...  | 0.15-0.35                   | ...              | 0.05 <sup>K</sup>  | 0.10 | Remainder          |
| A201.1             | A201.2       | 10/09/70        | Ingot                 | 0.05              | 0.07              | 4.0-5.0 | 0.20-0.40        | 0.20-0.35 | ...       | ...      | ... | ... | ...  | 0.15-0.35                   | ...              | 0.03 <sup>K</sup>  | 0.10 | Remainder          |
| 203.2              | Aluminum 350 | 12/02/72        | Ingot                 | 0.20              | 0.35              | 4.8-5.2 | 0.20-0.30        | 0.10      | ...       | 1.3-1.7  | ... | ... | 0.10 | 0.15-0.25                   | ...              | 0.05 <sup>L</sup>  | 0.20 | Remainder          |
| 204.2              | A-U5GT       | 10/01/74        | Ingot                 | 0.15              | 0.10-0.20         | 4.2-4.9 | 0.05             | 0.20-0.35 | ...       | 0.03     | ... | ... | 0.05 | 0.15-0.25                   | ...              | 0.05               | 0.15 | Remainder          |
| 206.2              | ...          | 04/23/76        | Ingot                 | 0.10              | 0.10              | 4.2-5.0 | 0.20-0.50        | 0.20-0.35 | ...       | 0.03     | ... | ... | 0.05 | 0.15-0.25                   | ...              | 0.05               | 0.15 | Remainder          |
| A206.2             | ...          | 04/23/76        | Ingot                 | 0.05              | 0.07              | 4.2-5.0 | 0.20-0.50        | 0.20-0.35 | ...       | 0.03     | ... | ... | 0.05 | 0.15-0.25                   | ...              | 0.05               | 0.15 | Remainder          |
| B206.2             | ...          | 07/07/03        | Ingot                 | 0.05              | 0.07              | 4.2-5.0 | 0.20-0.50        | 0.20-0.35 | ...       | 0.03     | ... | ... | 0.05 | 0.15-0.25                   | ...              | 0.05               | 0.15 | Remainder          |
| 240.1              | A240.1, A140 | ...             | Ingot                 | 0.50              | 0.40              | 7.0-9.0 | 0.30-0.7         | 5.6-6.5   | ...       | 0.30-0.7 | ... | ... | 0.10 | 0.20                        | ...              | 0.05               | 0.15 | Remainder          |
| 242.1              | 142          | ...             | Ingot                 | 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              | 142          | ...             | Ingot                 | 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             | A142         | ...             | Ingot                 | 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             | A142         | ...             | Ingot                 | 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              | 195          | ...             | Ingot                 | 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              | 195          | ...             | Ingot                 | 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              | B295.1, B195 | ...             | Ingot                 | 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              | B295.2, B195 | ...             | Ingot                 | 2.0-3.0           | 0.8               | 4.0-5.0 | 0.30             | 0.03      | ...       | ...      | ... | ... | 0.30 | 0.20                        | ...              | 0.05               | 0.15 | Remainder          |
| 301.1 <sup>M</sup> | ...          | 08/02/94        | Ingot <sup>N</sup>    | 9.5-10.5          | 0.8-1.2           | 3.0-3.5 | 0.50-0.8         | 0.30-0.50 | ...       | 1.0-1.5  | ... | ... | 0.05 | 0.20                        | ...              | 0.03               | 0.10 | Remainder          |

**TABLE 1 Continued**

| Designation         |               | Registered Date | Products <sup>C</sup> | Composition, % |                   |          |                   |           |      |          |      |           |      |                             | Aluminum Minimum                          |                     |
|---------------------|---------------|-----------------|-----------------------|----------------|-------------------|----------|-------------------|-----------|------|----------|------|-----------|------|-----------------------------|-------------------------------------------|---------------------|
|                     |               |                 |                       | Si             | Fe                | Cu       | Mn                | Mg        | Cr   | Ni       | Zn   | Ti        | Sn   | Others <sup>D</sup><br>Each | Others <sup>D</sup><br>Total <sup>E</sup> | Aluminum<br>Minimum |
