JIS

Methods for Atomic Absorption Spectrometric Analysis of Aluminium and Aluminium Alloys

JIS H 1306:1999

Modified on August 20, 1999

Reviewed by Japanese Industrial Standards Committee

(Issued by Japanese Standards Association)

Foreword

The standard is the Japanese Industrial Standard modified by the Minister of International Trade and Industry according to the provisions of the Industrial Standardization Law, after being reviewed by Japanese Industrial Standards Committee. According to the above procedures, we modified JIS H 1306:1992 and replaced the above industrial standards.

This modification integrated the international standards ISO 3256:1977 (Aluminium and aluminium alloys-Determination of magnesium-Atomic absorption spectrophotometric method) and ISO 5194:1981 (Aluminium and aluminium alloys-Determination of zinc content-Flame atomic absorption spectrophotometric method) for magnesium and zinc, which are the components of the nine quantitative elements used for implementing the test on the methods for atomic absorption spectrographic analysis. It also stipulated the quantitative method of iron, manganese and bismuth that did not stipulate in the International Standard additionally.

Besides, it did not adopt the quantitative methods of the methods for atomic absorption spectrographic analysis of four elements stipulated in ISO 3980 (quantitative of copper), ISO 3981 (quantitative of nickel), ISO 4192 (quantitative of lead) and ISO 4193 (quantitative of chrome), for it needs mercury in the decomposition of samples, which will be stipulated in other methods.

Japanese Industrial Standards

JIS

H 1306:1999

Methods for atomic absorption spectrometric analysis of aluminium and aluminium alloys

Introduction

The international standards which corresponding to the standard are ISO 3256 (Aluminium and aluminium alloys-Determination of magnesium-Atomic absorption spectrophotometric method), ISO 3980 (Aluminium and aluminium alloys-Determination of copper-Atomic absorption spectrophotometric method), ISO 3981 (Aluminium and aluminium alloys-Determination of nickel-Atomic absorption spectrophotometric method) initially issued in 1977 and ISO 4192 (Aluminium and aluminium alloys-Determination of lead content-Flame atomic absorption spectrophotometric method), ISO 4193 (Aluminium and aluminium alloys-Determination of chromium content-Flame atomic absorption spectrophotometric method), ISO 5194 (Aluminium and aluminium alloys-Determination of zinc content-Flame atomic absorption spectrophotometric method) initially issued in 1981; among which, the standards of ISO 3980, ISO 3981, ISO 4192 and ISO 4193 has not been adopted, for it needs mercury in the decomposition of samples; the corresponding parts of ISO 3256 and ISO 5194 retained their original technical contents and became the Japanese Industrial Standards directly.

Besides, it also formulated the international standard corresponding to iron, manganese and bismuth that did not formulate in the international standard, and it also additionally stipulated the quantitative method of methods for atomic absorption spectrographic analysis of four elements stipulated in ISO 3980 (quantitative of copper), ISO 3981 (quantitative of nickel), ISO 4192 (quantitative of lead) and ISO 4193 (quantitative of

chrome), for it needs mercury in the decomposition of samples, which will be stipulated in other methods.

1. Scope

The standard stipulates the Methods for atomic absorption spectrometric analysis of aluminium and aluminium alloys.

Remarks and the international standards corresponding to the standard are as follows:

ISO 3256:1977 Aluminium and aluminium alloys-Determination of magnesium-Atomic absorption spectrophotometric method

ISO 3980:1977 Aluminium and aluminium alloys-Determination of copper-Atomic absorption spectrophotometric method

ISO 3981:1977 Aluminium and aluminium alloys-Determination of nickel-Atomic absorption spectrophotometric method

ISO 4192:1981 Aluminium and aluminium alloys-Determination of lead content-Flame atomic absorption spectrophotometric method

ISO 4193:1981 Aluminium and aluminium alloys-Determination of chromium content-Flame atomic absorption spectrophotometric method

ISO 5194:1981 Aluminium and aluminium alloys-Determination of zinc content-Flame atomic absorption spectrophotometric method

2. Normative references

The following standards become a part of the standard after being quoted, and these quoted standards apply to the latest edition.

JIS H 1351 General rules for chemical analysis of aluminium and aluminium alloy

JIS K0121 General rules for atomic absorption spectrometry

3. General matter

General matter common to the chemical analysis shall be in accordance with JIS H 1351 and JIS K 0121.

4. Determining elements and determining ranges

The determining elements and the determining ranges shall be as given in Table 1.

Table 1—Determining elements and determining ranges

Determining element	Determining range % (m/m)
Iron	0.005 -- 1.5
Copper	0.005 -- 5.0
Manganese	0.005 -- 1.5
Zinc	0.005 -- 6.0
Magnesium	0.005 -- 5.0
Chromium	0.01 -- 0.5
Nickel	0.005 -- 3.0
Bismuth	0.1 -- 1.0
Lead	0.1 -- 1.0

NOTE: In table 1, The quantitative range, accuracy and precisian can expand to the lower limiting value of about 0.002% (in/in)

5. Method for determination of iron

5.1 Summary

After decomposing a sample with hydrochloric acid and hydrogen peroxide, atomize the solution into the air-acetylene flame of an atomic absorption photometer, and measure the absorbance.

