

Certified Reference Material

Certificate of Analysis

Product ID: IARM-NIG30-22

ISO
17034:2016

ISO/IEC
17025:2017

ISO
9001:2015

Product Description: Nickel Alloy, Nickel Chromium, Alloy G-30 / N06030

Revision No.: 000
 Revision Date: 01/17/2024

Description and Intended Use: This **Certified Reference Material** is covered under the scope of accreditation to **ISO 17034** by LGC Standards - Manchester, NH. As an ISO 17034 certified reference material, appropriate use of this material will fulfill the certified reference material and traceability requirements for use in **ISO 17025** accredited laboratories. This CRM may come in the form of a solid disk, or chips. The intended use of this CRM may include, but is not limited to, the calibration of instruments and the validation of analytical methods.

Certified Values listed in wt.% with associated uncertainties

Al	0.186 ± 0.007	B	0.0011 ± 0.0004	C	0.0177 ± 0.0006	Co	0.18 ± 0.01
Cr	29.2 ± 0.1	Cu	1.31 ± 0.02	Fe	15.5 ± 0.2	Mn	0.96 ± 0.02
Mo	5.13 ± 0.07	N	0.046 ± 0.003	Nb	0.85 ± 0.03	Ni	44.6 ± 0.7
O	0.0024 ± 0.0007	P	0.0108 ± 0.0006	S	0.0005 ± 0.0002	Si	0.47 ± 0.02
Sn	0.0020 ± 0.0003	Ti	0.140 ± 0.006	V	0.035 ± 0.002	W	1.43 ± 0.03

Indicative Values listed in ppm

Mg 8 Ta 30 Zr 19

Homogeneity and Uncertainty: "Uncertainty" values, as reported adjacent to certified concentration values, are based on a 95% Confidence Interval. These estimated uncertainties include the combined effects of method imprecision, material inhomogeneity, and any bias between methods. Homogeneity data from experimental XRF results are reflected in both the overall statistics and certified data. Homogeneity samples are selected by a systematic sampling procedure. The number of samples may be determined by equation 1, where N_{prod} is the number of units produced and N_{min} is the number of samples used for homogeneity testing. These samples are arranged in a simple randomized design such that each sample is analyzed multiple times by XRF. Homogeneity may also be determined within sample using an applied version of ASTM E826. A single factor ANOVA is used to calculate uncertainty due to inhomogeneity (U_{hom}). Uncertainty of the material is calculated by equation 2, where $H=U_{hom}$, S = Standard deviation, t = t-value at 95% CI, and n = number of observations.

$$1. N_{MIN} = \max(10, \sqrt[3]{N_{PROD}})$$

$$2. U_{CRM} = \frac{\sqrt{H^2 + S^2}}{\sqrt{n}} * t$$

Certification Laboratories: Much of the analytical work performed to assess this material has been carried out by laboratories with proven competence, as indicated by their accreditation to ISO 17025. It is an implicit requirement for this accreditation that analytical work should be performed with due traceability, via an unbroken chain of comparisons, each with stated uncertainty, to primary standards such as the mole, or to nationally- or internationally-recognised reference materials. Of the individual results herein, some have traceability (to the mole) via primary analytical methods. Some are traceable to substances of known stoichiometry. Most have traceability via commercial solutions. Furthermore, some results have additional traceability to NIST standards, as part of the analytical calibration or process control.

- Anderson Laboratories, Inc. - Greendale, WI
- IMR Test Labs - Lansing, NY
- NSL Analytical Services - Cleveland, OH
- Dirats Laboratories - Westfield, MA
- Instytut Metalurgii Zelaza - Gliwice, Poland
- SGS MSi - Melrose Park, IL
- EAG Laboratories - Liverpool, NY
- Laboratory Testing, Inc. - Hatfield, PA
- Sheffield Assay Office - Sheffield, England
- Elemental Analysis Inc. - Lexington, KY
- LGC Standards - Manchester, NH
- TEC Eurolab - Campogalliano, Italy

Instructions for Use: The test surface is on the opposite side of the labeled surface, which includes the material identification. The entire thickness of the unit is certified. However, the user is cautioned not to measure disks less than 2 mm thick when using X-ray fluorescence spectrometry. Each packaged disk has been prepared by finishing the test surface using a lathe. The user must determine the correct surface preparation procedure for each analytical technique. The user is cautioned to use care when either resurfacing the disk or performing additional polishing, as these processes may contaminate the surface. The minimum sample size for chips should be individually evaluated based on the analytical technique used; this would typically be greater than 0.1 grams. The material should be stored in a cool, dry location when not in use.

Chips are not recommended for gas analysis.

Period of Validity: The certification of this material is valid indefinitely, within the uncertainty specified, provided the material is handled and stored in accordance with the instructions stated on this certificate. The certification is nullified if the material is damaged, contaminated, otherwise modified, or used in a manner for which it was not intended.



Chuck Goudreau, Certifying Officer

17 January 2024
 Certification Date



ISO 17034 Accredited: Reference Materials
 Producer, Certificate # 2848.02
 ISO/IEC 17025 Accredited: Chemical
 Testing, Certificate # 2848.01



Conditions of Sale and Supply: All CRMs & RMs sold are subject to applicable LGC Standard Terms and Conditions of Sale.

The following data represents all pertinent information reported as it applies to the chemical characterization of this material.

