



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS H 5202 : 2010

(JAA/JSA)

Aluminium alloy castings

ICS 77.150.10

Reference number : JIS H 5202 : 2010 (E)

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H 5202 : 2010

Date of Establishment: 1955-10-07

Date of Revision: 2010-03-23

Date of Public Notice in Official Gazette: 2010-03-23

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Non-Ferrous Metals

JIS H 5202 : 2010, First English edition published in 2010-12

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal of revision of Japanese Industrial Standard submitted by Japan Aluminium Association (JAA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS H 5202:1999** has been replaced with this Standard.

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Aluminium alloy castings

Introduction

This Japanese Industrial Standard has been prepared based on the fourth edition of **ISO 3522** published in 2007. While adopting the corresponding parts from the said International Standard without modifying any technical contents, this Standard also consists of preserved contents from the previous edition of **JIS H 5202**, which has conventionally and widely used.

Consequently, this Standard consists of the specifications of the aluminium alloy castings of all the types given in **ISO 3522**, excluding die-cast alloys, as well as those of the types given in the previous edition of **JIS H 5202**, all of which are classified by respective symbols. The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies aluminum alloy castings, such as permanent mould castings and sand castings (hereafter referred to as the “castings”).

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows :

ISO 3522 : 2007 *Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties* (MOD)

The symbols which denote the degree of correspondence in the contents in the corresponding International Standard and **JIS** are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0403	<i>Castings — System of dimensional tolerances and machining allowances</i>
JIS H 0001	<i>Aluminium, magnesium and their alloys — Temper designation</i>
JIS H 0321	<i>General rules for inspection of non-ferrous metal materials</i>
JIS H 1305	<i>Method for optical emission spectrochemical analysis of aluminium</i>

and aluminium alloys

- JIS H 1306 *Methods for atomic absorption spectrometric analysis of aluminium and aluminium alloys*
- JIS H 1307 *Methods for inductively coupled plasma emission spectrometric analysis of aluminium and aluminium alloys*
- JIS H 1352 *Methods for determination of silicon in aluminium and aluminium alloys*
- JIS H 1353 *Methods for determination of iron in aluminium and aluminium alloys*
- JIS H 1354 *Methods for determination of copper in aluminium and aluminium alloys*
- JIS H 1355 *Methods for determination of manganese in aluminium and aluminium alloys*
- JIS H 1356 *Method for determination of zinc in aluminium and aluminium alloys*
- JIS H 1357 *Methods for determination of magnesium in aluminium and aluminium alloys*
- JIS H 1358 *Methods for determination of chromium in aluminium and aluminium alloys*
- JIS H 1359 *Methods for determination of titanium in aluminium and aluminium alloys*
- JIS H 1360 *Methods for determination of nickel in aluminium and aluminium alloys*
- JIS H 1361 *Methods for determination of tin in aluminium and aluminium alloys*
- JIS H 1362 *Method for determination of vanadium in aluminium and aluminium alloys*
- JIS H 1363 *Methods for determination of zirconium in aluminium alloys*
- JIS H 1364 *Methods for determination of bismuth in aluminium and aluminium alloys*
- JIS H 1365 *Methods for determination of boron in aluminium and aluminium alloys*
- JIS H 1366 *Methods for determination of lead in aluminium and aluminium alloys*
- JIS Z 2201 *Test pieces for tensile test for metallic materials*
- JIS Z 2241 *Method of tensile test for metallic materials*
- JIS Z 2243 *Brinell hardness test — Test method*

3 Classification and symbols

Classification and symbols of castings are shown in table 1 and table 2.

The types of castings given in table 1 are those which have been conventionally specified in Japanese Industrial Standard, and the types given in table 2 are those specified in the corresponding International Standard.

Table 1 Classification symbols

Classification symbols	Application	Classification symbols	Application
AC1B	Sand casting • Permanent mould casting	AC4D	Sand casting • Permanent mould casting
AC2A	Sand casting • Permanent mould casting	AC5A	Sand casting • Permanent mould casting
AC2B	Sand casting • Permanent mould casting	AC7A	Sand casting • Permanent mould casting
AC3A	Sand casting • Permanent mould casting	AC8A	Permanent mould casting
AC4A	Sand casting • Permanent mould casting	AC8B	Permanent mould casting
AC4B	Sand casting • Permanent mould casting	AC8C	Permanent mould casting
AC4C	Sand casting • Permanent mould casting	AC9A	Permanent mould casting
AC4CH	Sand casting • Permanent mould casting	AC9B	Permanent mould casting

Table 2 Classification symbols (types specified in ISO 3522 : 2007)