5.2 Reagents

The reagents shall be as follows:

a) Hydrochloric acid (1+1)

b) Nitric acid (1+1)

c) Hydrofluoric acid

d) Aluminium, aluminium of which the purity is as high as possible without containing iron, or aluminium of which the iron content is known and is as low as possible.

e) Hydrogen peroxide

f) Tin solution; Weigh out 0.1g of tin [99.9% (m/m)] or over, transfer into a beaker (200ml), add 30ml of hydrochloric acid (1+1), and decompose by heating at 50℃ to 80℃ making platinum contact therewith. After cooling to ordinary temperature, make

up to 100ml in the quantity of solution with hydrochloric acid (1+5).

g) Nickel solution; Weigh out 0.1 g of nickel [99.9 % (m/m) or over], transfer into a beaker (200 ml), add 10 ml of nitric acid (1 + 1), and decompose by gently heating. After cooling to ordinary temperature, make up to 100 ml in the quantity of solution with water.

h) Standard iron solution A (1000 μg Fe/ml) Weigh out 1,000 g of iron [99.9 % (m/m) or over], transfer into a beaker (200 ml), cover with a watch glass, add 30 ml of nitric acid (1 + 1), and decompose by gently heating. After cooling to ordinary temperature, wash the bottom surface of the watch glass and the inner wall of the beaker with water, and remove the watch glass. Transfer the solution into a 1000 ml volumetric flask by using water, and dilute to the mark with water to make the standard iron solution A.

i) Standard iron solution B (100 μg Fe/ml); Dilute a necessary quantity of standard iron solution A [(h)] accurately 10 times with water every service, to make the standard iron solution B.

5.3 Weighing out quantity of sample

The weighing out quantity of a sample shall be 1.00g. The measures value is about 1mg

5.4 Operation

5.4.1 Preparation of sample solution

Prepare sample solution in accordance with the following procedure:

a) Weigh out a sample, and transfer into a beaker (300ml).

b) Cover with a watch glass, add 30 ml of hydrochloric acid (1 + 1), and decompose by gently heating (1). Add 1 ml of hydrogen peroxide to this solution (2), and decompose the sample thoroughly by heating (3), (4). After cooling to ordinary temperature, wash the bottom surface of the watch glass and the inner wall of the beaker with water, and remove the watch glass. Transfer the solution into a 100 ml volumetric flask by using water, and dilute to the mark with water.

c) Partially take the solution into a 100 ml volumetric flask in accordance with Table 2 corresponding to the iron content in the sample, and dilute to the mark with water (5).

7. Method for determination of manganese

7.1 Summary

After decomposing a sample with hydrochloric acid and hydrogen peroxide, atomize the solution into the air-acetylene flame of an atomic absorption photometer, and measure the absorbance.

7.2 Reagents

The reagents shall be as follows:

a) Hydrochloric acid (1 + 1)

b) Nitric acid (1 + 1)

c) Hydrofluoric acid

d) Aluminium, Aluminium which is as high in purity as possible without containing manganese, or aluminium of which the manganese is as low as possible.

e) Hydrogen peroxide

f) Tin solution; As described in 5.2 (f).

g) Nickel solution; As described in 5.2 (g).

h) Standard manganese solution A (1000 μg Mn/ml); Weigh out 1,000 g of manganese [99.9 % (m/m) or over], transfer into a beaker (200 ml), cover with a watch glass, add 30 ml of hydrochloric acid (1 + 1), and decompose by gently heating. After cooling to ordinary temperature, wash the bottom surface of the watch glass and the inner wall of the beaker with water, and remove the watch glass. Transfer the solution into a 1000 ml volumetric flask by using water, and dilute to the mark with water to make the standard manganese solution A.

i) Standard manganese solution B (100 μg Mn/ml); Dilute a necessary quantity of standard manganese solution A [(h)] accurately 10 times with water at each time of use to make the standard manganese solution B.

7.3 Weighing out quantity of sample

The weighing out quantity of a sample shall be 1.00 g. The measures value is about 1mg.

7.4 Operation

7.4.1 Preparation of sample solution

Prepare the sample solution in accordance with the following procedure:

Interpretation for Atomic Absorption Spectroscopy of Aluminium and Aluminium Alloys

This interpretation is to explain the items specified in the Standard and other relevant matters, but it is not a part of this Standard.

I. Process of this amendment The industrial standards of Al and aluminium alloys Atomic Absorption Spectroscopy was formulated in 1974 and later amended in 1992, which expanded the upper limit of Range of application of Cu, Zn, Mg and Ni so as to unify itself with ISO standard.

II. The purpose and process of this amendment The Atomic Absorption Spectroscopy was revised in 1992, which is partially integrated with ISO standards. The purpose of this amendment is to fully integrate JIS standard with ISO standard.