| 302.1 <sup>M</sup>  | ...           | 08/02/94        | Ingot <sup>N</sup>    | 9.5-10.5       | 0.20              | 2.8-3.2  | ...               | 0.8-1.2   | ...  | 1.0-1.5  | 0.05 | 0.20      | ...  | 0.03                        | 0.10                                      | Remainder           |
| 303.1 <sup>M</sup>  | ...           | 08/02/94        | Ingot <sup>N</sup>    | 9.5-10.5       | 0.8-1.2           | 0.20     | 0.50-0.8          | 0.50-0.7  | ...  | ...      | 0.05 | 0.20      | ...  | 0.03                        | 0.10                                      | Remainder           |
| 308.1 <sup>M</sup>  | A108          | ...             | Ingot                 | 5.0-6.0        | 0.8               | 4.0-5.0  | 0.50              | 0.10      | ...  | ...      | 1.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 308.2 <sup>M</sup>  | A108          | ...             | Ingot                 | 5.0-6.0        | 0.8               | 4.0-5.0  | 0.30              | 0.10      | ...  | ...      | 0.50 | 0.20      | ...  | 0.50                        | Remainder                                 |                     |
| 318.1 <sup>M</sup>  | ...           | 01/29/91        | Ingot                 | 5.5-6.5        | 0.8               | 3.0-4.0  | 0.50              | 0.15-0.6  | ...  | 0.35     | 0.9  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 319.1 <sup>M</sup>  | 319, All Cast | ...             | Ingot                 | 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 <sup>M</sup>  | 319, All Cast | ...             | Ingot                 | 5.5-6.5        | 0.6               | 3.0-4.0  | 0.10              | 0.10      | ...  | 0.10     | 0.10 | 0.20      | ...  | 0.20                        | Remainder                                 |                     |
| A319.1 <sup>M</sup> | ...           | 08/28/70        | Ingot                 | 5.5-6.5        | 0.8               | 3.0-4.0  | 0.50              | 0.10      | ...  | 0.35     | 3.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| B319.1 <sup>M</sup> | ...           | 10/30/81        | Ingot                 | 5.5-6.5        | 0.9               | 3.0-4.0  | 0.8               | 0.15-0.50 | ...  | 0.50     | 1.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 320.1 <sup>M</sup>  | ...           | 04/08/82        | Ingot                 | 5.0-8.0        | 0.9               | 2.0-4.0  | 0.8               | 0.10-0.6  | ...  | 0.35     | 3.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 328.1 <sup>M</sup>  | Red X-8       | ...             | Ingot                 | 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>M</sup>  | F332.1, F132  | ...             | Ingot                 | 8.5-10.5       | 0.9               | 2.0-4.0  | 0.50              | 0.6-1.5   | ...  | 0.50     | 1.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 332.2 <sup>M</sup>  | F332.2, F132  | ...             | Ingot                 | 8.5-10.0       | 0.6               | 2.0-4.0  | 0.10              | 0.9-1.3   | ...  | 0.10     | 0.10 | 0.20      | ...  | 0.30                        | Remainder                                 |                     |
| 333.1 <sup>M</sup>  | 333           | ...             | Ingot                 | 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                                 |                     |
| A333.1 <sup>M</sup> | ...           | 08/28/70        | Ingot                 | 8.0-10.0       | 0.8               | 3.0-4.0  | 0.50              | 0.10-0.50 | ...  | 0.50     | 3.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 336.1 <sup>M</sup>  | A332.1, A132  | ...             | Ingot                 | 11.0-13.0      | 0.9               | 0.50-1.5 | 0.35              | 0.8-1.3   | ...  | 2.0-3.0  | 0.35 | 0.25      | 0.05 | ...                         | Remainder                                 |                     |
| 336.2 <sup>M</sup>  | A332.2, A132  | ...             | Ingot                 | 11.0-13.0      | 0.9               | 0.50-1.5 | 0.10              | 0.9-1.3   | ...  | 2.0-3.0  | 0.10 | 0.20      | 0.05 | 0.15                        | Remainder                                 |                     |
| 339.1 <sup>M</sup>  | Z332.1, Z132  | ...             | Ingot                 | 11.0-13.0      | 0.9               | 1.5-3.0  | 0.50              | 0.6-1.5   | ...  | 0.50-1.5 | 1.0  | 0.25      | ...  | 0.50                        | Remainder                                 |                     |
