

# Analytical Reference Materials International

## Certificate of Analysis Certified Reference Material



Grade: **CDA 715 / UNS C71500**

Part Number (Q.A. NO.): **IARM 85C**

Certificate Date: **09/08/2008**

Certificate No.: **85C-09082008-IARM-F**

Revision Date: **09/22/2008**

### Interpretation of Data

1. Certified values listed below reflect analysis results submitted by qualified analytical laboratories using a combination of methods and instrumentation that emulate actual methods and instrumental techniques currently utilized in the analytical community and are reported as % wt. unless otherwise noted.
2. Any data reported and enclosed by a **parentheses ( )** is a **"best estimate"** and is **NOT CERTIFIED**. This data could not be quantified sufficiently for certification. It was however, reported by enough laboratories to be considered as potentially present in the matrix of the material being examined.
3. The "Inter-laboratory Analysis Program" (ILAP) utilized in the establishment of the data are an ongoing program with permanent membership. Certain elements may be selected by a consensus of the members for more extensive testing. Therefore the data in **brackets [ ]** indicates **further testing is in process**.
4. The "**±Estimated Uncertainty**" is enclosed by a **parentheses ( )** below the individual **element's concentration** and is based on a Confidence Interval at 95%. Included in this estimated uncertainty, are the combined effects of method imprecision, material inhomogeneity, and any bias between methods.

**Important: A "User Registration Card" accompanies all shipments. This card should be completed immediately upon receipt of materials with the appropriate user information. This is the only way in which ARMI can guarantee customer updates or possible data modifications!**

<u>Silver</u> <0.002	<u>Aluminum</u> <0.01	<u>Antimony</u>	<u>Arsenic</u> 0.0009 (0.0002)	<u>Carbon</u> 0.008 (0.002)	<u>Cobalt</u> 0.016 (0.001)	<u>Chromium</u> 0.002 (0.001)
<u>Copper</u> 67.3 (0.1)	<u>Iron</u> 0.63 (0.01)	<u>Magnesium</u> 0.01 (0.004)	<u>Manganese</u> 0.65 (0.01)	<u>Nickel</u> 31.3 (0.2)	<u>Nitrogen</u> <0.0003	<u>Oxygen</u> (0.003)
<u>Phosphorus</u> 0.003 (0.001)	<u>Lead</u> 0.004 (0.001)	<u>Sulfur</u> 0.002 (0.001)	<u>Selenium</u>	<u>Silicon</u> 0.01 (0.002)	<u>Tin</u> 0.005 (0.001)	<u>Zinc</u> 0.057 (0.002)

The laboratories participating in the "Inter-Laboratory Analysis Program" (ILAP) and certification of this material are as follows:

Anderson Laboratories, Inc. - Greendale, WI	ATI Allvac, Lockport - Lockport, NY
Berntsen Brass & Aluminum Foundry, Inc. - Madison, WI	California Metal-X - Los Angeles, CA
Chicago Spectro Service Laboratories - Chicago, IL	Concast Metal Products Co. - Mars, PA
Crucible Research - Pittsburgh, PA	I. Schumann & Company - Bedford, OH
Laboratory Testing, Inc. - Hatfield, PA	Sipi-Metals Corp - Chicago, IL
Special Metals IncoTest - Hereford, UK	Stork Materials Testing and Inspection - Huntington Beach, CA
The Ingot Co. - Weston, ON	

**Traceability:** All members of the "Inter-Laboratory Analysis Program" (ILAP) listed above validate test methods and instrument performance utilizing SRMs produced by the National Institute of Standards and Technology, (NIST) as well as other CRMs and RMs produced by recognized Certifying Bodies from around the world. The specific SRMs, CRMs, and RMs applicable to the material covered by this certificate are: **IARM 84A, 85A, IMN NB1, NB2, NB3, NB4, NB5, WILLAN CN/1F, CN/3E, CN/4F, CN/5F, MBH LB2F, NS4, BS 706A, 932, CKD 320, BAM 376, CTIF 4873, 4583, BN FC62/12-1, CONCAST 50005, 675505, HAS 412B, 413B, BCS 351, 454/1, 462/1, LECO 501-551, 502-102, 501-147, NIST 1276A, IARM 84A, LECO 501-643, IARM 84A, 85A, NIST 124D, C1253, IARM 85B, NIST 62D, 184, IARM 88B, 91C, MBH 31XWSB2, NIST 1270, 1275, IARM 84A, 85A, 85B, NIST 3101A, 3112A, 3113, 3126A, 3128, 3132, 3136, 3161A, 3168A, VHG 32/06N, 44/08RN, 503-0145, 505-0223R, LECO 501-551, 501-553, ALPHA AR 892, IARM 91A, NIST 171, ULRICH RC-38/5, BS 314B, BCS 179/2, MBH NS5, BS 706A, 715A, 976, NIST 1276A, CT043, BS CSN-485400B, 052944, LECO 501-643, 501-673, 501-674, NIST 1276, IARM 85B.**

