

# CHEMICAL COMPOSITION LIMITS OF WROUGHT ALUMINUM ALLOYS

AA DESIG- NATION	SILICON	IRON	COPPER	MAN- GANESE	MAG- NESIUM	CHROMIUM	NICKEL	ZINC	TITAN- IUM	OTHERS <sup>(2)</sup>		ALUMI- NUM Min. <sup>(4)</sup>
										Each <sup>(20)</sup>	Total <sup>(3)</sup>	
1050	0.25	0.40	0.05	0.05	0.05	..	..	0.05	0.03	0.03 <sup>(9)</sup>	..	99.50
1060	0.25	0.35	0.05	0.03	0.03	..	..	0.05	0.03	0.03 <sup>(9)</sup>	..	99.60
1100	0.95 Si + Fe	..	0.05-0.20	0.05	..	..	..	0.10	..	0.05 <sup>(16)</sup>	0.15	99.00
1145 <sup>(8)</sup>	0.55 Si + Fe	..	0.05	0.05	0.05	..	..	0.05	0.03	0.03 <sup>(9)</sup>	..	99.45
1200	1.00 Si + Fe	..	0.05	0.05	..	..	..	0.10	0.05	0.05	0.15	99.00
1230 <sup>(7)</sup>	0.70 Si + Fe	..	0.10	0.05	0.05	..	..	0.10	0.03	0.03 <sup>(9)</sup>	..	99.30
1235	0.65 Si + Fe	..	0.05	0.05	0.05	..	..	0.10	0.06	0.03 <sup>(9)</sup>	..	99.35
1345	0.30	0.40	0.10	0.05	0.05	..	..	0.05	0.03	0.03 <sup>(9)</sup>	..	99.45
1350 <sup>(6)</sup>	0.10	0.40	0.05	0.01	..	0.01	..	0.05	..	0.03 <sup>(13)</sup>	0.10	99.50
2011	0.40	0.7	5.0-6.0	..	..	..	..	0.30	..	0.05 <sup>(10)</sup>	0.15	Remainder
2014	0.50-1.2	0.7	3.9-5.0	0.40-1.2	0.20-0.8	0.10	..	0.25	0.15	0.05	0.15	Remainder
2017	0.20-0.8	0.7	3.5-4.5	0.40-1.0	0.40-0.8	0.10	..	0.25	0.15	0.05	0.15	Remainder
2018	0.9	1.0	3.5-4.5	0.20	0.45-0.9	0.10	1.7-2.3	0.25	..	0.05	0.15	Remainder
2024	0.50	0.50	3.8-4.9	0.30-0.9	1.2-1.8	0.10	..	0.25	0.15	0.05	0.15	Remainder
2025	0.50-1.2	1.0	3.9-5.0	0.40-1.2	0.05	0.10	..	0.25	0.15	0.05	0.15	Remainder
2036	0.50	0.50	2.2-3.0	0.10-0.40	0.30-0.6	0.10	..	0.25	0.15	0.05	0.15	Remainder
2117	0.8	0.7	2.2-3.0	0.2	0.20-0.50	0.1	..	0.25	..	0.05	0.15	Remainder
2124	0.20	0.30	3.8-4.9	0.30-0.9	1.2-1.8	0.10	..	0.25	0.15	0.05	0.15	Remainder
2218	0.9	1.0	3.5-4.5	0.20	1.2-1.8	0.10	1.7-2.3	0.25	..	0.05	0.15	Remainder
2219	0.20	0.30	5.8-6.8	0.20-0.40	0.02	..	..	0.10	0.02-0.10	0.05 <sup>(16)</sup>	0.15	Remainder
2319	0.20	0.30	5.8-6.8	0.20-0.40	0.02	..	..	0.10	0.10-0.20	0.05 <sup>(16)</sup>	0.15	Remainder
2618	0.10-0.25	0.9-1.3	1.9-2.7	..	1.3-1.8	..	0.9-1.2	0.10	0.04-0.10	0.05	0.15	Remainder
3003	0.6	0.7	0.05-0.20	1.0-1.5	..	..	..	0.10	..	0.05	0.15	Remainder
3004	0.30	0.7	0.25	1.0-1.5	0.8-1.3	..	..	0.25	..	0.05	0.15	Remainder
3005	0.6	0.7	0.30	1.0-1.5	0.20-0.6	0.1	..	0.25	0.10	0.05	0.15	Remainder
