~~Designation:B179–06~~ Designation: B179 – 09

Standard Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes[1]

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 (ε) 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 Table 1.

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

~~1.2Alloy~~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~~B85/B85M, ~~B108~~B108/B108M, ~~B618, and B686~~B618/B618M, B686/B686M, and B955/B955M.

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

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.

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

~~1.5~~

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

1.6 *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:*[2]

B26/B26M Specification for Aluminum-Alloy Sand Castings

B~~85~~85/B85M Specification for Aluminum-Alloy Die Castings

B~~108~~108/B108M Specification for Aluminum-Alloy Permanent Mold Castings

B~~618~~618/B618M Specification for Aluminum-Alloy Investment Castings

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

B~~686~~686/B686M Specification for Aluminum Alloy Castings, High-Strength

B955/B955M Specification for Aluminum-Alloy Centrifugal Castings

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 ~~E88Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition~~

[1] 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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[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.**

TABLE 1 Chemical Composition Limits of Aluminum Alloys in Ingot and Molten Forms for All Casting Processes[A,B]

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

Designation		Registered Date	Products[C]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[D] Each	Others[D] Total[E]	Aluminum Minimum
100.1*	...	06/30/70	Ingot	0.15	0.6-0.8	0.10	...[F]	...	...[F]	...	0.05	...[F]	...	0.03[F]	0.10	99.00[G]
130.1*	...	06/30/70	Ingot	...[H]	...[H]	0.10	...[F]	...	...[F]	...	0.05	...[F]	...	0.03[F]	0.10	99.30[G]
150.1*	...	06/30/70	Ingot	...[I]	...[I]	0.05	...[F]	...	...[F]	...	0.05	...[F]	...	0.03[F]	0.10	99.50[G]
160.1	...	01/28/76	Ingot	0.10[I]	0.25[I]	...	...[F]	...	...[F]	...	0.05	...[F]	...	0.03[F]	0.10	99.60[G]
170.1*	...	06/30/70	Ingot	...[J]	...[J]	...	...[F]	...	...[F]	...	0.05	...[F]	...	0.03[F]	0.10	99.70[G]
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[K]	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[K]	0.10	Remainder
203.2	Hiduminium 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[L]	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	0.05	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	0.05	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	0.05	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	0.05	0.05	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[M]	....	08/02/94	Ingot[N]	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
302.1[M]	....	08/02/94	Ingot[N]	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[M]	....	08/02/94	Ingot[N]	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[M]	A108	...	Ingot	5.0-6.0	0.8	4.0-5.0	0.50	0.10	...	...	1.0	0.25	...	...	0.50	Remainder

TABLE 1 *Continued*

Designation		Registered Date	Products[C]	Composition, %										Others[D]		Aluminum Minimum
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Each	Total[E]	
308.2[M]	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[M]	...	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[M]	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[M]	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[M]	...	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[M]	...	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[M]	...	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[M]	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[M]	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[M]	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[M]	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[M]	...	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[M]	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[M]	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[M]	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[M]	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[M]		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[M]	355	...	Ingot	4.5-5.5	0.50[O]	1.0-1.5	0.50[O]	0.45-0.6	0.25	...	0.35	0.25	...	0.05	0.15	Remainder
355.2[M]	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[M]	...	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[M]	...	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[M]	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[M]	356	...	Ingot	6.5-7.5	0.50[O]	0.25	0.35[O]	0.25-0.45	...	...	0.35	0.25	...	0.05	0.15	Remainder
356.2[M]	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[M]	...	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[M]	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
B356.2[M]	...	09/17/81	Ingot	6.5-7.5	0.06	0.03	0.03	0.30-0.45	...	...	0.03	0.04-0.20	...	0.03	0.10	Remainder
C356.2[M]	...	05/30/85	Ingot	6.5-7.5	0.04	0.03	0.03	0.30-0.45	...	...	0.03	0.04-0.20	...	0.03	0.10	Remainder
F356.2[M]	...	10/20/71	Ingot	6.5-7.5	0.12	0.10	0.05	0.17-0.25	...	...	0.05	0.04-0.20	...	0.05	0.15	Remainder
357.1[M]	357	...	Ingot	6.5-7.5	0.12	0.05	0.03	0.45-0.6	...	...	0.05	0.20	...	0.05	0.15	Remainder

