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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 16474-2011

**Designation system for wrought aluminium and aluminium
alloy**

变形铝及铝合金牌号表示方法
(English Translation)

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1 Scope

This Standard specifies the designation system for wrought aluminum and aluminum alloys.

This Standard applies to wrought aluminum and aluminum alloy processed products and their blanks.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 8005.1, Aluminium and aluminium alloy terms and definitions - Part 1:

Product and method of processing and treatment

GB/T 8170, Rules of rounding off for numerical values and expression and judgement of limiting values

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 8005.1 as well as the followings apply.

3.1

combination of elements

When the chemical composition is specified, when the limit value is specified for the total content of two or more elements, these two or more elements are collectively referred to as a set of combination of elements.

3.2

arithmetic mean of limits

The arithmetic mean of the maximum and minimum percentages allowed for alloying elements.

4 Basic principles for designation naming

4.1

The international four-digit number system designation¹ (see Annex C) can be directly quoted.

4.2 Deformed aluminum and aluminum alloys not named as international four-digit

number system designations shall be named with four-character designations (but test aluminum and aluminum alloys shall be named with the prefix x plus four-character designations). Register the chemical composition according to the requirements of

Annex A. Calculate the density of deformed aluminum and aluminum alloy according to Annex B. The naming method of four-character designations shall comply with the regulations in Chapter 5.

5.1 Designation structure

The first, third and fourth digits of the four-character system designation are Arabic numerals. The second digit is an English capital letter (except C, I, L, N, O, P, Q, Z letters). The first digit of the designation indicates the group of aluminum and aluminum alloys, as shown in Table 1. In addition to modified alloys, the aluminum alloy group is determined by the main alloying elements (6xxx series is according to Mg₂Si). The main alloying elements refer to the alloying elements whose limit content arithmetic mean value is the largest. When the arithmetic mean value of limit content of more than one alloying element is the largest, the alloy group shall be determined in the order of

Cu, Mn, Si, Mg, Mg₂Si, Zn, and other elements. The second letter of the designation indicates the modification of the original pure aluminum or aluminum alloy. The last two digits are used to identify different aluminum alloys in the same group or to indicate the purity of the aluminum.

5.2 Naming method for pure aluminum designation

When the aluminum content is not less than 99.00%, it is pure aluminum. Its designation is represented by 1xxx series. The last two digits of the designation indicate the minimum aluminum percentage. When the minimum aluminum percentage is accurate to 0.01%, the

last two digits of the designation are the two digits after the decimal point in the minimum aluminum percentage. The second letter of the designation indicates the modification of the original pure aluminum. If the second letter is A, it means original pure aluminum. If it is other letters of B~Y, it means the

1 The international four-digit designation system for wrought aluminum and aluminum alloys refers to the designations named in accordance with the recommended method for the international designation system for wrought aluminum and aluminum alloys formulated in December 1970. This recommended method is proposed by groups or organizations from various countries in the world that recognize the declaration of the agreement on the international designation system for wrought aluminum and aluminum alloys. The registration secretariat of designations and ingredients is in the Aluminum Association of America (AA).

Annex B (normative)

Calculation of density of aluminum and aluminum alloy

B.1 Determination of the arithmetic mean of the mass fraction of each element in the tested aluminum and aluminum alloy

B.1.1 The arithmetic mean of element mass fractions shall be calculated based on element mass fraction limit values. When only the maximum limit value is specified for the mass fraction of an element, its minimum limit value is regarded as zero. The arithmetic mean shall be rounded to the number of significant digits shown in Table B.1.

Numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170.

B.1.2 For the combination of elements whose mass fraction limit is only specified by the maximum value, such as (iron + silicon), each single element is regarded as having the same mass fraction. The arithmetic mean of its mass fraction is calculated by dividing the arithmetic mean of the mass fraction of combined elements (calculated and rounded according to B.2) by the number of individual elements in the combination of elements. The calculation results are rounded to the effective digits shown in Table B.1.

Numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170.

B.1.3 The mass fraction of aluminum is greater than or equal to 99.90%. But when it is less than or equal to 99.99%, its arithmetic mean is determined by subtracting the sum of the arithmetic mean values of all elements whose mass fraction maximum limit is not less than 0.0010% from 100.00%. The arithmetic mean of the mass fraction of each element before summing shall be expressed to 0.0xx%. After summing, round the sum to 0.0x%. Numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170.

B.1.4 The mass fraction of aluminum is greater than or equal to 99.00%. But when it is less than 99.90%, its arithmetic mean is determined by subtracting the sum of the arithmetic mean values of all elements whose mass fraction maximum limit is not less than 0.010% from 100.00%. The arithmetic mean of the mass fractions of each element before summing shall be expressed to 0.0x%. Numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170.

B.1.5 When the mass fraction of aluminum is less than 99.00%, its arithmetic mean is subtracted from 100.00% by the sum of the arithmetic mean values of the mass fractions of each element. The result is rounded to the second decimal place. Numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170.

B.2.1 Calculate the density of aluminum and aluminum alloys according to the formula

(B.1). That is, multiply the arithmetic mean of the mass fraction of each element obtained by the above method by the respective corresponding coefficients given in

Table B.2 (the reciprocal value of the density). The results obtained are rounded to the third decimal place (the numerical rounding rules shall be carried out in accordance with the relevant provisions of GB/T 8170). Then add all the values. The reciprocal of the sum obtained is the calculated value of the aluminum alloy density D. The value shall be rounded as follows:

- When the minimum limit value of the mass fraction of aluminum is greater than or equal to 99.35%, the resulting value is rounded to the nearest multiple of 0.005. It is expressed as: x.xx0 or x.xx5.

- When the minimum limit value of the mass fraction of aluminum is less than 99.35%, the resulting value is rounded to the nearest multiple of 0.01. It is expressed as: x.xx.

Where,

D - The measured density of aluminum and aluminum alloys, in grams per cubic centimeter (g/cm³);

Al%, Cu%, Fe%,... - The arithmetic mean of the mass fraction of each element in the tested alloy (%);

DAI, Dcu, DFe,... - The density of each element, in grams per cubic centimeter (g/cm³).

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