	Al	B	C	Co	Cr	Cu	Fe	Hf	Mg	Mn	Mo	N	Nb
1	0.1590	0.0004	0.0164	0.1480	28.82	1.255	14.75	<0.005	0.0003	0.8840	4.886	0.0391	0.7580
2	0.1737	0.0005	0.0170	0.1540	29.00	1.275	15.16		0.0006	0.8997	4.923	0.0405	0.7880
3	0.1740	0.0008	0.0173	0.1547	29.02	1.281	15.24		0.0007	0.9040	5.068	0.0451	0.8107
4	0.1780	0.0011	0.0173	0.1670	29.05	1.285	15.36		0.0009	0.9607	5.100	0.0458	0.8260
5	0.1800	0.0012	0.0176	0.1690	29.13	1.294	15.38		0.0017	0.9620	5.120	0.0460	0.8570
6	0.1840	0.0012	0.0177	0.1710	29.17	1.300	15.51		<0.0010	0.9650	5.125	0.0470	0.8590
7	0.1840	0.0015	0.0180	0.1780	29.21	1.300	15.54		<0.005	0.9710	5.133	0.0477	0.8630
8	0.1870	0.0016	0.0185	0.1793	29.27	1.303	15.56		<0.005	0.9730	5.152	0.0480	0.8710
9	0.1920	0.0018	0.0187	0.1800	29.27	1.309	15.57			0.9800	5.163	0.0503	0.8760
10	0.1934	<0.005	0.0188	0.1850	29.33	1.312	15.63			0.9840	5.169	0.0510	0.8780
11	0.1940	<0.005		0.1910	29.34	1.323	15.63			0.9890	5.194		0.8800
12	0.1981			0.1931	29.36	1.347	15.74			0.9980	5.210		0.8843
13	0.1987			0.1990	29.45	1.354	16.30			1.0021	5.276		0.8901
14	0.2060			0.2020		1.400	16.33			1.0060	5.367		0.9200
Mean	0.1859	0.0011	0.0177	0.1765	29.19	1.310	15.55		0.0008	0.9628	5.135	0.0461	0.8544
STDV	0.0124	0.0005	0.0008	0.0169	0.18	0.037	0.41		0.0005	0.0391	0.123	0.0038	0.0438
Certified	0.186	0.0011	0.0177	0.18	29.2	1.31	15.5		(0.0008)	0.96	5.13	0.046	0.85
U _{CRM}	0.007	0.0004	0.0006	0.01	0.1	0.02	0.2			0.02	0.07	0.003	0.03
Methods	I,X,O,IM	I,IM,O	C	I,X,O,IM	I,X,O	I,X,O	I,X,O		IM,I	I,X,O	I,X,O	F	I,X,O

	Ni	O	P	Pb	S	Si	Sn	Ta	Ti	V	W	Zr
1	43.83	0.0018	0.0096	<0.005	0.0002	0.4140	0.0013	0.0006	0.1170	0.0296	1.310	0.0001
2	44.09	0.0018	0.0099		0.0003	0.4240	0.0016	0.0014	0.1320	0.0304	1.398	0.0001
3	44.40	0.0019	0.0100		0.0004	0.4282	0.0019	0.0017	0.1320	0.0314	1.410	0.0018
4	44.58	0.0021	0.0100		0.0004	0.4400	0.0020	0.0019	0.1330	0.0321	1.412	0.0020
5	44.98	0.0024	0.0100		0.0005	0.4460	0.0020	0.0029	0.1367	0.0330	1.413	0.0020
6	45.78	0.0028	0.0110		0.0005	0.4697	0.0021	0.0047	0.1370	0.0337	1.427	0.0021
7		0.0040	0.0110		0.0006	0.4710	0.0023	0.0051	0.1371	0.0346	1.437	0.0050
8		<0.001	0.0112		0.0008	0.4830	0.0024	0.0060	0.1377	0.0350	1.441	<0.0010
9			0.0118		0.0009	0.4880	<0.0020	<0.005	0.1390	0.0380	1.443	<0.005
10			0.0119			0.4917	<0.005		0.1410	0.0380	1.455	<0.005
11			0.0120			0.4980	<0.005		0.1500	0.0392	1.457	
12			<0.005			0.4980			0.1527	0.0400	1.460	
13						0.5277			0.1553		1.484	
14									0.1580		1.516	
Mean	44.61	0.0024	0.0108		0.0005	0.4676	0.0020	0.0030	0.1399	0.0346	1.433	0.0019
STDV	0.70	0.0008	0.0009		0.0002	0.0345	0.0004	0.0020	0.0110	0.0035	0.047	0.0016
Certified	44.6	0.0024	0.0108		0.0005	0.47	0.0020	(0.0030)	0.140	0.035	1.43	(0.0019)
U _{CRM}	0.7	0.0007	0.0006		0.0002	0.02	0.0003		0.006	0.002	0.03	
Methods	I,X,O	F	I,X,O,IM		C	I,O,X	IM,I,O	IM,I,O	I,X,O,IM	IM,I,X,O	I,X,O	IM,X,O,I

Legend: W = Classical, C = Combustion, F = Fusion, A = AA or GFAA, I = ICP or DCP, IM=ICP-MS, D = DC Arc, O = AES, X = XRF, G = GDAES or GDMS, H = Hollow Cathode AES