



**International
Standard**

ISO 209

**Wrought aluminium and aluminium
alloys — Chemical composition**

*Aluminium et alliages d'aluminium corroyés — Composition
chimique*

**Second edition
2024-12**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

This second edition cancels and replaces the first edition (ISO 209:2007), which has been technically revised. The main changes are as follows:

- Title: changed from “Aluminium and aluminium alloy — Chemical composition” to “Wrought aluminium and aluminium alloy — Chemical composition”;
- [Clause 1](#): clarification that this document specifies the chemical composition limits of wrought products and ingots intended to be wrought in aluminium and aluminium alloys;
- [Clauses 3 to 8](#): merging the chemical composition limits and other contents of wrought aluminium and aluminium alloys specified in ISO 6361-5 and ISO 6362-7 respectively into this standard;
- [Clause 5](#): addition of eight alloys specified in ISO 7271 to [Table 1](#);
- [Annex A](#): addition of information about the correspondence between alloys and forms of products.
- Bibliography: addition of ISO 6361-1, ISO 6362-1, ISO 6363-1 and ISO 7271;

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Wrought aluminium and aluminium alloys — Chemical composition

1 Scope

This document specifies the chemical composition limits of wrought products and ingots intended to be wrought in aluminium and aluminium alloys.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Alloy designations

Alloy designations is in accordance with the recommendation (Teal sheets) for an International Alloy Designation and Chemical Composition Limits System for Wrought Aluminum and Wrought Aluminum Alloys issued by the Aluminum Association. <https://standards.iteh.ai/catalog/standards/iso/8d5d3f93-6895-4922-9aa8-94b3e49cac12/iso-209-2024>

In order to differentiate from four-digit designation systems for other materials, it is recommended to introduce a prefix to these registered designations that do not change the registered composition and should be considered equivalent to these listed in this document.

The correspondence between the alloys listed in this document and their applicable form of products is provided in [Annex A](#).

5 Chemical composition limits

The chemical composition of wrought aluminium and aluminium alloys is specified in percentage by mass in [Table 1](#). Limits of impurities are expressed as a maximum. Limits of alloying elements are expressed as a range. Aluminium is specified as a minimum for unalloyed aluminium, and as a remainder for aluminium alloys.

For the purpose of determining conformance to these limits, an observed value or a calculated value obtained from analysis is rounded off, in accordance with the rules for rounding, specified in [Clause 8](#).

The conformity does not preclude the possible presence of other elements that are not specified. If the purchase's requirements necessitate limits for any other element not specified, these shall be agreed upon between the supplier and purchaser.

"The remainder" is the difference between 100,00 % and the sum of all other metallic elements present in amounts of 0,010 % or more each, expressed to the second decimal place before determining the sum.

6 Writing rules

6.1 Standard limits for alloying elements and impurities are expressed in percentage by mass to the following decimal places:

— less than 0,001 %:	0,000X;
— 0,001 % but less than 0,01 %:	0,00X;
— 0,01 % but less than 0,10 %:	
— unalloyed aluminium made by a refining process	0,0XX;
— others	0,0X;
— 0,10 % to 0,55 %:	0,XX;
— over 0,55 %:	0,X; X,X; XX,X.

Exception: combined Si + Fe limits for 1xxx designations shall be expressed as 0,XX or 1,XX.

6.2 The mass fraction of aluminium for unalloyed aluminium made by a refining process is the difference between 100,00 % and the sum of all other metallic elements present in amounts of 0,001 0 % or more each, expressed to the third decimal place before determining the sum, which is rounded to the second decimal place before subtracting.

For unalloyed aluminium not made by a refining process, the mass fraction of aluminium is the difference between 100,00 % and the sum of all other metallic elements present in amounts of 0,010 % or more, each expressed to the second decimal place before determining the sum.

7 Sequences of elements Document Preview

Standard limits for alloying elements and impurities are expressed in the following sequence: silicon, iron, copper, manganese, magnesium, chromium, zinc, titanium, remarks, other elements: each, other elements: total, aluminium.

