National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 1020-a
No. +++
High Nickel Alloy for EPMA

This certified reference material (CRM) was produced in accordance with the NMIJ’s management system and in compliance with ISO Guide 34:2000 and ISO/IEC 17025:2005. 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 high Nickel Alloy.

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 half-width of the expanded uncertainty interval calculated using a coverage factor (k) of 2, which gives a level of confidence of approximately 95 %.

<table>
<thead>
<tr>
<th>Element</th>
<th>Certified value (Mass Fraction)</th>
<th>Expanded uncertainty (Mass Fraction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cr</td>
<td>29.846 %</td>
<td>0.082 %</td>
</tr>
<tr>
<td>Ni</td>
<td>60.054 %</td>
<td>0.133 %</td>
</tr>
<tr>
<td>Fe</td>
<td>10.030 %</td>
<td>0.036 %</td>
</tr>
</tbody>
</table>

Analytical Methods
The certified values were based on the results of the following analytical methods:

1) Titration analysis
2) Electron probe micro analyzer (EPMA) analysis
   (accelerating voltage: 20kV, beam diameter: 1.5 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 a primary method of measurement with 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.

Sample Form
This CRM is in the form of a rectangular tip with 3 mm × 10 mm × 15 mm, packaged in a plastic container.

Homogeneity
The homogeneity of this CRM was determined by analyzing 6 specimens selected randomly from 130 specimens using the EPMA analysis. The variance between specimens is reflected in the uncertainty of the certified values.
Date of Shipment: 20xx.xx.xx

Instructions for Storage
After rinsing the alloy surface with acetone or the like, this CRM should be kept in dry and clean atmosphere such as desiccator at room temperature.

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
Refer to the safety data sheet (SDS) on this CRM before use.

Preparation Method
This CRM was made by Sumitomo Metal Technology, Inc. High purity electrolytic iron, chromium and nickel 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 I. Kojima and A. Hioki. The production manager is S. Terauchi. The analysts are A. Hioki, S. Terauchi, and M. Ito.

Technical Information
Customer registration on the NMIJ Website (given below) will facilitate notification of any revisions of the information given above. 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, 2015
Ryoji Chubachi
President
National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:
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Phone: +81-29-861-4059; Fax: +81-29-861-4009, https://www.nmij.jp/english/service/C/

Revision record
April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”
February 13, 2018: The description in “Expiration of Certification” was changed to “one year from the date of shipment.”