Therefore, in 1997, entrusted by Industrial Technology Research Institute, Corporation Aggregate Light Metal Association set up formulation committee for drafting amendment of JIS Al analysis method, which conducted investigation and research according to previous standards and examine the draft. This draft amendment was reported to Industrial Technology Research Institute in March, 1998. The Industrial Technology Research Institute carried out deliberation and vote in the 137th Investigation Meeting of Japanese Industrial Standards Committee (JISC), which was held on February 19, 1999.

III. The main contents and reasons of this amendment The Atomic Absorption Spectroscopy of ISO standard is an international standard corresponded with other six standards such as ISO3256:1977 (the first edition, issued in 1977) 1977，Aluminium and aluminium alloys-Determination of magnesium-Atomic absorption spectrophotometric method, ISO 3980: 1977, Aluminium and aluminium alloys-Determination of copper-Atomic absorption spectrophotometric method, ISO 3981: 1977, Aluminium and aluminium alloys-Determination of nickel-Atomic absorption spectro・photometric method and ISO 4192:1981 (the first edition, issued in 1981) Aluminium and aluminium alloys-Determination of lead content-Flame atomic absorption spectrophotometric method, ISO 4193: 1981, Aluminium and aluminium alloys-Determination of chromium content-Flame atomic absorption spectrophotometric method， ISO 5194 : 1981, Aluminium and aluminium alloys-Determination of zinc content-Flame atomic absorption

When JIS standard errata are issued, the following main points shall be obeyed.

(1) The monthly publication "Standardized publication" issued by this association published the right and wrong contents.

(2) In the third Tuesday of every month, it will notice the "JIS standard serial number and the standard name of the published errata" in the advertising column issued by JIS in the "Nikkei Industry News" and "Nikkan Industry News".

If you want to obtain the errata, please contact the following address (universal), and we will send them to you.

For people booking the JIS of this association, when the booked department issues the errata, we will automatically send them to you.

JIS H 1306 Atomic Absorption Spectroscopy of Aluminium and Aluminium Alloys
The first version published on October 31, 1999

Editor and publisher Hirakawa Kimio
The publishing institute
Consortium Corporation Japan Standards Association
Postal code Chome 1-24, Akasaka 4, Tokyo metropolitan area, 107-8440
Tel Tokyo (03)3583-8071 (Standard published)
Fax Tokyo (03)3582-3372
Tel Tokyo (03)3583-8002 (Universal)
Fax Tokyo (03)3582-0462
Transfer account: 00160-2-195146

Sapporo branch Postal code 060-0003 Inside the Sapporo Datong Life Building, North 3, West 3 Chome 1 of Sapporo central area
Tel Sapporo (011)261-0045 FAX Sapporo (011)221-4020
Transfer account: 02760-7-4351

Northeast branch Postal code 980-0014 Inside the Guangongshi Hall of Miyagi-ken, Chome 5-22, Motomachi 3, Aoba-ku, Sendai
Tel Sendai (022)227-8336 FAX Sendai (022)266-0905 (representative)
Transfer account: 02200-4-0166

Nagoya branch Postal code 460-0008 Inside the Baichuan Building Chome 6-12, Rong 2, Downtown Area, Nagoya
Tel Nagoya (052) 221 -8316 FAX Nagoya (052)203-4806 (representative)
Transfer account: 00800-2-23283

Kansai branch Postal code 541-0053 Inside the Motomachi Nomura Building, Motomachi 3, Chome 4-10, Downtown Central Area, Osaka
Tel Osaka (06)6261 8086 FAX Osaka (06)6261-9114 (representative)
Transfer account: 00910-2-2636

Hiroshima branch Postal code 730-0011 Inside the Hiroshima business conference building, Motomachi 5-44, Downtown Area of Hiroshima
Tel Hiroshima (082)221-7023, 7035, FAX Hiroshima (082)223-7568

7036
Transfer account: 01340-9-9479
Shikoku branch Postal code 760-0023 Inside the Sumitomo Life Takamatsu Kotobukicho Building Chome 2-10, Kotobukicho 2, Takamatsu
Tel Takamatsu (087)821-7851 FAX Takamatsu (087)821-3261
Transfer account: 01680-2-3359
Fukuoka branch Postal code 812-0025 Inside the Tokyo Life Fukuoka Building, Tenyamachi 1-31, Hakata Area, Fukuoka
Tel Fukuoka (092)282-9080 FAX Fukuoka (092)282-9118
Transfer account: 01790-5-21632

Japan HIGH-COM Printed and bound by Kabuskiki Kaisha Printed in Japan

JAPANESE INDUSTRIAL STANDARD

Methods for atomic absorption spectrometric analysis of

JIS H 1306: 1999

Revised 1999-08-20

Investigated by

Japanese Industrial Standards Committee

Published by

Japanese Standards Association

Price: 2000 YEN

ICS 77. 120. 10

Descriptors: atomic absorption spectrophotometry, absorption spectrophotometry, aluminium, non-ferrous metals, all alloys, non-ferrous alloys, light alloys, determination of content

Reference number: JIS H 1306: 1999 (J)

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------