TABLE 1 *Continued*

Designation		Registered Date	Products[C]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[D] Each	Others[D] Total[E]	Aluminum Minimum
A357.2[M]	A357	...	Ingot	6.5-7.5	0.12	0.10	0.05	0.45-0.7	...	...	0.05	0.04-0.20	...	0.03[P]	0.10	Remainder
B357.2[M]	...	09/17/81	Ingot	6.5-7.5	0.06	0.03	0.03	0.45-0.6	...	...	0.03	0.04-0.20	...	0.03	0.10	Remainder
C357.2[M]	...	09/17/81	Ingot	6.5-7.5	0.06	0.03	0.03	0.50-0.7	...	...	0.03	0.04-0.20	...	0.03[P]	0.10	Remainder
E357.1[M]	...	06/06/01	Ingot	6.5-7.5	0.07	...	0.10	0.6-0.7	...	...	...	0.10-0.20	...	0.05[Q]	0.15	Remainder
E357.2[M]	...	06/06/01	Ingot	6.5-7.5	0.07	...	0.10	0.6-0.7	...	...	...	0.10-0.20	...	0.05[R]	0.15	Remainder
F357.1[M]	...	06/06/01	Ingot	6.5-7.5	0.07	0.20	0.10	0.45-0.7	...	...	0.10	0.04-0.20	...	0.05[Q]	0.15	Remainder
F357.2[M]	...	06/06/01	Ingot	6.5-7.5	0.07	0.20	0.10	0.45-0.7	...	...	0.10	0.04-0.20	...	0.05[R]	0.15	Remainder
358.2[M]	B358.2, Tens-50	...	Ingot	7.6-8.6	0.20	0.10	0.10	0.45-0.6	0.05	...	0.10	0.12-0.20	...	0.05[S]	0.15	Remainder
359.2[M]	359	...	Ingot	8.5-9.5	0.12	0.10	0.10	0.55-0.7	...	...	0.10	0.20	...	0.05	0.15	Remainder
A359.1[M]	....	08/02/94	Ingot[N]	8.5-9.5	0.20	0.20	0.10	0.45-0.6	...	...	0.05	0.20	...	0.03	0.10	Remainder
360.2[M]	360	...	Ingot	9.0-10.0	0.7-1.1	0.10	0.10	0.45-0.6	...	0.10	0.10	...	0.10	...	0.20	Remainder
A360.1[T,M]	A360	...	Ingot	9.0-10.0	1.0	0.6	0.35	0.45-0.6	...	0.50	0.40	...	0.15	...	0.25	Remainder
A360.2[M]	A360	...	Ingot	9.0-10.0	0.6	0.10	0.05	0.45-0.6	...	...	0.05	...	...	0.05	0.15	Remainder
361.1[M]	...	06/30/78	Ingot	9.5-10.5	0.8	0.50	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[M]	363	01/16/70	Ingot	4.5-6.0	0.8	2.5-3.5	...[U]	0.20-0.40	...[U]	0.25	3.0-4.5	0.20	0.25	...[V]	0.30	Remainder
364.2[M]	364	...	Ingot	7.5-9.5	0.7-1.1	0.20	0.10	0.25-0.40	0.25-0.50	0.15	0.15	...	0.15	0.05[W]	0.15	Remainder
365.1[M]	Silafont-36	01/05/96	Ingot	9.5-11.5	0.12	0.03	0.50-0.8	0.15-0.50	...	...	0.07	0.04-0.15	...	0.03[X]	0.10	Remainder
366.1[M]	...-	03/27/03	Ingot[Y]	6.5-7.5	0.12	0.05	0.03	0.6-1.2	...	...	0.05	0.20	...	0.05	0.15	Remainder
367.1[M]	Mercalloy367	10/01/07	Ingot	8.5–9.5	0.20	0.25	0.25–0.35	0.35–0.50	...	...	0.10	0.20	...[Z]	0.05	0.15	Remainder
368.1[M]	Mercalloy366	10/01/07	Ingot	8.5–9.5	0.20	0.25	0.25–0.35	0.15–0.30	...	...	0.10	0.20	...[Z]	0.05	0.15	Remainder
369.1[M]	Special K-9	04/04/78	Ingot	11.0-12.0	1.0	0.50	0.35	0.30-0.45	0.30-0.40	0.05	0.9	...	0.10	0.05	0.15	Remainder
380.2[M]	380	...	Ingot	7.5-9.5	0.7-1.1	3.0-4.0	0.10	0.10	...	0.10	0.10	...	0.10	...	0.20	Remainder
A380.1[T,M]	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[M]	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[M]	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[M]	...	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[M]	...	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