Limits of additional specified elements are inserted in alphabetical order of their chemical symbols under "Remarks".

8 Rules for rounding for determination

In recording test results, the number representing the result of a test to determine an element concentration shall be expressed to the same number of decimal places as the corresponding limit in this document.

The following rules shall be used for rounding.

- a) When the figure immediately after the last figure to be retained is less than 5, the last figure to be retained remains unchanged.
- b) When the figure immediately after the last figure to be retained is greater than 5, or equal to 5 and followed by at least one figure other than 0, the last figure to be retained is increased by 1.
- c) When the figure immediately after the last figure to be retained is equal to 5 and followed by 0 only, the last figure to be retained remains unchanged if even and is increased by 1 if odd.

Table 1 — Chemical composition limits (% by mass)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Remarks	Others ^a		Al Minimum
										Each	Total ^b	
1050	0,25	0,40	0,05	0,05	0,05	—	0,05	0,03	0,05 V	0,03	—	99,50 ^c
1050A	0,25	0,40	0,05	0,05	0,05	—	0,07	0,05	—	0,03	—	99,50 ^c
1060	0,25	0,35	0,05	0,03	0,03	—	0,05	0,03	0,05 V	0,03	—	99,60 ^c
1070	0,20	0,25	0,04	0,03	0,03	—	0,04	0,03	0,05 V ^e	0,03	—	99,70 ^c
1070A	0,20	0,25	0,03	0,03	0,03	—	0,07	0,03	—	0,03	—	99,70 ^c
1080	0,15	0,15	0,03	0,02	0,02	—	0,03	0,03	0,03 Ga 0,05 V	0,02	—	99,80 ^c
1080A	0,15	0,15	0,03	0,02	0,02	—	0,06	0,02	0,03 Ga ^e	0,02	—	99,80 ^c
1085	0,10	0,12	0,03	0,02	0,02	—	0,03	0,02	0,03 Ga 0,05 V	0,01	—	99,85 ^c
1098	0,010	0,006	0,003	—	—	—	0,015	0,003	—	0,003	—	99,98 ^d
1100	—	—	0,05 to 0,20	0,05	—	—	0,10	—	0,95 Si+Fe ^e	0,05	0,15	99,00 ^c
1100A	—	—	0,05 to 0,20	0,05	—	—	0,10	0,10	1,00 Si+Fe	0,05	0,15	99,00 ^c
1200	—	—	0,05	0,05	—	—	0,10	0,05	1,00 Si+Fe ^e	0,05	0,15	99,00 ^c
1230A	—	—	0,10	0,05	0,05	—	0,05	—	0,70 Si+Fe	0,03	—	99,30 ^c
1235	—	—	0,05	0,05	0,05	—	0,10	0,06	0,05 V 0,65 Si+Fe	0,03	—	99,35 ^c

^a "Others" includes listed elements for which no specific limit is shown, as well as unlisted metallic elements. The producer may analyse 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 as non conforming.

^b The sum of those "Others": metallic elements 0,010 % or more, each expressed to the second decimal place before determining the sum.

^c The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,010 % or more each, expressed to the second decimal before determining the sum. For alloys and unalloyed aluminium not made by a refining process, when the 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".

^d The aluminium content for unalloyed aluminium made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,001 0 % or more each, expressed to the third decimal before determining the sum, which is rounded to the second decimal before subtracting. For unalloyed aluminium made by a refining process, when the specified maximum limit is 0,0XX, an observed value or a calculated value greater than 0,000 5 but less than 0,001 0 % is rounded off and shown as "less than 0,001".

^e 0,000 3 % maximum Be for welding electrode, welding rod and filler wire.