3105	0.6	0.7	0.3	0.30-0.8	0.20-0.8	0.20	..	0.40	0.10	0.05	0.15	Remainder
4032	11.0-13.5	1.0	0.50-1.3	..	0.8-1.3	0.10	0.50-1.3	0.25	..	0.05	0.15	Remainder
4043	4.5-6.0	0.8	0.30	0.05	0.05	..	..	0.10	0.20	0.05 <sup>(16)</sup>	0.15	Remainder
4045 <sup>(11)</sup>	9.0-11.0	0.8	0.30	0.05	0.05	..	..	0.10	0.20	0.05	0.15	Remainder
4047 <sup>(11)</sup>	11.0-13.0	0.8	0.30	0.15	0.10	..	..	0.20	..	0.05 <sup>(16)</sup>	0.15	Remainder
4145 <sup>(11)</sup>	9.3-10.7	0.8	3.3-4.7	0.15	0.15	0.15	..	0.20	..	0.05 <sup>(16)</sup>	0.15	Remainder
4343 <sup>(11)</sup>	6.8-8.2	0.8	0.25	0.10	..	..	..	0.20	..	0.05	0.15	Remainder
4643	3.6-4.6	0.8	0.10	0.05	0.10-0.30	..	..	0.10	0.15	0.05 <sup>(16)</sup>	0.15	Remainder
5005	0.30	0.7	0.20	0.20	0.50-1.1	0.10	..	0.25	..	0.05	0.15	Remainder
5050	0.40	0.7	0.20	0.10	1.1-1.8	0.10	..	0.25	..	0.05	0.15	Remainder
5052	0.25	0.40	0.10	0.10	2.2-2.8	0.15-0.35	..	0.10	..	0.05	0.15	Remainder
5056	0.30	0.40	0.10	0.05-0.20	4.5-5.6	0.05-0.20	..	0.10	..	0.05	0.15	Remainder
5083	0.40	0.40	0.10	0.40-1.0	4.0-4.9	0.05-0.25	..	0.25	0.15	0.05	0.15	Remainder
5086	0.40	0.50	0.10	0.20-0.7	3.5-4.5	0.05-0.25	..	0.25	0.15	0.05	0.15	Remainder
5154	0.25	0.40	0.10	0.10	3.1-3.9	0.15-0.35	..	0.20	0.20	0.05 <sup>(16)</sup>	0.15	Remainder
5183	0.40	0.40	0.10	0.50-1.0	4.3-5.2	0.05-0.25	..	0.25	0.15	0.05 <sup>(16)</sup>	0.15	Remainder
5252	0.08	0.10	0.10	0.10	2.2-2.8	..	..	0.05	..	0.03 <sup>(9)</sup>	0.10	Remainder
5254	0.45 Si + Fe	..	0.05	0.01	3.1-3.9	0.15-0.35	..	0.20	0.05	0.05	0.15	Remainder
5356	0.25	0.40	0.10	0.05-0.20	4.5-5.5	0.05-0.20	..	0.10	0.06-0.20	0.05 <sup>(16)</sup>	0.15	Remainder
5454	0.25	0.40	0.10	0.50-1.0	2.4-3.0	0.05-0.20	..	0.25	0.20	0.05	0.15	Remainder
5456	0.25	0.40	0.10	0.50-1.0	4.7-5.5	0.05-0.20	..	0.25	0.20	0.05	0.15	Remainder
5457	0.08	0.10	0.20	0.15-0.45	0.8-1.2	..	..	0.05	..	0.03 <sup>(9)</sup>	0.10	Remainder
5554	0.25	0.40	0.10	0.50-1.0	2.4-3.0	0.05-0.20	..	0.25	0.05-0.20	0.05 <sup>(16)</sup>	0.15	Remainder
5556	0.25	0.40	0.10	0.50-1.0	4.7-5.5	0.05-0.20	..	0.25	0.05-0.20	0.05 <sup>(16)</sup>	0.15	Remainder
5652	0.40 Si + Fe	..	0.04	0.01	2.2-2.8	0.15-0.35	..	0.10	..	0.05	0.15	Remainder
5654	0.45 Si + Fe	..	0.05	0.01	3.1-3.9	0.15-0.35	..	0.20	0.05-0.15	0.05 <sup>(16)</sup>	0.15	Remainder
5657	0.08	0.10	0.10	0.03	0.6-1.0	..	..	0.05	..	0.02 <sup>(19)</sup>	0.05	Remainder