TABLE 1 *Continued*

Designation		Registered Date	Products[C]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[D] Each	Others[D] Total[E]	Aluminum Minimum
E380.1[M]	...	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[M]	...	06/12/97	Ingot	9.0-10.0	0.7-1.0	3.0-4.0	0.50	0.13	0.15	0.50	2.9	0.20	0.15	...[AA]	0.50	Remainder
383.1[M]	...	...	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[M]	...	...	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[M]	...	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[M]	...	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[M]	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[M]	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[M]	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[M]	...	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[M]	...	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[M]	390	...	Ingot	16.0-18.0	0.6-1.0	4.0-5.0	0.10	0.50-0.65[AB]	...	...	0.10	0.20	...	0.10	0.20	Remainder
A390.1[M]	A390	...	Ingot	16.0-18.0	0.40	4.0-5.0	0.10	0.50-0.65[AB]	...	...	0.10	0.20	...	0.10	0.20	Remainder
B390.1[M]	...	03/29/79	Ingot	16.0-18.0	1.0	4.0-5.0	0.50	0.50-0.65[AB]	...	0.10	1.4	0.20	...	0.10	0.20	Remainder
391.1[M]	Mercosil	01303/01	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[M]	Mercosil	01/30/01	Ingot	18.0-20.0	0.50[O]	0.20	0.30[O]	0.45-0.70	...	...	0.10	0.20	...	0.10	0.20	Remainder
B391.1[M]	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[M]	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[M]	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[AC]	0.15	Remainder
393.2[M]	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[AC]	0.15	Remainder
413.2[M]	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*

