

JIS

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS H 1272 : 1998

Methods for determination of copper in nickel and nickel alloys

ICS 77.120.40

Descriptors : nickel, nickel alloys, castings, copper, quantitative analysis, chemical analysis and testing

Reference number : JIS H 1272 : 1998 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS H 1272 : 1988** is replaced with **JIS H 1272 : 1998**.

In this revision, in order to make comparison with **ISO**, preparation of **JIS** agreeing with **ISO**, and proposal of the draft of **ISO** based on the **JIS** easy, **ISO 6351 : 1985**, *Nickel—Determination of silver, bismuth, cadmium, cobalt, copper, iron, manganese, lead and zinc contents—Flame atomic absorption spectrometric method*, **ISO 7530-1 : 1990**, *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 1 : General requirements and sample dissolution*, and **ISO 7530-4 : 1990**, *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 4 : Determination of copper content* are made a part of this Standard.

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Date of Establishment: 1988-08-01

Date of Revision: 1998-08-20

Date of Public Notice in Official Gazette: 1998-08-20

Investigated by: Japanese Industrial Standards Committee
Divisional Council on Non-Ferrous Metals

JIS H 1272 : 1998, First English edition published in 1999-10

Translated and published by: Japanese Standards Association
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Printed in Japan

Methods for determination of copper in nickel and nickel alloys

Introduction This Standard is a Japanese Industrial Standard so prepared as to conform in technical contents to corresponding parts of corresponding International Standards **ISO 6351** : 1985, *Nickel—Determination of silver, bismuth, cadmium, cobalt, copper, iron, manganese, lead and zinc contents—Flame atomic absorption spectrometric method*, **ISO 7530-1** : 1990, *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 1 : General requirements and sample dissolution*, and **ISO 7530-4** : 1990, *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 4 : Determination of copper content* (a part on determination of copper for **ISO 6351** and all for **ISO 7530-4**).

Further, one determining method without having any corresponding International Standard is specified as **JIS**.

1 Scope This Standard specifies the methods for determination of copper in nickel and nickel alloys.

Remarks : Corresponding International Standards to this Standard are given as follows.

ISO 6351 : 1985 *Nickel—Determination of silver, bismuth, cadmium, cobalt, copper, iron, manganese, lead and zinc contents—Flame atomic absorption spectrometric method*

ISO 7530-1 : 1990 *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 1 : General requirements and sample dissolution*

ISO 7530-4 : 1990 *Nickel alloys—Flame atomic absorption spectrometric analysis—Part 4 : Determination of copper content*

2 Normative reference The following standard contains provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standard indicated below shall be applied.

JIS H 1270 *General rules for chemical analysis of nickel and nickel alloys*

3 General matters General matters common to the methods for chemical analysis shall be in accordance with **JIS H 1270**.

4 Classification of determination methods The method for determination of copper shall be in accordance with any one of the following methods and a sample applied to each determination method shall be as given in Table 1.

- a) **Copper electrogravimetric method** This method applies to the sample of 20 % (m/m) or over up to and including 50 % (m/m) copper content.
- b) **Flame atomic absorption spectrometric method (method A)** This method applies to the sample of 0.01 % (m/m) or over up to and including 2.0 % (m/m) copper content.

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- c) **Flame atomic absorption spectrometric method (method B)** This method applies to the sample of 0.01 % (m/m) or over up to and including 4.0 % (m/m) copper content.

Table 1 Determination method and material to be applied

Sample name		Determination method		
Alloy number	Alloy symbol	Copper electro-gravimetric method	Flame atomic absorption spectrometric method (method A)	Flame atomic absorption spectrometric method (method B)
NW2200	Ni99.0		○	○
NW2201	Ni99.0-LC		○	○
	NATA		○	○
NW4400	NiCu30	○		
NW4402	NiCu30-LC	○		
NW5500	NiCu30Al3Ti	○		
NW6007	NiCr22Fe20Mo7Cu2Nb			○
NW6985	NiCr22Fe20Mo6Cu			○
Nickel castings			○	○
Nickel + copper alloy castings		○		

5 Copper electrogravimetric method

5.1 Summary After decomposing a sample with mixed acid of nitric acid and sulfuric acid, the sample solution is electrolyzed by using a platinum electrode. Copper is deposited at a cathode and the mass thereof is measured.

5.2 Reagents The reagents shall be as follows.

- Nitric acid (1+1)
- Mixed acid (1 part of nitric acid, 2 parts of sulfuric acid, and 5 parts of water by volume)
- Ethanol (95)

5.3 Appliances The appliances shall be as follows.

- Cylindrical platinum electrode Generally use that as given in Fig. 1.
- Spiral platinum anode Generally use that as given in Fig. 2.
- Semicircular watch glass Generally use that as given in Fig. 3.