Classification symbols	Application	Classification symbols	Application	Classification symbols	Application
Al Cu4Ti	Sand casting · Permanent mould casting	Al Si9Mg	Sand casting · Permanent mould casting	Al Si8Cu3	Sand casting · Permanent mould casting
Al Cu4MgTi	Sand casting · Permanent mould casting · LW casting	Al Si10Mg	Sand casting · Permanent mould casting	Al Si9Cu1Mg	Sand casting · Permanent mould casting
Al Cu5MgAg	Sand casting · Permanent mould casting	Al Si10Mg(Cu)	Sand casting · Permanent mould casting	Al Si12(Cu)	Sand casting · Permanent mould casting
Al Si11	Sand casting · Permanent mould casting	Al Si5Cu1Mg	Sand casting · Permanent mould casting	Al Si12CuMgNi	Permanent mould casting
Al Si12(a)	Sand casting · Permanent mould casting	Al Si5Cu3	Permanent mould casting	Al Si17Cu4Mg	LW casting
Al Si12(b)	Sand casting · Permanent mould casting · LW casting	Al Si5Cu3Mg	Permanent mould casting	Al Mg3	Sand casting · Permanent mould casting
Al Si2MgTi	Sand casting · Permanent mould casting	Al Si5Cu3Mn	Sand casting · Permanent mould casting · LW casting	Al Mg5	Sand casting · Permanent mould casting · LW casting
Al Si7Mg	Sand casting · Permanent mould casting · LW casting	Al Si6Cu4	Sand casting · Permanent mould casting	Al Mg5(Si)	Sand casting · Permanent mould casting
Al Si7Mg0.3	Sand casting · Permanent mould casting · LW casting	Al Si7Cu2	Sand casting · Permanent mould casting	Al Zn5Mg	Sand casting · Permanent mould casting
Al Si7Mg0.6	Sand casting · Permanent mould casting · LW casting	Al Si7Cu3Mg	Permanent mould casting	Al Zn10Si8Mg	Sand casting · Permanent mould casting
NOTE : "LW" indicates lost wax.					

4 Quality

4.1 Quality of castings

The castings shall be free from flaws, blowholes, inclusion and the like which may be detrimental to service. More concrete requirement may be agreed by deliberation with

the purchaser.

4.2 Chemical composition

The chemical composition of castings shall be as given in table 3 and table 4.

Table 3 Chemical composition

Unit : %

Classification symbol	Chemical composition											
	Cu	Si	Mg	Zn	Fe	Mn	Ni	Ti	Pb	Sn	Cr	Al
AC1B	4.2 to 5.0	0.30 max.	0.15 to 0.35	0.10 max.	0.35 max.	0.10 max.	0.05 max.	0.05 to 0.35	0.05 max.	0.05 max.	0.05 max.	Remainder
AC2A	3.0 to 4.5	4.0 to 6.0	0.25 max.	0.55 max.	0.8 max.	0.55 max.	0.30 max.	0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder
AC2B	2.0 to 4.0	5.0 to 7.0	0.50 max.	1.0 max.	1.0 max.	0.50 max.	0.35 max.	0.20 max.	0.20 max.	0.10 max.	0.20 max.	Remainder
AC3A	0.25 max.	10.0 to 13.0	0.15 max.	0.30 max.	0.8 max.	0.35 max.	0.10 max.	0.20 max.	0.10 max.	0.10 max.	0.15 max.	Remainder
AC4A	0.25 max.	8.0 to 10.0	0.30 to 0.6	0.25 max.	0.55 max.	0.30 to 0.6	0.10 max.	0.20 max.	0.10 max.	0.05 max.	0.15 max.	Remainder
AC4B	2.0 to 4.0	7.0 to 10.0	0.50 max.	1.0 max.	1.0 max.	0.50 max.	0.35 max.	0.20 max.	0.20 max.	0.10 max.	0.20 max.	Remainder
AC4C	0.20 max.	6.5 to 7.5	0.20 to 0.4	0.3 max.	0.5 max.	0.6 max.	0.05 max.	0.20 max.	0.05 max.	0.05 max.	0.05 max.	Remainder
AC4CH ^{a)}	0.10 max.	6.5 to 7.5	0.25 to 0.45	0.10 max.	0.20 max.	0.10 max.	0.05 max.	0.20 max.	0.05 max.	0.05 max.	0.05 max.	Remainder
AC4D	1.0 to 1.5	4.5 to 5.5	0.4 to 0.6	0.5 max.	0.6 max.	0.5 max.	0.3 max.	0.2 max.	0.1 max.	0.1 max.	0.05 max.	Remainder
AC5A	3.5 to 4.5	0.7 max.	1.2 to 1.8	0.1 max.	0.7 max.	0.6 max.	1.7 to 2.3	0.2 max.	0.05 max.	0.05 max.	0.2 max.	Remainder
AC7A	0.10 max.	0.20 max.	3.5 to 5.5	0.15 max.	0.30 max.	0.6 max.	0.05 max.	0.20 max.	0.05 max.	0.05 max.	0.15 max.	Remainder
AC8A	0.8 to 1.3	11.0 to 13.0	0.7 to 1.3	0.15 max.	0.8 max.	0.15 max.	0.8 to 1.5	0.20 max.	0.05 max.	0.05 max.	0.10 max.	Remainder
AC8B	2.0 to 4.0	8.5 to 10.5	0.50 to 1.5	0.50 max.	1.0 max.	0.50 max.	0.10 to 1.0	0.20 max.	0.10 max.	0.10 max.	0.10 max.	Remainder
AC8C	2.0 to 4.0	8.5 to 10.5	0.50 to 1.5	0.50 max.	1.0 max.	0.50 max.	0.50 max.	0.20 max.	0.10 max.	0.10 max.	0.10 max.	Remainder
AC9A	0.50 to 1.5	22 to 24	0.50 to 1.5	0.20 max.	0.8 max.	0.50 max.	0.50 to 1.5	0.20 max.	0.10 max.	0.10 max.	0.10 max.	Remainder
AC9B	0.50 to 1.5	18 to 20	0.50 to 1.5	0.20 max.	0.8 max.	0.50 max.	0.50 to 1.5	0.20 max.	0.10 max.	0.10 max.	0.10 max.	Remainder
Chemical analysis of elements not given in the table shall be made only upon request from the purchaser. NOTE : Modifying or refining elements are, for example, Na, Sr, Sb and P. Note ^{a)} Elements not given in this table shall only be contained up to 0.05 % individually, and up to 0.15 % totally. This requirement does not apply to modifying or refining elements.												