^f Zr+Ti limit of 0,20 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

^g Zr+Ti limit of 0,25 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

Table 1 (continued)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Remarks	Others ^a		Al Minimum
										Each	Total ^b	
1145	—	—	0,05	0,05	0,05	—	0,05	0,03	0,05 V 0,55 Si+Fe	0,03	—	99,45 ^c
1350	0,10	0,40	0,05	0,01	—	0,01	0,05	—	0,05 B 0,03 Ga 0,02 V+Ti	0,03	0,10	99,50 ^c
2007	0,8	0,8	3,3 to 4,6	0,50 to 1,0	0,40 to 1,8	0,10	0,8	0,20	0,20 Bi 0,20 Ni 0,8 to 1,5 Pb 0,20 Sn	0,10	0,30	Remain- der
2011	0,40	0,7	5,0 to 6,0	—	—	—	0,30	—	0,20 to 0,6 Bi 0,20 to 0,6 Pb	0,05	0,15	Remain- der
2011A	0,40	0,50	4,5 to 6,0	—	—	—	0,30	—	0,20 to 0,6 Bi 0,20 to 0,6 Pb	0,05	0,15	Remain- der
2014	0,50 to 1,2	0,7	3,9 to 5,0	0,40 to 1,2	0,20 to 0,8	0,10	0,25	0,15	f	0,05	0,15	Remain- der
2014A	0,50 to 0,9	0,50	3,9 to 5,0	0,40 to 1,2	0,20 to 0,8	0,10	0,25	0,15	0,10 Ni 0,20 Zr+Ti	0,05	0,15	Remain- der
2017	0,20 to 0,8	0,7	3,5 to 4,5	0,40 to 1,0	0,40-0,8	0,10	0,25	0,15	f	0,05	0,15	Remain- der

^a "Others" includes listed elements for which no specific limit is shown, as well as unlisted metallic elements. The producer may analyse 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 as non conforming.

^b The sum of those "Others": metallic elements 0,010 % or more, each expressed to the second decimal place before determining the sum.

^c The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,010 % or more each, expressed to the second decimal before determining the sum. For alloys and unalloyed aluminium not made by a refining process, when the 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".

^d The aluminium content for unalloyed aluminium made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,001 0 % or more each, expressed to the third decimal before determining the sum, which is rounded to the second decimal before subtracting. For unalloyed aluminium made by a refining process, when the specified maximum limit is 0,0XX, an observed value or a calculated value greater than 0,000 5 but less than 0,001 0 % is rounded off and shown as "less than 0,001".

^e 0,000 3 % maximum Be for welding electrode, welding rod and filler wire.

^f Zr+Ti limit of 0,20 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

^g Zr+Ti limit of 0,25 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

Table 1 (continued)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Remarks	Others ^a		Al Minimum
										Each	Total ^b	
2017A	0,20 to 0,8	0,7	3,5 to 4,5	0,40 to 1,0	0,40-1,0	0,10	0,25	—	0,25 Zr+Ti	0,05	0,15	Remainder
2117	0,8	0,7	2,2 to 3,0	0,20	0,20-0,50	0,10	0,25	—	—	0,05	0,15	Remainder
2618A	0,15 to 0,25	0,9-1,4	1,8 to 2,7	0,25	1,2-1,8	—	0,15	0,20	0,8 to 1,4 Ni 0,25 Zr+Ti	0,05	0,15	Remainder
2219	0,20	0,30	5,8 to 6,8	0,20 to 0,40	0,02	—	0,10	0,02-0,10	0,05 to 0,15 V 0,10 to 0,25 Zr	0,05	0,15	Remainder
2024	0,50	0,50	3,8 to 4,9	0,30 to 0,9	1,2 to 1,8	0,10	0,25	0,15	f	0,05	0,15	Remainder
2124	0,20	0,30	3,8 to 4,9	0,30-0,9	1,2 to 1,8	0,10	0,25	0,15	f	0,05	0,15	Remainder
2030	0,8	0,7	3,3-4,5	0,20 to 1,0	0,50 to 1,3	0,10	0,50	0,20	0,20 B 0,8 to 1,5 Pb	0,10	0,30	Remainder
2033	0,10-1,2	0,7	2,2-2,7	0,40 to 1,0	0,20 to 0,6	0,15	0,50	0,10	0,05-0,8 Bi 0,15 Ni	0,05	0,15	Remainder
3102	0,40	0,7	0,10	0,05 to 0,40	—	—	0,30	0,10	—	0,05	0,15	Remainder
3003	0,6	0,7	0,05 to 0,20	1,0 to 1,5	—	—	0,10	—	—	0,05	0,15	Remainder

^a "Others" includes listed elements for which no specific limit is shown, as well as unlisted metallic elements. The producer may analyse 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 as non conforming.