A specific line of traceability is established to NIST and other Certifying Bodies for those elements that are noted as "Certified Values" on the Certificates of Analyses referenced above.

**See Reverse Side for Statistical Data and Additional Information Regarding this Material.**

The following data and accompanying statements represent all pertinent information reported in the ILAP as it applies to the chemical characterization of this material as of 09/22/2008.

85C	Ag	Al	As	Be	Bi	C	Co	Cr	Cu	Fe	Mn	Nb	Ni	P	Pb
1	0.0006	0.0091	0.0010	0.0222	0.0010	0.0073	0.016	0.0025	67.41	0.60	0.64	<0.001	30.95	0.0010	0.002
2	0.0001	0.007	0.0008	<0.0001	0.00003	0.0103	0.0159	0.0001	67.25	0.62	0.6390	0.0096	31.315	0.0008	0.006
3	0.0009	0.0011	0.0012	0.0011	<0.0001	0.0074	0.016	0.0043	67.227	0.631	0.66	<0.01	31.35	0.0030	0.0060
4	0.0025	0.0123	0.0010	<0.0005	<0.001	0.0056	0.01665	0.0012	67.15	0.643	0.6406	0.0046	31.547	0.0014	0.0004
5	0.0019	0.0020	0.0007	0.0033	<0.001	0.007	0.0154	0.0033	67.40	0.636	0.6626	<0.001	31.405	0.0013	0.0036
6	0.0021	0.0038	0.0006	<0.005	0.0150	0.0075	0.017	0.001	67.37	0.6495	0.650	0.0142	31.67	0.0036	0.0005
7		0.003		0.117	<0.005	0.0113	0.015	0.0035	67.40	0.618	0.645		31.22	0.0016	0.0018
8		0.0155			0.0013	0.00661	0.017	0.0024	67.348	0.615	0.65		31.23	0.0030	0.0040
9		0.0065			0.004	0.0107	0.0157		67.282	0.64	0.673		31.12	0.006	0.005
10					0.107		0.0146			0.652	0.669		30.8982	0.0027	0.0047
11					0.0045			0.018		0.613	0.623		30.983	0.0031	0.0050
12								0.019		0.625	0.668		30.756	0.0065	0.0043
13										0.642	0.673		31.792		
14										0.619	0.64		31.32		
Mean	0.0014	0.0067	0.0009	0.0359	0.0190	0.0082	0.0164	0.0023	67.3152	0.6288	0.6524	0.0095	31.2540	0.0028	0.0036
STDV.	0.0010	0.0049	0.0002	0.0549	0.0391	0.0020	0.0013	0.0014	0.0921	0.0154	0.0154	0.0048	0.2972	0.0018	0.0020
Certified	<0.002	<0.01	0.0009			0.008	0.016	0.002	67.3	0.63			31.3	0.003	0.004
95% C.I.			0.0002			0.002	0.001	0.001	0.1	0.01	0.01		0.2	0.001	0.001
Methods	H,D,I,O	X,A,I,O	H,I,O			C,I,O	X,D,I,O	X,I,O	X,W,I,O	X,D,I,O	X,D,A,I,O		X,W,A,I,O	X,I,O	X,D,H,I,O