| 354.1 <sup>M</sup>  | 354           | ...             | Ingot                 | 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                                 |                     |
| 354.2 <sup>M</sup>  | 354           | 07/21/97        | Ingot                 | 8.6-9.4        | 0.06              | 1.6-2.0  | 0.10              | 0.45-0.6  | ...  | ...      | 0.10 | 0.20      | 0.05 | 0.15                        | Remainder                                 |                     |
| 355.1 <sup>M</sup>  | 355           | ...             | Ingot                 | 4.5-5.5        | 0.50 <sup>O</sup> | 1.0-1.5  | 0.50 <sup>O</sup> | 0.45-0.6  | 0.25 | ...      | 0.35 | 0.25      | 0.05 | 0.15                        | Remainder                                 |                     |
| 355.2 <sup>M</sup>  | 355           | ...             | Ingot                 | 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                                 |                     |
| A355.2 <sup>M</sup> | ...           | 09/17/81        | Ingot                 | 4.5-5.5        | 0.06              | 1.0-1.5  | 0.03              | 0.50-0.6  | ...  | ...      | 0.03 | 0.04-0.20 | 0.03 | 0.10                        | Remainder                                 |                     |
| C355.1 <sup>M</sup> | ...           | 06/04/74        | Ingot                 | 4.5-5.5        | 0.15              | 1.0-1.5  | 0.10              | 0.45-0.6  | ...  | ...      | 0.10 | 0.20      | 0.05 | 0.15                        | Remainder                                 |                     |
| C355.2 <sup>M</sup> | C355          | ...             | Ingot                 | 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 <sup>M</sup>  | 356           | ...             | Ingot                 | 6.5-7.5        | 0.50 <sup>O</sup> | 0.25     | 0.35 <sup>O</sup> | 0.25-0.45 | ...  | ...      | 0.35 | 0.25      | 0.05 | 0.15                        | Remainder                                 |                     |
| 356.2 <sup>M</sup>  | 356           | ...             | Ingot                 | 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                                 |                     |
| A356.1 <sup>M</sup> | ...           | 06/04/74        | Ingot                 | 6.5-7.5        | 0.15              | 0.20     | 0.10              | 0.30-0.45 | ...  | ...      | 0.10 | 0.20      | 0.05 | 0.15                        | Remainder                                 |                     |
| A356.2 <sup>M</sup> | A356          | ...             | Ingot                 | 6.5-7.5        | 0.12              | 0.10     | 0.05              | 0.30-0.45 | ...  | ...      | 0.05 | 0.20      | 0.05 | 0.15                        | Remainder                                 |                     |

**TABLE 1 Continued**

| Designation           |                 | Registered Date | Products <sup>C</sup> | Composition, % |           |         |           |           |           |         |           |      |                   | Others <sup>D</sup> |                    | Aluminum Minimum |
|-----------------------|-----------------|-----------------|-----------------------|----------------|-----------|---------|-----------|-----------|-----------|---------|-----------|------|-------------------|---------------------|--------------------|------------------|
| AA No.                | Former          |                 |                       | Si             | Fe        | Cu      | Mn        | Mg        | Cr        | Ni      | Zn        | Ti   | Sn                | Each                | Total <sup>E</sup> |                  |
| B356.2 <sup>M</sup>   | ...             | 09/17/81        | Ingot                 | 6.5-7.5        | 0.06      | 0.03    | 0.30-0.45 | ...       | ...       | 0.03    | 0.04-0.20 | ...  | 0.03              | 0.10                | Remainder          |                  |
| C356.2 <sup>M</sup>   | ...             | 05/30/85        | Ingot                 | 6.5-7.5        | 0.04      | 0.03    | 0.30-0.45 | ...       | ...       | 0.03    | 0.04-0.20 | ...  | 0.03              | 0.10                | Remainder          |                  |
| F356.2 <sup>M</sup>   | ...             | 10/20/71        | Ingot                 | 6.5-7.5        | 0.12      | 0.05    | 0.17-0.25 | ...       | ...       | 0.05    | 0.04-0.20 | ...  | 0.05              | 0.15                | Remainder          |                  |
| 357.1 <sup>M</sup>    | 357             | ...             | Ingot                 | 6.5-7.5        | 0.12      | 0.03    | 0.45-0.6  | ...       | ...       | 0.03    | 0.20      | ...  | 0.05              | 0.15                | Remainder          |                  |
