



ARMI

ISO Certified • 9001 • 17025 • 17043 • 17034

Certificate of Analysis

IARM FeA100-18

Stainless Steel / Aermet 100 / UNS K92580

Certified Reference Material

Certified Values listed in wt.% with associated uncertainties

Al	0.007 ± 0.005	C	0.222 ± 0.006	Co	13.4 ± 0.2	Cr	2.98 ± 0.02
Cu	0.010 ± 0.002	Mn	0.013 ± 0.004	Mo	1.19 ± 0.04	N	0.0010 ± 0.0007
Nb	0.003 ± 0.002	Ni	11.2 ± 0.1	O	0.0009 ± 0.0004	P	0.004 ± 0.002
Si	0.039 ± 0.006	Ti	0.008 ± 0.002	V	0.007 ± 0.004	W	0.006 ± 0.004

Indicative Values listed in ppm

As (<50)	B (<10)	Bi (<50)	Ca (<50)	Cd (<50)	H (<10)	Hf (<10)
Mg (<50)	Pb (<50)	S (<10)	Sb (<50)	Se (<50)	Sn (<50)	Ta (<400)
Zn (<50)	Zr (<60)					

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** certified laboratories. This CRM may come in the form of a solid disk, chips, or powder. The intended use of this CRM may include, but is not limited to, the calibration of instruments and the validation of analytical methods.

Instructions for Use

1. 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.
2. 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.
3. The material should be stored in a cool, dry location when not in use.
4. Chips are not recommended for gas analysis.

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

	Al	As	B	Bi	C	Ca	Cd	Co	Cr	Cu	H	Hf	Mg	Mn	Mo	N
1	0.001	0.001	0.00018	<0.001	0.2011	0.0005	<0.001	12.5619	2.915	0.0053	0.000114	<0.001	<0.001	0.0009	1.085	0.0005
2	0.002	0.0014	0.00075	<0.005	0.214	<0.005	<0.005	12.77	2.96	0.007	<0.0001		<0.005	0.00767	1.145	0.0005
3	0.0028	<0.005	0.001		0.2162	<0.005		13.14	2.962	0.007				0.0116	1.15	0.0005
4	0.003	<0.005	<0.001		0.22			13.46	2.977	0.007				0.0117	1.154	0.0006
5	0.003				0.22			13.48	2.98	0.0072				0.012	1.16	0.0017
6	0.0034				0.22			13.4801	2.987	0.0075				0.012	1.18	0.002
7	0.0036				0.22			13.494	2.988	0.008				0.0137	1.18	
8	0.0093				0.221			13.50	2.991	0.011				0.0143	1.1913	
9	0.02				0.227			13.55	2.994	0.012				0.015	1.194	
10	0.02				0.2282			13.586	3.01	0.0125				0.018	1.1943	
11					0.23			13.59	3.012	0.0127				0.02	1.2111	
12					0.2367			13.7178	3.03	0.017				0.0235	1.2136	
13					0.2378			13.9136							1.3641	
14																
15																
Mean	0.007	0.0010	0.001		0.222			13.4	2.98	0.01				0.013	1.19	0.001
STDV.	0.007	0.0003	0.0004		0.01			0.4	0.03	0.003				0.006	0.06	0.0007
Certified	0.007	(<0.005)	(<0.001)	(<0.005)	0.222	(<0.005)	(<0.005)	13.4	2.98	0.010	(<0.001)	(<0.001)	(<0.005)	0.013	1.19	0.0010
U _{CRM}	0.005				0.006			0.2	0.02	0.002				0.004	0.04	0.0007
Methods	X,O,I,IM	O,I,IM	O,I,IM	I,IM	C,O	O,I,IM	I,IM	X,I,O	X,I,O	X,I,O,IM	F	IM	I,IM	X,I,O,IM	X,I,O	F

