

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 1017-a

No. +++



Stainless Steel for EPMA

This certified reference material (CRM) is produced in accordance with the NMIJ's management system and is in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended for use in the calibration of the concentration of elements during the electron probe micro analyzer (EPMA) analysis of Cr, Ni and Fe in stainless steels.

Certified Values

The certified values for Cr, Ni and Fe in this CRM are given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

	CAS No.	Certified value, Mass fraction (%)	Expanded uncertainty, Mass fraction (%)
Cr	7440-47-3	25.029	0.066
Ni	7440-02-0	20.081	0.075
Fe	7439-89-6	54.833	0.144

Analysis

The certified values of this CRM were based on the results of the following analytical methods:

- (1) Titration analysis
- (2) EPMA analysis

(accelerating voltage: 20 kV, beam diameter: 1.4 μm)

The characteristic value was determined by titration analysis. The standard uncertainty for the certified value of this CRM includes the uncertainty due to titration analysis, the uncertainty due to EPMA analysis and the homogeneity between specimens determined by EPMA analysis.

Metrological Traceability

The certified values were determined by titration as the primary method of measurement with the NMIJ primary standard solutions of Cr, Ni and Fe. It is traceable to the International System of Units (SI).

Expiration of Certification

This certificate is valid for one year from the date of shipment, provided that the material is stored in accordance with the instructions given in this certificate.

Description of the material

This CRM is in the form of a rectangular tip with 3 mm by 10 mm by 10 mm, kept in a plastic container.

Homogeneity

The homogeneity of this CRM was determined by analyzing 5 times at each 20 randomly selected points of each of 6 randomly selected specimens from 130 specimens using the EPMA analysis. The variance between specimens is reflected in the uncertainty of the certified values.

Date of Shipment: XXXXX XX, 20XX

1017a00-070521-211125

Instructions for Storage

This CRM should be kept in dry and clean atmosphere such as desiccator at a temperature between 5 °C and 35 °C.

Instructions for Use

When used for EPMA measurement, use mirror polished surface. From the viewpoint of homogeneity, the certified value of this standard substance is a value representing the whole sample. When using for EPMA measurement, point analysis should be performed for multiple positions and the average value should be used.

Precautions for Handling

In order to avoid surface contamination of the CRM, appropriate tools such as clean gloves and tweezers should be used in handling. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

This CRM was made by Sumitomo Metal Technology, Inc. High purity electrolytic chromium, nickel and iron were mixed. High purity graphite carbon was added to avoid a formation of oxide. The specimens were produced from several procedures (dissolution by induction furnace in vacuum, hot forging, hot rolling and annealing).

NMIJ Analysts

Technical managers for this CRM are FUJIMOTO T. and HIOKI A. The production manager is TERAUCHI S. The analysts are HIOKI A. and TERAUCHI S.

Information

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the registered customers. Customer registration on the NMIJ Website (given below) will facilitate notification. Technical reports regarding this CRM can be obtained from the contact details given below.

Reproduction of Certificate

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:
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Revision history

April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."

November 12, 2015: The description in "Expiration of Certification" was changed to "one year from the date of shipment."