Designation		Registered Date	Products[C]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[D] Each	Others[D] Total[E]	Aluminum Minimum
A413.1[T,M]	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[M]	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[M]	...	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[M]	43	...	Ingot	4.5-6.0	0.6	0.6	0.50	0.05	0.25	...	0.50	0.25	...	...	0.35	Remainder
443.2[M]	43	...	Ingot	4.5-6.0	0.6	0.10	0.10	0.05	...	...	0.10	0.20	...	0.05	0.15	Remainder
A443.1[M]	43 (0.30 max Cu)	...	Ingot	4.5-6.0	0.6	0.30	0.50	0.05	0.25	...	0.50	0.25	...	...	0.35	Remainder
B443.1[M]	43 (0.15 max Cu)	...	Ingot	4.5-6.0	0.6	0.15	0.35	0.05	...	...	0.35	0.25	...	0.05	0.15	Remainder
C443.1[M]	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[M]	A43	...	Ingot	4.5-6.0	0.7-1.1	0.10	0.10	0.05	...	...	0.10	...	...	0.05	0.15	Remainder
444.2[M]	...	09/24/73	Ingot	6.5-7.5	0.13-0.25	0.10	0.05	0.05	...	...	0.05	0.20	...	0.05	0.15	Remainder
A444.1[M]	...	06/04/74	Ingot	6.5-7.5	0.15	0.10	0.10	0.05	...	...	0.10	0.20	...	0.05	0.15	Remainder
A444.2[M]	A344	...	Ingot	6.5-7.5	0.12	0.05	0.05	0.05	...	...	0.05	0.20	...	0.05	0.15	Remainder
505.1	...	04/12/004	Ingot[AD]	0.40-0.8	0.50	0.15-0.40	0.15	0.9-1.2	0.04-0.35	...	0.25	0.15	...	0.05	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	...	0.05	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	...	0.05	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	...	0.05	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	...	0.05	0.15	Remainder
514.1	214	...	Ingot	0.35	0.40	0.15	0.35	3.6-4.5	...	...	0.15	0.25	...	0.05	0.15	Remainder
514.2	214	...	Ingot	0.30	0.30	0.10	0.10	3.6-4.5	...	...	0.10	0.20	...	0.05	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	...	...	0.05	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	0.05[AE]	...	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	...	0.05	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	...	0.05[AF]	0.15	Remainder
A535.1	A218	...	Ingot	0.20	0.15	0.10	0.10-0.25	6.6-7.5	...	...	...	0.25	...	0.05	0.15	Remainder

TABLE 1 *Continued*

Designation		Registered Date	Products[C]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[D] Each	Others[D] Total[E]	Aluminum Minimum
B535.2	B218	...	Ingot	0.10	0.12	0.05	0.05	6.6-7.5	...	...	...	0.10-0.25	...	0.05	0.15	Remainder
705.1	603, Ternalloy 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	...	0.05	0.15	Remainder
707.1	607, Ternalloy 7	...	Ingot	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
709.1	...	04/12/04	Ingot[AD]	0.40	0.40	1.2-2.0	0.30	2.2-2.9	0.18-0.28	...	5.1-6.1	0.20	...	0.05	0.15	Remainder
709.2	.....	04/12/04	Ingot[AD]	0.15	0.20	1.2-2.0	0.15	2.2-2.9	0.18-0.28	...	5.1-6.0	0.20	...	0.05	0.15	Remainder
710.1	A712.1, A612	...	Ingot	0.15	0.40	0.35-0.6	0.05	0.65-0.8	...	...	6.0-7.0	0.25	...	0.05	0.15	Remainder
711.1	C712.1, C612	...	Ingot	0.30	0.7-1.1	0.35-0.6	0.05	0.30-0.45	...	...	6.0-7.0	0.20	...	0.05	0.15	Remainder
712.2	D712.2, D612, 40E	...	Ingot	0.15	0.40	0.25	0.10	0.50-0.659	0.40-0.6	...	5.0-6.5	0.15-0.25	...	0.05	0.20	Remainder
713.1	613, Tenzaloy	...	Ingot	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	Precedent 71A	...	Ingot	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
772.2	B771.2, Precedent 71B	...	Ingot	0.10	0.10	0.10	0.10	0.65-0.8	0.06-0.20	...	6.0-7.0	0.10-0.20	...	0.05	0.15	Remainder
850.1	750	...	Ingot	0.7	0.50	0.7-1.3	0.10	0.10	...	0.7-1.3	...	0.20	5.5-7.0	...	0.30	Remainder
851.1	A850.1, A750	...	Ingot	2.0-3.0	0.50	0.7-1.3	0.10	0.10	...	0.30-0.7	...	0.20	5.5-7.0	...	0.30	Remainder
852.1	B850.1, B750	...	Ingot	0.40	0.50	1.7-2.3	0.10	0.7-0.9	...	0.9-1.5	...	0.20	5.5-7.0	...	0.30	Remainder
853.2	XC850.2, XC750	...	Ingot	5.5-6.5	0.50	3.0-4.0	0.10	...	...	...	...	0.20	5.5-7.0	...	0.30	Remainder

* Rated minimum conductivities for rotor ingot (electrical Motor armatures) and other high conductivity applications:

Ingot	Percent IACS
100.2	54
130.2	55
150.2	57
170.1	59

The rating of ingot metal for minimum conductivity characteristic is based on established relations between electrical conductivity and metal composition.