^b The sum of those "Others": metallic elements 0,010 % or more, each expressed to the second decimal place before determining the sum.

^c The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,010 % or more each, expressed to the second decimal before determining the sum. For alloys and unalloyed aluminium not made by a refining process, when the 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".

^d The aluminium content for unalloyed aluminium made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,001 0 % or more each, expressed to the third decimal before determining the sum, which is rounded to the second decimal before subtracting. For unalloyed aluminium made by a refining process, when the specified maximum limit is 0,0XX, an observed value or a calculated value greater than 0,000 5 but less than 0,001 0 % is rounded off and shown as "less than 0,001".

^e 0,000 3 % maximum Be for welding electrode, welding rod and filler wire.

^f Zr+Ti limit of 0,20 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

^g Zr+Ti limit of 0,25 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

Table 1 (continued)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Remarks	Others ^a		Al Minimum
										Each	Total ^b	
3103	0,50	0,7	0,10	0,9 to 1,5	0,30	0,10	0,20	—	0,10 Zr+Ti ^e	0,05	0,15	Remainder
3203	0,6	0,7	0,05	1,0 to 1,5	—	—	0,10	—	e	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
3104	0,6	0,8	0,05 to 0,25	0,8 to 1,4	0,8 to 1,3	—	0,25	0,10	0,05 Ga 0,05 V	0,05	0,15	Remainder
3005	0,6	0,7	0,30	1,0 to 1,5	0,20 to 0,6	0,10	0,25	0,10	—	0,05	0,15	Remainder
3105	0,6	0,7	0,30	0,30 to 0,8	0,20 to 0,8	0,20	0,40	0,10	—	0,05	0,15	Remainder
3021	0,50	0,7	0,20 to 0,6	0,05 to 0,8	0,10	0,10	0,10	0,10	—	0,05	0,15	Remainder
4006	0,8 to 1,2	0,50 to 0,8	0,10	0,05	0,01	0,20	0,05	—	—	0,05	0,15	Remainder
4007	1,0 to 1,7	0,40 to 1,0	0,20	0,8 to 1,5	0,20	0,05 to 0,25	0,10	0,10	0,05 Co 0,15 to 0,7 Ni	0,05	0,15	Remainder
4015	1,4 to 2,2	0,7	0,20	0,6 to 1,2	0,10 to 0,50	—	0,20	—	—	0,05	0,15	Remainder

^a "Others" includes listed elements for which no specific limit is shown, as well as unlisted metallic elements. The producer may analyse 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 as non conforming.

^b The sum of those "Others": metallic elements 0,010 % or more, each expressed to the second decimal place before determining the sum.

^c The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,010 % or more each, expressed to the second decimal before determining the sum. For alloys and unalloyed aluminium not made by a refining process, when the 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".

^d The aluminium content for unalloyed aluminium made by a refining process is the difference between 100,00 % and the sum of all other metallic elements together with silicon present in amounts of 0,001 0 % or more each, expressed to the third decimal before determining the sum, which is rounded to the second decimal before subtracting. For unalloyed aluminium made by a refining process, when the specified maximum limit is 0,0XX, an observed value or a calculated value greater than 0,000 5 but less than 0,001 0 % is rounded off and shown as "less than 0,001".

^e 0,000 3 % maximum Be for welding electrode, welding rod and filler wire.

^f Zr+Ti limit of 0,20 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.

^g Zr+Ti limit of 0,25 % maximum may be used for extruded products if mutually agreed by the supplier or manufacturer and the purchaser.