



# ARCONIC SPECTROCHEMICAL REFERENCE MATERIALS

## Certificate of Analysis

Certified: December 07, 2016

### SS-6061LX

| Element               | Si       | Fe     | Cu       | Mn       | Mg     | Cr     | Ni     | Zn     | Ti      | Ag      |
|-----------------------|----------|--------|----------|----------|--------|--------|--------|--------|---------|---------|
| Weight Percent        | 0.642    | 0.346  | 0.304    | 0.0522   | 0.998  | 0.228  | 0.0473 | 0.0802 | 0.0389  | 0.0001  |
| Estimated Uncertainty | 0.009    | 0.005  | 0.005    | 0.0008   | 0.009  | 0.004  | 0.0007 | 0.0009 | 0.0006  | 0.0002  |
| Element               | As       | B      | Be       | Bi       | Ca     | Cd     | Co     | Ga     | Li      | Na      |
| Weight Percent        | (0.0000) | 0.0001 | 0.00000  | 0.0000   | 0.0000 | 0.0000 | 0.0001 | 0.0202 | 0.00000 | 0.00008 |
| Estimated Uncertainty |          | 0.0002 | 0.00005  | 0.0002   | 0.0002 | 0.0002 | 0.0002 | 0.0004 | 0.00005 | 0.00005 |
| Element               | P        | Pb     | Sb       | Sc       | Sn     | Sr     | V      | Zr     |         |         |
| Weight Percent        | (0.0004) | 0.0004 | (0.0000) | (0.0000) | 0.0002 | 0.0001 | 0.0106 | 0.0010 |         |         |
| Estimated Uncertainty |          | 0.0002 |          |          | 0.0002 | 0.0002 | 0.0004 | 0.0002 |         |         |

This certificate of analysis applies to sections 1 thru 36.

Alcoa Inc. recently separated into two companies; Arconic Inc. and Alcoa Corp. Alcoa Spectrochemical Standards is now part of Arconic Inc. and has been renamed Arconic Spectrochemical Reference Materials. Some products and packaging may still be marked with the Alcoa Inc. logo while this certificate of analysis (COA) is marked with the Arconic Inc. logo. The CRM or RM is traceable to this COA through the lot number stamped on the CRM or RM regardless of the logo.

Arconic Inc.

\* Arconic Spectrochemical Reference Materials

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Manager



Testing Certificate # 1019.01  
17025:2005 Chemical Testing

Registered to ISO 9001:2008 by  
BSI Management System America, Inc.

See Reverse for Application Notes



ISO 9001:2008  
REFERENCE MATERIAL  
PRODUCER  
Certificate Number: AR-1993

**Description of CRM/IRM** – Aluminum discs are generally 64 mm (2.5 inches) in diameter by 25 mm (1 inch) high. In a few cases, the height may vary depending on the particular alloy or drift correction reference material purchased (see the catalog for details). Upon request, the certified reference materials (CRMs) and reference materials (RMs) are available as millings or chips for use in chemical methods of analysis requiring dissolution. Arconic CRMs and RMs are produced by proprietary casting techniques that minimize or substantially eliminate both macro and micro segregations. Metallurgical structure is controlled to match chill cast disks and therefore produce the same spectral response when used according to the methods cited. All CRMs and RMs are labeled and stenciled to show the catalog number, production lot and individual section number.

**Intended Use** – Arconic CRMs and RMs in disc form are intended for use with Spark-AES instruments for analysis of chill cast disks as described in American Society for Testing and Materials (ASTM) methods E607, E716, and E1251. Because of the effects of macro and micro segregation and metallurgical structure on spectral response, metal in any form other than chill cast discs (ingot, billet, sheet, plate, extrusion, forging, castings, etc.) should be remelted and cast in disk form, as described in ASTM B985, prior to comparison to alloy CRMs. CRMs may be used for calibration, type standardizing, control standards and method validation for Spark-AES methods. RMs, typically designated as "SQ", are intended for drift correction of Spark-AES instruments. The CRMs may also be used for calibration, control and method validation for other methods, including but not limited to classical wet chemical approaches, ICP-AES, ICP-MS, GD-AES, GD-MS, and XRF.