	Nb	Ni	O	P	Pb	S	Sb	Se	Si	Sn	Ta	Ti	V	W	Zn	Zr
1	0.0004	11.01	0.0002	0.0006	0.001	0.0003	0.00006	<0.005	0.023	0.00023	0.008	0.004	0.0012	0.001	0.00006	0.006
2	0.0011	11.0246	0.0006	0.0015	0.0034	0.0004	<0.001	<0.005	0.026	0.0005	0.019	0.0044	0.0025	0.00167	<0.001	<0.001
3	0.003	11.0612	0.0007	0.002	0.0081	0.0005	<0.005		0.0333	0.00057	0.0371	0.006	0.003	0.0028	<0.005	<0.005
4	0.004	11.076	0.00083	0.002	<0.001	0.0005			0.035	<0.001	<0.001	0.0068	0.0035	0.003		
5	0.004	11.0873	0.001	0.0021	<0.005	0.001			0.0385	<0.005	<0.005	0.007	0.004	0.0054		
6	0.005	11.11	0.001	0.0029		<0.0005			0.0385			0.0077	0.0043	0.01		
7		11.12	0.0014	0.0034		<0.001			0.04			0.0077	0.0093	0.01		
8		11.14	0.0018	0.004		<0.001			0.0403			0.008	0.013	0.012		
9		11.16		0.009					0.041			0.009	0.013			
10		11.20		0.00933					0.04187			0.01	0.0136			
11		11.5049		0.0103					0.042			0.01				
12		11.57							0.0443			0.0188				
13									0.0608							
14																
15																
Mean	0.003	11.2	0.0009	0.004	0.004	0.0005			0.039	0.0004	0.02	0.008	0.007	0.006		
STDV.	0.002	0.2	0.0005	0.004	0.004	0.0003			0.009	0.0002	0.01	0.004	0.005	0.004		
Certified	0.003	11.2	0.0009	0.004	(<0.005)	(<0.001)	(<0.005)	(<0.005)	0.039	(<0.005)	(<0.04)	0.008	0.007	0.006	(<0.005)	(<0.006)
U _{CRM}	0.002	0.1	0.0004	0.002					0.006			0.002	0.004	0.004		
Methods	X,O,IM,I	X,I,O	F	X,I,O,IM	O,I,IM	O,C	IM,I	I,IM	X,I,O,IM	O,IM,I	O,I,IM	X,O,I,IM	X,O,I,IM	X,O,IM,I	I,IM	O,I,IM

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

Certification Laboratories

Kennametal Stellite, Inc.	Belleville, ON	Laboratory Testing, Inc.	Hatfield, PA
Anderson Laboratories, Inc.	Greendale, WI	Carpenter Technology - Athens Operations	Tanner, AL
Cronimet Specialty Metals USA, Inc.	Wheatland, PA	Latrobe Specialty Metals, A Carpenter Co.	Latrobe, PA
LGC Standards	Manchester, NH	NSL Analytical Services, Inc.	Cleveland, OH
IMR Test Labs	Lansing, NY	EAG Laboratories, Inc.	Liverpool, NY
Dirats Laboratories	Westfield, MA		

Certification laboratories have demonstrated performance and traceability by utilizing a variety of test methods all under the scope of ISO 17025. Some of the specific CRMs and SRMs used in the analysis of the material covered by this certificate are:

NIST 1139A NIST 1155A NIST 1156 NIST 1171 NIST 293 NIST 339 IARM 16C IARM 21B IARM 242A IARM 4C IARM 98B

Homogeneity and Uncertainty

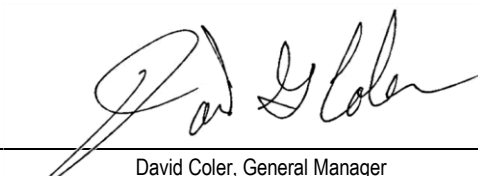
"Uncertainty" values, as reported adjacent to certified concentration values, are based on a 95% Confidence Interval. These estimated uncertainties include the combined effects of method imprecision, material inhomogeneity, and any bias between methods. Homogeneity data from experimental XRF results 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.

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

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

Expiration

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.



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Analytical Reference Materials International