[A] Composition in weight percent maximum unless shown as a range or a minimum.
Standard limits for alloying elements and impurities are expressed to the following places:
Less than 0.001 percent: 0.000X
0.001 but less than 0.01 percent: 0.00X
0.01 but less than 0.10 percent:

Unalloyed aluminum made by a refining process: 0.0XX
Alloys and unalloyed aluminum not made by a refining process: 0.0X
0.10-0.55 percent: 0.XX
(It is customary to express limits of 0.30 percent through 0.55 percent as 0.X0 or 0.X5)
Over 0.55 percent: 0.X, X.X, etc.
(Note—Mg percent for some long standing alloys is an exception to this rule.)

[B] Except for "Aluminum" and "Others," analysis normally is made for elements for which specific limits are shown. For purposes of determining conformance to these limits, an observed value or calculated value obtained from analysis is rounded off to the nearest unit in the last right-hand-place of figures used in expressing the specified limit, in accordance with the following:
—When the figure next beyond the last figure or place to be retained is less than 5, the figure in the last place retained should be kept unchanged.
—When the figure next beyond the last figure or place to be retained is greater than 5, the figure in the last place retained should be increased by 1.
—When the figure next beyond the last figure or place to be retained is 5, and
(a) There are no figures or only zeros, beyond this 5, if the figure in the last place to be retained is odd, it should be increased by 1; if even, it should be kept unchanged.
(b) If the 5 next beyond the figure in the last place to be retained is followed by any figures other than zero, the figure in the last place retained should be increased by 1, whether odd or even.

[C] Ingot is the normal form in which the material is purchased or delivered, but it may also be in the molten form.

[D] "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 registration or specification. However, such analysis is not required and may not cover all metallic "other" 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.

[E] The sum of those "Others" metallic elements 0.010 percent or more each, expressed to the second decimal before determining the sum.

[F] Manganese + chromium + titanium + vanadium 0.025 maximum.

[G] The aluminum content for unalloyed aluminum not made by a refining process is the difference between 100.00 percent and the sum of all other analyzed metallic elements and silicon present in amounts of 0.010 percent or more each, expressed to the second decimal before determining the sum. When an element's specified maximum limit is 0.XX, an observed value or a calculated value greater than 0.005 but less than 0.010 % is rounded off and shown as "less than 0.01."

[H] Iron/silicon ratio 2.5 minimum.

[I] Iron/silicon ratio 2.0 minimum.

[J] Iron/silicon ratio 1.5 minimum.

[K] Silver 0.40-1.0.

[L] Antimony 0.20-0.30; cobalt 0.20-0.30; zirconium 0.10-0.30, Titanium + zirconium 0.50 max.

[M] Identifiers for 3xx.x and 4xx.x Foundry Ingot Containing Structure Modifiers:

Alloy Designation Suffix	Structure Modifying Element	Chemical Composition Limits Min (%)	Max (%)
N	Na	0.003	0.08
S	Sr	0.005	0.08
C	Ca	0.005	0.15
P	P	—	0.06

—The letter suffix follows and is separated from the registered foundry ingot designations by a hyphen (i.e., "A356.1-S").
—In cases where more than one modifier is intentionally added, only the modifier of greater concentration shall be identified by suffix letter affixed to the registered alloy designation.
—When a foundry alloy is sold with a suffix added to its alloy designation, the modifying element's concentration is not to be included in the "Others, Each" "Others, Total."
—It is not intended that these structure modifier identities be treated as new alloy designation, nor should these designations be listed in the Registration Record.