For all numbered footnotes, see page KA-REF-AA2-1.09

# CHEMICAL COMPOSITION LIMITS OF WROUGHT ALUMINUM ALLOYS

AA DESIGNATION	SILICON	IRON	COPPER	MANGANESE	MAGNESIUM	CHROMIUM	NICKEL	ZINC	TITANIUM	OTHERS <sup>②</sup>		ALUMINUM Min. <sup>④</sup>
										Each <sup>⑩</sup>	Total <sup>③</sup>	
6003 <sup>⑦</sup>	0.35-1.0	0.6	0.10	0.8	0.8-1.5	0.35	..	0.20	0.10	0.05	0.15	Remainder
6005	0.6-0.9	0.35	0.10	0.10	0.40-0.6	0.10	..	0.10	0.10	0.05	0.15	Remainder
6005A	0.50-0.9	0.35	0.30	0.50 <sup>⑦</sup>	0.40-0.7	0.30	..	0.20	0.10	0.05	0.15	Remainder
6053	<sup>⑤</sup>	0.35	0.10	..	1.1-1.4	0.15-0.35	..	0.10	..	0.05	0.15	Remainder
6061	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.35	..	0.25	0.15	0.05	0.15	Remainder
6063	0.20-0.6	0.35	0.10	0.10	0.45-0.9	0.10	..	0.10	0.10	0.05	0.15	Remainder
6066	0.9-1.8	0.50	0.7-1.2	0.6-1.1	0.8-1.4	0.40	..	0.25	0.20	0.05	0.15	Remainder
6070	1.0-1.7	0.50	0.15-0.40	0.40-1.0	0.50-1.2	0.10	..	0.25	0.15	0.05	0.15	Remainder
6082	0.7-1.3	0.50	0.10	0.40-1.0	0.6-1.2	0.25	..	0.20	0.10	0.05	0.15	Remainder
6101 <sup>⑧</sup>	0.30-0.7	0.50	0.10	0.03	0.35-0.8	0.03	..	0.10	..	0.03 <sup>⑩</sup>	0.10	Remainder
6105	0.6-1.0	0.35	0.10	0.15	0.45-0.8	0.10	..	0.10	0.10	0.05	0.15	Remainder
6151	0.6-1.2	1.0	0.35	0.20	0.45-0.8	0.15-0.35	..	0.25	0.15	0.05	0.15	Remainder
6162	0.40-0.8	0.50	0.20	0.10	0.7-1.1	0.10	..	0.25	0.10	0.05	0.15	Remainder
6201	0.50-0.9	0.50	0.10	0.03	0.6-0.9	0.03	..	0.10	..	0.03 <sup>⑩</sup>	0.10	Remainder
6262	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.14	..	0.25	0.15	0.05 <sup>⑤</sup>	0.15	Remainder
6351	0.7-1.3	0.50	0.10	0.40-0.8	0.40-0.8	..	..	0.20	0.20	0.05	0.15	Remainder
6463	0.20-0.6	0.15	0.20	0.05	0.45-0.9	..	..	0.05	..	0.05	0.15	Remainder
6951	0.20-0.50	0.8	0.15-0.40	0.10	0.40-0.8	..	..	0.20	..	0.05	0.15	Remainder
7005	0.35	0.40	0.10	0.20-0.7	1.0-1.8	0.06-0.20	..	4.0-5.0	0.01-0.06	0.05 <sup>⑭</sup>	0.15	Remainder
7008 <sup>⑦</sup>	0.10	0.10	0.05	0.05	0.7-1.4	0.12-0.25	..	4.5-5.5	0.05	0.05	0.10	Remainder
7049	0.25	0.35	1.2-1.9	0.20	2.0-2.9	0.10-0.22	..	7.2-8.2	0.10	0.05	0.15	Remainder
7050	0.12	0.15	2.0-2.6	0.10	1.9-2.6	0.04	..	5.7-6.7	0.06	0.05 <sup>⑮</sup>	0.15	Remainder
7072 <sup>⑦</sup>	0.7 Si + Fe	..	0.10	0.10	0.10	..	..	0.8-1.3	..	0.05	0.15	Remainder
7075	0.40	0.50	1.2-2.0	0.30	2.1-2.9	0.18-0.28	..	5.1-6.1	0.20	0.05	0.15	Remainder
7175	0.15	0.20	1.2-2.0	0.10	2.1-2.9	0.18-0.28	..	5.1-6.1	0.10	0.05	0.15	Remainder
7178	0.40	0.50	1.6-2.4	0.30	2.4-3.1	0.18-0.28	..	6.3-7.3	0.20	0.05	0.15	Remainder
7475	0.10	0.12	1.2-1.9	0.06	1.9-2.6	0.18-0.25	..	5.2-6.2	0.06	0.05	0.15	Remainder
8017	0.10	0.55-0.8	0.10-0.20	..	0.01-0.05	..	..	0.05	..	0.03 <sup>⑲</sup>	0.10	Remainder
8030	0.10	0.30-0.8	0.15-0.30	..	0.05	..	..	0.05	..	0.03 <sup>⑲</sup>	0.10	Remainder
8176	0.03-0.15	0.40-1.0	..	..	..	..	..	0.10	..	0.05 <sup>⑳</sup>	0.15	Remainder