| A357.2 <sup>M</sup>   | A357            | ...             | Ingot                 | 6.5-7.5        | 0.12      | 0.05    | 0.45-0.7  | ...       | ...       | 0.03    | 0.04-0.20 | ...  | 0.03 <sup>P</sup> | 0.10                | Remainder          |                  |
| B357.2 <sup>M</sup>   | ...             | 09/17/81        | Ingot                 | 6.5-7.5        | 0.06      | 0.03    | 0.45-0.6  | ...       | ...       | 0.03    | 0.04-0.20 | ...  | 0.03              | 0.10                | Remainder          |                  |
| C357.2 <sup>M</sup>   | ...             | 09/17/81        | Ingot                 | 6.5-7.5        | 0.06      | 0.03    | 0.50-0.7  | ...       | ...       | 0.03    | 0.04-0.20 | ...  | 0.03 <sup>P</sup> | 0.10                | Remainder          |                  |
| E357.1 <sup>M</sup>   | ...             | 06/06/01        | Ingot                 | 6.5-7.5        | 0.07      | 0.10    | 0.6-0.7   | ...       | ...       | 0.10    | 0.10-0.20 | ...  | 0.05 <sup>Q</sup> | 0.15                | Remainder          |                  |
| E357.2 <sup>M</sup>   | ...             | 06/06/01        | Ingot                 | 6.5-7.5        | 0.07      | 0.10    | 0.6-0.7   | ...       | ...       | 0.10    | 0.10-0.20 | ...  | 0.05 <sup>R</sup> | 0.15                | Remainder          |                  |
| F357.1 <sup>M</sup>   | ...             | 06/06/01        | Ingot                 | 6.5-7.5        | 0.07      | 0.10    | 0.45-0.7  | ...       | ...       | 0.10    | 0.04-0.20 | ...  | 0.05 <sup>Q</sup> | 0.15                | Remainder          |                  |
| F357.2 <sup>M</sup>   | ...             | 06/06/01        | Ingot                 | 6.5-7.5        | 0.07      | 0.10    | 0.45-0.7  | ...       | ...       | 0.10    | 0.04-0.20 | ...  | 0.05 <sup>R</sup> | 0.15                | Remainder          |                  |
| 358.2 <sup>M</sup>    | B358.2, Tens-50 | ...             | Ingot                 | 7.6-8.6        | 0.20      | 0.10    | 0.45-0.6  | 0.05      | ...       | 0.10    | 0.12-0.20 | ...  | 0.05 <sup>S</sup> | 0.15                | Remainder          |                  |
| 359.2 <sup>M</sup>    | 359             | ...             | Ingot                 | 8.5-9.5        | 0.12      | 0.10    | 0.55-0.7  | ...       | ...       | 0.10    | 0.20      | ...  | 0.05              | 0.15                | Remainder          |                  |
| A359.1 <sup>M</sup>   | ...             | 08/02/94        | Ingot <sup>N</sup>    | 8.5-9.5        | 0.20      | 0.10    | 0.45-0.6  | ...       | ...       | 0.10    | 0.20      | ...  | 0.03              | 0.10                | Remainder          |                  |
| 360.2 <sup>M</sup>    | 360             | ...             | Ingot                 | 9.0-10.0       | 0.7-1.1   | 0.10    | 0.45-0.6  | ...       | ...       | 0.10    | ...       | 0.10 | ...               | 0.20                | Remainder          |                  |
| A360.1 <sup>T,M</sup> | A360            | ...             | Ingot                 | 9.0-10.0       | 1.0       | 0.35    | 0.45-0.6  | ...       | ...       | 0.50    | ...       | 0.15 | ...               | 0.25                | Remainder          |                  |
| A360.2 <sup>M</sup>   | A360            | ...             | Ingot                 | 9.0-10.0       | 0.6       | 0.05    | 0.45-0.6  | ...       | ...       | ...     | ...       | ...  | 0.05              | 0.15                | Remainder          |                  |
| 361.1 <sup>M</sup>    | ...             | 06/30/78        | Ingot                 | 9.5-10.5       | 0.8       | 0.25    | 0.45-0.6  | 0.20-0.30 | 0.20-0.30 | 0.40    | 0.20      | 0.10 | 0.05              | 0.15                | Remainder          |                  |
| 363.1 <sup>M</sup>    | 363             | 01/16/70        | Ingot                 | 4.5-6.0        | 0.8       | 2.5-3.5 | 0.20-0.40 | ...       | ...       | 3.0-4.5 | 0.25      | 0.25 | ...               | 0.30                | Remainder          |                  |
| 364.2 <sup>M</sup>    | 364             | ...             | Ingot                 | 7.5-9.5        | 0.7-1.1   | 0.10    | 0.25-0.40 | 0.25-0.50 | 0.15      | 0.15    | ...       | 0.15 | 0.05 <sup>W</sup> | 0.15                | Remainder          |                  |