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

85C	S	Sb	Se	Si	Sn	Zn	B	Cd	Mg	Mo	N	O	Ti	Te	Zr
1	0.0035	0.0030	0.0007	0.0062	0.004	0.055		0.0001	0.0086	<0.001	0.0001	0.0030		<0.01	<0.001
2	0.004	<0.001	<0.001	0.0037	0.0021	0.0555		0.0001	0.008	<0.0001	0.0001	0.0034			0.0015
3	0.0013	0.0004	0.0050	0.008	0.0031	0.0612		<0.0001	0.0103	<0.01	0.0003	0.0022			0.003
4	0.0010	<0.001	0.002	0.0071	0.0060	0.057		<0.001	0.0097	0.004	0.0003	0.0020			
5	0.0017	0.0002		0.0118	0.0052	0.0583		0.0210	0.020	0.002					
6	0.0018	0.0003		0.0030	0.0051	0.05085		0.0124	0.0080						
7	0.0005	<0.001		0.0090	0.006	0.057			0.0120						
8	0.0025	0.0274		0.005	0.003	0.0575			0.0187						
9	0.001	0.015		0.0046	0.0046	0.057			0.0009						
10	0.001	0.0326		0.0137	0.0054	0.0561									
11	0.0045	0.0036		0.0102	0.007										
12	0.0013			0.003	0.0051										
13	0.00150			0.0065											
14	0.0026														
Mean	0.0020	0.0103	0.0026	0.0071	0.0047	0.0565		0.0084	0.0107	0.0030	0.0002	0.0027			0.0023
STDV.	0.0012	0.0131	0.0022	0.0034	0.0015	0.0026		0.0102	0.0058	0.0014	0.0001	0.0007			0.0011
Certified	0.002			0.01	0.005	0.057			0.01		<0.0003	(0.003)			
95% C.I.	0.001			0.002	0.001	0.002			0.004						
Methods	X,C,I,O			X,I,O	X,H,A,I,O	D,A,I,O			D,I,O						

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

The International Standards Organization (ISO) definitions, expressed in ISO Guide 30-1992 list the following:

**Certifying Body:** Any technically competent body (organization or firm, public or private) that issues a reference material certificate which provides the information detailed in ISO Guide 31. The only generally accepted certifying body in the United States for primary standards - Standard Reference Materials (SRM) is the U. S. Department of Commerce, National Institute of Standards & Technology, (NIST), Gaithersburg, MD. All other certifying bodies in the United States produce Reference Materials (RM) or Certified Reference Materials (CRM).


**Reference Material (RM):** Material or substance one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

**Certified Reference Material (CRM):** Reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes its traceability to an accurate realization of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence.

**Inter-Laboratory Analysis Program (ILAP):** Although ASTM Standard E691-87 applies to inter-laboratory studies to "Determine the Precision of a Single Test Method", it is also a well thought out and logical plan for conducting an inter-laboratory program involving multiple techniques. Therefore, the planning, conducting, analyzing, protocol, and treatment of data resulting from this inter-laboratory program were performed utilizing the guidelines established in ASTM E691-87.

**Methods of Analysis:** In view of the fact, that the "Inter-Laboratory Analysis Program" entails a wide variety of materials, no single analytical method would provide optimum data results. Therefore, the methods utilized were a combination of ASTM Standard Methods for classical wet chemistry, ICP, AA, Optical Emission, and X-Ray spectrometric methods. The determinations for Carbon, Sulfur, Nitrogen, and Oxygen are the result of combustion instrument procedures.

**Selection of Materials:** A "batch" or "series" is defined as a single bar of one continuous length and heat. The majority of materials are in wrought condition; other methods of manufacture are utilized as a less desirable resort. ILAP samples are taken by removing a section, a minimum of, every one-twelfth of total length from the entire bar. A portion of the section is converted to chips and thin (pin) disk for analysis by classical wet chemistry, ICP, AA, and combustion procedures, and the balance remains as a thick disk for OES and X-Ray analysis. Each member of the ILAP is furnished a sample pack from a specific location on the batch bar. This systematic sampling procedure results in the homogeneity being reflected as a product of the overall statistics and certified data. This method of homogeneity testing is in accordance with ISO Guide 34, regarding the systematic selection and testing of a representative number of units for the assessment of homogeneity.

Certified by:   
 William D. Britt, President/General Manager  
 Analytical Reference Materials International

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