**Instructions for Use - Spark-AES** – The surface of the disc should be prepared using a lathe or milling machine. Carbide or diamond tipped tool bits are recommended. Avoid use of tool bits that may contaminate the surface with elements of interest. Do not grind or sand. If using a machining lubricant such as alcohol, make sure that it is of sufficient purity to avoid contamination of the surface with elements of interest. The surface roughness should be less than 0.0016 mm (63 inches) RMS. Do not touch the prepared analysis surface or allow the surface to come into contact with any source of contamination. Sparks should be placed, without overlapping, around the circumference of the CRM/IRM close to the outer edge. Avoid the zone within a 12 mm (0.5 inch) radius of the center of the sample because of the slight chance that radial segregation may occur. This zone should also be avoided when collecting machine turnings or chips for chemical analysis methods that involve dissolution.

The CRMs and RMs are certified using a Spark-AES spectrometer with a spark circumference of approximately 12 mm (0.5 inch) and ICP-AES results based on sample sizes that are greater than or equal to 0.1 g. Spark diameters or subsample sizes less than those used during the certification may invalidate the use of the certified value.

**Storage** – For best results the CRM/IRM should be stored in a cool dry place free from corrosive fumes. Exposure to temperatures above approximately 200 °C (392 °F) may cause metallurgical changes that will invalidate the certificate of analysis.

**Shelf Life** – The certification is valid indefinitely, within the measurement uncertainty specified, provided the CRM is handled and stored in accordance with the instructions given in this certificate (see "Instructions for Use"). Periodic recertification of this CRM is not required. The certification is nullified if the CRM is damaged, contaminated, or otherwise modified.

**Material Certification:** Compositions are determined using two or more independent analytical methods which may include, Spark-AES, ICP-AES, XRF, GD-MS, ICP-MS or other approaches deemed appropriate for a specific application. All CRM/IRM ingots are evaluated for uniformity both within and among sections by extensive Spark-AES testing. Spectral response is determined by comparison with Arconic master CRMs. Rigorous statistical analysis is used to ensure the accuracy of the final composition certification, the chemical and physical uniformity, and the performance of the CRMs/RMs in use. Values contained within parentheses, e.g. (0.05), are provided for reference only and are not certified for use as calibrants, standardants, or analytical performance checks.

**Limits of Uncertainty:** The certified values shown are generally weighted mean values from the analysis of representative samples, using at least two independent analytical methods. The given limits of uncertainty represent a combined uncertainty and seek to estimate, with a 95% confidence level, a range in which the true value may be expected to lie. While the homogeneity of the ingots and the mean values given as the certified compositions are determined using rigorous statistical techniques, the cited uncertainties represent not only this statistical treatment but also estimates of bias based on extensive historical data and technical judgment. The uncertainties cited represent an expanded uncertainty given by  $U = k \cdot u_c$  where  $u_c$  represents the combined standard uncertainty and  $k$  is a coverage factor chosen to represent a desired level of confidence. For this application  $k=2$  and  $U$  expresses an estimate of a 95% confidence level. The use of this expression is consistent with guidelines given in the International Organization for Standardization (ISO) document "Guide to the Expression of Uncertainty in Measurement" and National Institute of Standards and Technology (NIST) Technical Note 1297 "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results". In some cases no uncertainty is given because of limited data or the lack of a second independent measure. No uncertainties are provided for estimated compositions, i.e. parenthetical numbers.

**Traceability:** During the certification process, NIST traceable CRMs, both solid and liquid, are used. NIST traceable weights are used for the calibration and verification of balances in both CRM production and analytical certification methods.

**Traceability policy:** CRMs are prepared and certified for the spectrochemical analyses of aluminum alloys using methodology similar to that described in ASTM methods E716 and E1251. All certifications are produced using at least two independent methods and detailed statistical analysis to assure homogeneity. Traceability to NIST is maintained through the use of NIST Standard Reference Materials® (SRM) or certified reference materials directly traceable to NIST SRMs. Balances used during production and analyses are calibrated with and traceable to NIST standard weight sets.

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