| 365.1 <sup>M</sup>    | Silafont-36     | 01/05/96        | Ingot                 | 9.5-11.5       | 0.12      | 0.03    | 0.15-0.50 | ...       | ...       | 0.07    | 0.04-0.15 | ...  | 0.03 <sup>X</sup> | 0.10                | Remainder          |                  |
| A365.1 <sup>M</sup>   | Aural 2         | 10/17/08        | Ingot                 | 9.5-11.5       | 0.15-0.20 | 0.02    | 0.15-0.6  | ...       | ...       | 0.03    | 0.10      | ...  | 0.05 <sup>Y</sup> | 0.15                | Remainder          |                  |
| 366.1 <sup>M</sup>    | ...             | 03/27/03        | Ingot <sup>Z</sup>    | 6.5-7.5        | 0.12      | 0.05    | 0.6-1.2   | ...       | ...       | 0.05    | 0.20      | ...  | 0.05              | 0.15                | Remainder          |                  |
| 367.1 <sup>M</sup>    | Mercalloy367    | 10/01/07        | Ingot                 | 8.5-9.5        | 0.20      | 0.25    | 0.35-0.50 | ...       | ...       | 0.10    | 0.20      | ...  | 0.05              | 0.15                | Remainder          |                  |
| 368.1 <sup>M</sup>    | Mercalloy366    | 10/01/07        | Ingot                 | 8.5-9.5        | 0.20      | 0.25    | 0.15-0.30 | ...       | ...       | 0.10    | 0.20      | ...  | 0.05              | 0.15                | Remainder          |                  |
| 369.1 <sup>M</sup>    | Special K-9     | 04/04/78        | Ingot                 | 11.0-12.0      | 1.0       | 0.50    | 0.30-0.45 | 0.30-0.40 | 0.05      | 0.9     | ...       | 0.10 | 0.05              | 0.15                | Remainder          |                  |
| 380.2 <sup>M</sup>    | 380             | ...             | Ingot                 | 7.5-9.5        | 0.7-1.1   | 0.10    | 0.10      | ...       | 0.10      | 0.10    | ...       | 0.10 | ...               | 0.20                | Remainder          |                  |

**TABLE 1 Continued**

| Designation           |          | Registered Date | Products <sup>C</sup> | Composition, % |                   |          |                   |                         |      |      |         |      |           | Others <sup>D</sup> |                    | Aluminum Minimum |           |
|-----------------------|----------|-----------------|-----------------------|----------------|-------------------|----------|-------------------|-------------------------|------|------|---------|------|-----------|---------------------|--------------------|------------------|-----------|
| AA No.                | Former   |                 |                       | Si             | Fe                | Cu       | Mn                | Mg                      | Cr   | Ni   | Zn      | Ti   | Sn        | Each                | Total <sup>E</sup> |                  |           |
| A380.1 <sup>T,M</sup> | A380     | ...             | Ingot                 | 7.5-9.5        | 1.0               | 3.0-4.0  | 0.50              | 0.10                    | ...  | ...  | 0.50    | 2.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| A380.2 <sup>M</sup>   | A380     | ...             | Ingot                 | 7.5-9.5        | 0.6               | 3.0-4.0  | 0.10              | 0.10                    | ...  | ...  | 0.10    | 0.10 | ...       | ...                 | 0.05               | 0.15             | Remainder |
| B380.1 <sup>M</sup>   | A380     | ...             | Ingot                 | 7.5-9.5        | 1.0               | 3.0-4.0  | 0.50              | 0.10                    | ...  | ...  | 0.50    | 0.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| C380.1 <sup>M</sup>   | ...      | 01/29/91        | Ingot                 | 7.5-9.5        | 1.0               | 3.0-4.0  | 0.50              | 0.15-0.30               | ...  | ...  | 0.50    | 2.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| D380.1 <sup>M</sup>   | ...      | 01/29/91        | Ingot                 | 7.5-9.5        | 1.0               | 3.0-4.0  | 0.50              | 0.15-0.30               | ...  | ...  | 0.50    | 0.90 | ...       | 0.35                | ...                | 0.50             | Remainder |
| E380.1 <sup>M</sup>   | ...      | 10/12/06        | Ingot                 | 7.5-9.5        | 1.0               | 3.0-4.0  | 0.50              | 0.30                    | ...  | ...  | 0.50    | 2.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| 381.2 <sup>M</sup>    | ...      | 06/12/97        | Ingot                 | 9.0-10.0       | 0.7-1.0           | 3.0-4.0  | 0.50              | 0.13                    | 0.15 | 0.50 | 0.50    | 2.9  | 0.20      | 0.15                | ...                | 0.50             | Remainder |
