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JIS G 1312-5 : 2011

(JFA/JSA)

**Method for chemical analysis of ferrosili-  
con — Part 5: Methods for determination  
of aluminium content**

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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 established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by the Japan Ferroalloy Association (JFA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Consequently **JIS G 1312:1998** has been withdrawn and partially replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public or utility model right. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public or utility model right.

**JIS G 1312** series consists of the following 6 parts under the general title "*Method for chemical analysis of ferrosilicon*":

*Part 1: Methods for determination of silicon content*

*Part 2: Methods for determination of carbon content*

*Part 3: Methods for determination of phosphorus content*

*Part 4: Methods for determination of sulfur content*

*Part 5: Methods for determination of aluminium content*

*Part 6: Methods for determination of titanium content*

## Method for chemical analysis of ferrosilicon — Part 5 : Methods for determination of aluminium content

### Introduction

**JIS G 1312** was established in 1953 and was revised for the fifth time in 1998. This time, to correspond to the progress in the analytical technology, **JIS G 1312** : 1998 is withdrawn and partially replaced with this Japanese Industrial Standard, which is established as the methods for determination of aluminium content.

This Standard has been prepared based on the first edition of **ISO 4139** published in 1979 with some modifications of the technical contents to correspond to the actual situation in Japan.

The portions given sidelines or dotted underlines are the matters not given in the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

### 1 Scope

This Standard specifies the methods for determination of aluminium content in ferrosilicon.

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

ISO 4139 : 1979 *Ferrosilicon — Determination of aluminium content — Flame atomic absorption spectrometric method* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant 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 G 1301 *Ferroalloys — General rules for chemical analysis*

JIS K 8001 *General rule for test methods of reagents*

### 3 General

General matters common to the chemical analysis method shall be in accordance with JIS G 1301.

#### 4 Classification of determination method

The determination methods of aluminium content shall be according to any of the following.

- a) **Disodium dihydrogen ethylenediamine tetraacetate-copper back titration method after iron separation** This method is applicable to the sample of 0.05 % (mass fraction) or over up to and including 3.0 % (mass fraction) in aluminium content.
- b) **Atomic absorption spectrometry** This method is applicable to the sample of 0.02 % (mass fraction) or over up to and including 5.0 % (mass fraction) in aluminium content.
- c) **ICP atomic emission spectroscopy** This method is applicable to the sample of 0.01 % (mass fraction) or over up to and including 3.0 % (mass fraction) in aluminium content.

#### 5 Disodium dihydrogen ethylenediamine tetraacetate-copper back titration method after iron separation

##### 5.1 Summary

Decompose the sample with nitric acid and hydrofluoric acid. Add sulfuric acid, generate white fume of sulfuric acid by heating, and remove nitric acid and hydrofluoric acid. After adding hydrochloric acid and dissolving the salts, extract and remove most part of iron with 4-methyl-2-pentanone. Adjust pH and add disodium ethylenediamine tetraacetate (hereafter referred to as "EDTA2Na") solution for masking of residual iron by using sulfosalicylic acid as the indicator. Adjust pH, add a definite amount of EDTA2Na solution to generate EDTA complex of aluminium, and titrate excessive EDTA2Na with copper solution by using 1-pyridylazo-2-naphthol copper (hereafter referred to as "Cu-PAN") as the indicator.

##### 5.2 Reagents

Reagents shall be as follows.

##### 5.2.1 Hydrochloric acid (7 + 5)

##### 5.2.2 Nitric acid

##### 5.2.3 Nitric acid (1 + 1)

##### 5.2.4 Perchloric acid

##### 5.2.5 Hydrofluoric acid

##### 5.2.6 Sulfuric acid (1 + 1)

##### 5.2.7 Iron That of 0.001 % (mass fraction) or under in aluminium content rate.

##### 5.2.8 Sodium disulfate

##### 5.2.9 Sodium carbonate

##### 5.2.10 Boric acid