## Footnotes

Note: Listed herein are designations and chemical composition limits for some wrought unalloyed aluminum and for wrought aluminum alloys registered with The Aluminum Association. This list does not include all alloys registered with The Aluminum Association. A complete list of registered designations is contained in the "Registration Record of International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys." These lists are maintained by the Technical Committee on Product Standards of the Aluminum Association.

- ① Composition in percent by weight maximum unless shown as a range or a minimum.
- ② 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 a 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 ASTM Recommended Practice E 29.
- ③ The sum of those "Other" metallic elements 0.010 percent or more each, expressed to the second decimal before determining the sum.
- ④ 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 present in amounts of 0.010 percent or more each, expressed to the second decimal before determining the sum. For alloys and unalloyed aluminum not made by a refining process, when the specified maximum 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".
- ⑤ Also contains 0.40-0.7 percent each of lead and bismuth.
- ⑥ Electric conductor. Formerly designated EC.
- ⑦ Cladding Alloy. See Table 6.1.
- ⑧ Foil.
- ⑨ Vanadium 0.05 percent maximum.

- ⑩ Also contains 0.20-0.6 percent each of lead and bismuth.
- ⑪ Brazing alloy.
- ⑫ Bus conductor.
- ⑬ Vanadium plus titanium 0.02 percent list maximum; boron 0.05 percent maximum; gallium 0.03 percent maximum.
- ⑭ Zirconium 0.08-0.20.
- ⑮ Silicon 45 to 65 percent of actual magnesium content.
- ⑯ Beryllium 0.0003 maximum for welding electrode and welding rod only.
- ⑰ Boron 0.06 percent maximum.
- ⑱ Vanadium 0.05-0.15; zirconium 0.10-0.25.
- ⑲ Gallium 0.03 percent maximum; vanadium 0.05 percent maximum.
- ⑳ In addition to those alloys referencing footnote ⑯, a 0.0008 weight percent maximum beryllium is applicable to any alloy to be used as welding electrode or welding rod.
- ㉑ Zirconium 0.08-0.15.
- ㉒ "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 nonconforming.
- ㉓ Boron 0.04 percent maximum; lithium 0.003 percent maximum.
- ㉔ Boron 0.001-0.04.
- ㉕ Gallium 0.03 percent maximum.
- ㉖ Boron 0.04 percent maximum.
- ㉗ 0.12-0.50 Manganese and Chromium.