| 383.1 <sup>M</sup>    | ...      | ...             | Ingot                 | 9.5-11.5       | 1.0               | 2.0-3.0  | 0.50              | 0.10                    | ...  | ...  | 0.30    | 2.9  | ...       | 0.15                | ...                | 0.50             | Remainder |
| 383.2 <sup>M</sup>    | ...      | ...             | Ingot                 | 9.5-11.5       | 0.6-1.0           | 2.0-3.0  | 0.10              | 0.10                    | ...  | ...  | 0.10    | 0.10 | ...       | 0.10                | ...                | 0.20             | Remainder |
| A383.1 <sup>M</sup>   | ...      | 01/29/91        | Ingot                 | 9.5-11.5       | 1.0               | 2.0-3.0  | 0.50              | 0.15-0.30               | ...  | ...  | 0.30    | 2.9  | ...       | 0.15                | ...                | 0.50             | Remainder |
| B383.1 <sup>M</sup>   | ...      | 10/12/06        | Ingot                 | 9.5-11.5       | 1.0               | 2.0-3.0  | 0.50              | 0.30                    | ...  | ...  | 0.30    | 2.9  | ...       | 0.15                | ...                | 0.50             | Remainder |
| 384.1 <sup>M</sup>    | 384      | ...             | Ingot                 | 10.5-12.0      | 1.0               | 3.0-4.5  | 0.50              | 0.10                    | ...  | ...  | 0.50    | 2.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| 384.2 <sup>M</sup>    | 384      | ...             | Ingot                 | 10.5-12.0      | 0.6-1.0           | 3.0-4.5  | 0.10              | 0.10                    | ...  | ...  | 0.10    | 0.10 | ...       | 0.10                | ...                | 0.20             | Remainder |
| A384.1 <sup>M</sup>   | 384      | ...             | Ingot                 | 10.5-12.0      | 1.0               | 3.0-4.5  | 0.50              | 0.10                    | ...  | ...  | 0.50    | 0.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| B384.1 <sup>M</sup>   | ...      | 01/29/91        | Ingot                 | 10.5-12.0      | 1.0               | 3.0-4.5  | 0.50              | 0.15-0.30               | ...  | ...  | 0.50    | 0.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| C384.1 <sup>M</sup>   | ...      | 01/29/91        | Ingot                 | 10.5-12.0      | 1.0               | 3.0-4.5  | 0.50              | 0.15-0.30               | ...  | ...  | 0.50    | 2.9  | ...       | 0.35                | ...                | 0.50             | Remainder |
| 390.2 <sup>M</sup>    | 390      | ...             | Ingot                 | 16.0-18.0      | 0.6-1.0           | 4.0-5.0  | 0.10              | 0.50-0.65 <sup>AC</sup> | ...  | ...  | ...     | 0.10 | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| A390.1 <sup>M</sup>   | A390     | ...             | Ingot                 | 16.0-18.0      | 0.40              | 4.0-5.0  | 0.10              | 0.50-0.65 <sup>AC</sup> | ...  | ...  | ...     | 0.10 | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| B390.1 <sup>M</sup>   | ...      | 03/29/79        | Ingot                 | 16.0-18.0      | 1.0               | 4.0-5.0  | 0.50              | 0.50-0.65 <sup>AC</sup> | ...  | ...  | 0.10    | 1.4  | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| 391.1 <sup>M</sup>    | Mercosil | 01/30/01        | Ingot                 | 18.0-20.0      | 0.9               | 0.20     | 0.30              | 0.45-0.70               | ...  | ...  | ...     | 0.10 | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| A391.1 <sup>M</sup>   | Mercosil | 01/30/01        | Ingot                 | 18.0-20.0      | 0.50 <sup>D</sup> | 0.20     | 0.30 <sup>D</sup> | 0.45-0.70               | ...  | ...  | ...     | 0.10 | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| B391.1 <sup>M</sup>   | Mercosil | 01/30/01        | Ingot                 | 18.0-20.0      | 0.15              | 0.20     | 0.30              | 0.45-0.70               | ...  | ...  | ...     | 0.10 | 0.20      | ...                 | 0.10               | 0.20             | Remainder |
| 392.1 <sup>M</sup>    | 392      | ...             | Ingot                 | 18.0-20.0      | 1.1               | 0.40-0.8 | 0.20-0.6          | 0.9-1.2                 | ...  | ...  | 0.50    | 0.40 | 0.20      | 0.30                | 0.15               | 0.50             | Remainder |
| 393.1 <sup>M</sup>    | Vanasil  | ...             | Ingot                 | 21.0-23.0      | 1.0               | 0.7-1.1  | 0.10              | 0.8-1.3                 | ...  | ...  | 2.0-2.5 | 0.10 | 0.10-0.20 | ...                 | 0.05 <sup>AD</sup> | 0.15             | Remainder |