[N] Primarily used for making metal matrix composite.

[O] If iron exceeds 0.45, manganese content shall not be less than one-half iron content.

[P] Beryllium 0.04-0.07.

[Q] 0.002 max Be.

[R] 0.0003 max Be.

[S] Beryllium 0.15-0.30.

[T] A360.1, 380.2, A380.1 and A413.1 ingot is used to produce 360.0 and A360.0; 380.0 and A380.0; 413.0 and A413.0 castings, respectively.

[U] Manganese + chromium 0.8 maximum.

[V] Lead 0.25 maximum.

[W] Beryllium 0.02-0.04.

[X] Phosphorus 0.001 maximum; strontium 0.010–0.020.

[Y] Used for semi-solid formed products.

[Z] Casting: 0.001 % max. P; 0.05-0.07 % Sr.
Ingot: 0.001 % max. P, Sr range to be determined between producer and purchaser to allow for potential burn out at the caster's facility.

[AA] Antimony 0.15 maximum; lead 0.15 maximum.

[AB] The number of decimal places to which Mg percent is expressed is exempted by the Note stated in Footnote A.

[AC] Vanadium 0.08-0.15.

[AD] Used for centrifugally formed products.

[AE] Lead 0.10 maximum.

[AF] Beryllium 0.003-0.007; boron 0.002 maximum.

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
E716 Practices for Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis
E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Atomic Emission Spectrometry

2.2 *ANSI Standard:*
H35.1/H35.1(M) American National Standard Alloy and Temper Designation Systems for Aluminum[3]

2.3 *Aluminum Associations Standard:*
Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings and Ingot (The Pink Sheets)[3]

2.4 *Other Standards:*[4]
EN 14242 Aluminum and Aluminum Alloys — Chemical Analysis — Inductively Coupled Plasma Optical Emission Spectral Analysis

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),
~~3.1.2Alloy (Section~~
3.1.2 Alloy (Section 6, Table 1), and
~~3.1.3The quantity in pieces or pounds.~~

[3] Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, http://www.aluminum.org.
[4] Available from European Committee for Standardization (CEN), 36 rue de Stassart, B-1050, Brussels, Belgium, http://www.cenorm.be.

TABLE 1Chemical Composition Limits of Aluminum Alloys in Ingot and Molten Forms for All Casting Processes[1,2] 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

Designation		Registered Date	Products[5]	Composition, %												
AA No.	Former			Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Sn	Others[26] Each	Others[26] Total[3]	Aluminum Minimum
100.1*	...	06/30/70	Ingot	0.15	0.6-0.8	0.10	...[19]	...	...[19]	...	0.05	...[19]	...	0.03[19]	0.10	99.00[4]
130.1*	...	06/30/70	Ingot	...[18]	...[18]	0.10	...[19]	...	...[19]	...	0.05	...[19]	...	0.03[19]	0.10	99.30[4]
150.1*	...	06/30/70	Ingot	...[20]	...[20]	0.05	...[19]	...	...[19]	...	0.05	...[19]	...	0.03[19]	0.10	99.50[4]
160.1	...	01/28/76	Ingot	0.10[20]	0.25[20]	...	...[19]	...	...[19]	...	0.05	...[19]	...	0.03[19]	0.10	99.60[4]
170.1*	...	06/30/70	Ingot	...[21]	...[21]	...	...[19]	...	...[19]	...	0.05	...[19]	...	0.03[19]	0.10	99.70[4]
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[7]	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[7]	0.10	Remainder
203.2	Hiduminium 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[22]	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	0.05	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	0.05	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	0.05	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	0.05	0.05	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[28]	....	08/02/94	Ingot[27]	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
302.1[28]	....	08/02/94	Ingot[27]	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[28]	....	08/02/94	Ingot[27]	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[28]	A108	...	Ingot	5.0-6.0	0.8	4.0-5.0	0.50	0.10	...	...	1.0	0.25	...	...	0.50	Remainder