| 393.2 <sup>M</sup>    | Vanasil  | ...             | Ingot                 | 21.0-23.0      | 0.8               | 0.7-1.1  | 0.10              | 0.8-1.3                 | ...  | ...  | 2.0-2.5 | 0.10 | 0.10-0.20 | ...                 | 0.05 <sup>AD</sup> | 0.15             | Remainder |
| 413.2 <sup>M</sup>    | 13       | ...             | Ingot                 | 11.0-13.0      | 0.7-1.1           | 0.10     | 0.10              | 0.07                    | ...  | ...  | 0.10    | 0.10 | ...       | 0.10                | ...                | 0.20             | Remainder |

TABLE 1 Continued

| AA No.                | Designation      | Registered Date | Products <sup>C</sup> | Composition, % |           |           |           |          |           |     |           |         |           |                     | Aluminum Minimum |                    |           |
|-----------------------|------------------|-----------------|-----------------------|----------------|-----------|-----------|-----------|----------|-----------|-----|-----------|---------|-----------|---------------------|------------------|--------------------|-----------|
|                       |                  |                 |                       | Si             | Fe        | Cu        | Mn        | Mg       | Cr        | Ni  | Zn        | Ti      | Sn        | Others <sup>D</sup> |                  |                    |           |
|                       |                  |                 |                       |                |           |           |           |          |           |     |           |         |           | Each                |                  | Total <sup>E</sup> |           |
| A413.1 <sup>T,M</sup> | A13              | ...             | Ingot                 | 11.0-13.0      | 1.0       | 1.0       | 0.35      | 0.10     | ...       | ... | 0.50      | 0.40    | ...       | 0.15                | ...              | 0.25               | Remainder |
| A413.2 <sup>M</sup>   | A13              | ...             | Ingot                 | 11.0-13.0      | 0.6       | 0.10      | 0.05      | 0.05     | ...       | ... | 0.05      | 0.05    | ...       | 0.05                | ...              | 0.10               | Remainder |
| B413.1 <sup>M</sup>   | ...              | 11/06/84        | Ingot                 | 11.0-13.0      | 0.40      | 0.10      | 0.35      | 0.05     | ...       | ... | 0.05      | 0.10    | 0.25      | ...                 | 0.05             | 0.20               | Remainder |
| 443.1 <sup>M</sup>    | 43               | ...             | Ingot                 | 4.5-6.0        | 0.6       | 0.6       | 0.50      | 0.05     | ...       | ... | ...       | 0.50    | 0.25      | ...                 | 0.35             | Remainder          |           |
| 443.2 <sup>M</sup>    | 43               | ...             | Ingot                 | 4.5-6.0        | 0.6       | 0.10      | 0.10      | 0.05     | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| A443.1 <sup>M</sup>   | 43 (0.30 max Cu) | ...             | Ingot                 | 4.5-6.0        | 0.6       | 0.30      | 0.50      | 0.05     | ...       | ... | ...       | 0.50    | 0.25      | ...                 | 0.35             | Remainder          |           |
| B443.1 <sup>M</sup>   | 43 (0.15 max Cu) | ...             | Ingot                 | 4.5-6.0        | 0.6       | 0.15      | 0.35      | 0.05     | ...       | ... | ...       | 0.35    | 0.25      | ...                 | 0.15             | Remainder          |           |
| C443.1 <sup>M</sup>   | A43              | ...             | Ingot                 | 4.5-6.0        | 1.1       | 0.6       | 0.35      | 0.10     | ...       | ... | 0.50      | 0.40    | ...       | 0.15                | 0.25             | Remainder          |           |
| C443.2 <sup>M</sup>   | A43              | ...             | Ingot                 | 4.5-6.0        | 0.7-1.1   | 0.10      | 0.10      | 0.05     | ...       | ... | ...       | 0.10    | ...       | ...                 | 0.15             | Remainder          |           |
| 444.2 <sup>M</sup>    | ...              | 09/24/73        | Ingot                 | 6.5-7.5        | 0.13-0.25 | 0.10      | 0.05      | 0.05     | ...       | ... | ...       | 0.05    | 0.20      | ...                 | 0.15             | Remainder          |           |
| A444.1 <sup>M</sup>   | ...              | 06/04/74        | Ingot                 | 6.5-7.5        | 0.15      | 0.10      | 0.10      | 0.05     | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| A444.2 <sup>M</sup>   | A344             | ...             | Ingot                 | 6.5-7.5        | 0.12      | 0.05      | 0.05      | 0.05     | ...       | ... | ...       | 0.05    | 0.20      | ...                 | 0.15             | Remainder          |           |
| 505.1                 | ...              | 04/12/004       | Ingot <sup>A,E</sup>  | 0.40-0.8       | 0.50      | 0.15-0.40 | 0.15      | 0.9-1.2  | 0.04-0.35 | ... | ...       | 0.25    | 0.15      | ...                 | 0.15             | Remainder          |           |
| 511.1                 | F514.1, F214     | ...             | Ingot                 | 0.30-0.7       | 0.40      | 0.15      | 0.35      | 3.6-4.5  | ...       | ... | ...       | 0.15    | 0.25      | ...                 | 0.15             | Remainder          |           |
| 511.2                 | F514.2, F214     | ...             | Ingot                 | 0.30-0.7       | 0.30      | 0.10      | 0.10      | 3.6-4.5  | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| 512.2                 | B514.2, B214     | ...             | Ingot                 | 1.4-2.2        | 0.30      | 0.10      | 0.10      | 3.6-4.5  | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| 513.2                 | A514.2, A214     | ...             | Ingot                 | 0.30           | 0.30      | 0.10      | 0.10      | 3.6-4.5  | ...       | ... | ...       | 1.4-2.2 | 0.20      | ...                 | 0.15             | Remainder          |           |
| 514.1                 | 214              | ...             | Ingot                 | 0.35           | 0.40      | 0.15      | 0.35      | 3.6-4.5  | ...       | ... | ...       | 0.15    | 0.25      | ...                 | 0.15             | Remainder          |           |
| 514.2                 | 214              | ...             | Ingot                 | 0.30           | 0.30      | 0.10      | 0.10      | 3.6-4.5  | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| 515.2                 | L514.2, L214     | 01/02/70        | Ingot                 | 0.50-1.0       | 0.6-1.0   | 0.10      | 0.40-0.6  | 2.7-4.0  | ...       | ... | ...       | 0.05    | ...       | ...                 | 0.15             | Remainder          |           |
| 516.1                 | ...              | 09/30/83        | Ingot                 | 0.30-1.5       | 0.35-0.7  | 0.30      | 0.15-0.40 | 2.6-4.5  | ...       | ... | 0.25-0.40 | 0.20    | 0.10-0.20 | 0.10                | ...              | Remainder          |           |
| 518.1                 | 218              | ...             | Ingot                 | 0.35           | 1.1       | 0.25      | 0.35      | 7.6-8.5  | ...       | ... | 0.15      | 0.15    | ...       | 0.15                | 0.25             | Remainder          |           |
| 518.2                 | 218              | ...             | Ingot                 | 0.25           | 0.7       | 0.10      | 0.10      | 7.6-8.5  | ...       | ... | 0.05      | ...     | ...       | 0.05                | 0.10             | Remainder          |           |
| 520.2                 | 220              | ...             | Ingot                 | 0.15           | 0.20      | 0.20      | 0.10      | 9.6-10.6 | ...       | ... | ...       | 0.10    | 0.20      | ...                 | 0.15             | Remainder          |           |
| 535.2                 | Almag 35         | ...             | Ingot                 | 0.10           | 0.10      | 0.05      | 0.10-0.25 | 6.6-7.5  | ...       | ... | ...       | ...     | 0.10-0.25 | ...                 | 0.15             | Remainder          |           |
| A535.1                | A218             | ...             | Ingot                 | 0.20           | 0.15      | 0.10      | 0.10-0.25 | 6.6-7.5  | ...       | ... | ...       | ...     | 0.25      | ...                 | 0.15             | Remainder          |           |
| B535.2                | B218             | ...             | Ingot                 | 0.10           | 0.12      | 0.05      | 0.05      | 6.6-7.5  | ...       | ... | ...       | ...     | 0.10-0.25 | ...                 | 0.15             | Remainder          |           |
| 705.1                 | 603, Temalloy 5  | ...             | Ingot                 | 0.20           | 0.6       | 0.20      | 0.40-0.6  | 1.5-1.8  | 0.20-0.40 | ... | ...       | 2.7-3.3 | 0.25      | ...                 | 0.15             | Remainder          |           |