

Alcan International Limited

Arvida Research and Development Center

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CERTIFICATE OF ANALYSIS

Grade: **AA4045**

Part Number (Q.A. NO.): **ALC-X4045-AC**

Certification Date: **06/19/2002**

Certificate No.: **X4045AC-06192002-ALC-F**

INTERPRETATION OF DATA

Data in parentheses () on the "Certificate of Analysis" reflect the 95% confidence intervals.

CAUTION! It has been our experience that certain light elements such as **Li, Na, Ca** in low levels and **Mg** even in the higher concentrations will go through a burn off process during casting. These concentrations can vary in a monotone fashion along the length of the test billets. Since these same reference materials are used as working standards for the day-to-day operations of the Alcan production facilities worldwide, certification of these elements is routinely taken a step further than a simple batch or series relationship. A more thorough examination is conducted for these elements by analyzing each individual disk. **In the event the concentrations differ, even slightly, between the individual disk and the nominal certified value for the batch or series, then the respective individual concentrations are mechanically stamped on the actual disk.**

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 we can guarantee customer updates or possible data modifications!

<u>Silicon</u> 10.03	<u>Iron</u> 0.32	<u>Copper</u> 0.015	<u>Manganese</u> 0.013	<u>Magnesium</u> 0.015
<u>Chromium</u> 0.013	<u>Nickel</u> 0.014	<u>Zinc</u> 0.99	<u>Gallium</u> 0.016	<u>Vanadium</u> 0.012
<u>Titanium</u> 0.013	<u>Bismuth</u> 0.008	<u>Lead</u> 0.008	<u>Tin</u> 0.012	<u>Boron</u>
<u>Beryllium</u> 0.0009	<u>Calcium</u> 0.0024i	<u>Cadmium</u> 0.0013	<u>Cobalt</u>	<u>Lithium</u> 0.0019i
<u>Sodium</u> 0.0041i	<u>Strontium</u> 0.0029i	<u>Zirconium</u> 0.0031	<u>Antimony</u> 0.0038	<u>Phosphorus</u> 0.0058

"N" – value not certified, "L" or "<" – less than, "i" – individual value

Method of Manufacture: Alcan spectrochemical standards are not derived from "Production Material". Material produced for the purpose of becoming a certified reference material is produced by a "Direct Chill Continuous Cast" method. Three billets measuring 75mm (3.00") in diameter by 1.50m (60.00") in length are cast for each material batch. Typically, the "DC Disk Standards" render better uniformity than other methods and have proven over time to produce the most reliable results for the analysis of both the simple as well as the complex alloys.

Methods of Analysis: Certified values listed above reflect analysis results using a combination of classical chemical methods and instrumental techniques that emulate actual methods and instrumental techniques currently utilized in the analytical community. These methods and techniques include classical chemistry, ICP, AA, Optical Emission and X-Ray spectrometry as well as certain proprietary methods developed specifically by Alcan International Limited exclusively for the analysis of aluminum and its alloys.

Homogeneity: The total of the three billets cast is considered the "batch or series". Twelve (12) representative samples are selected from the batch. Each of the twelve samples is sparked seven (7) times following a given sequence on the quantimeter. These 84 results are statistically evaluated by an analysis of variance to determine the uniformity of composition within and among the entire batch series. **If this test reveals that one or more of the major alloying elements is not uniformly distributed, then the entire batch series is rejected.**

Traceability to NIST: Selected SRMs produced by the National Institute of Standards & Technology are routinely utilized in the verification of methods and instrumental techniques in relation to the matrix composition of the test materials being analyzed. Wherever possible, the SRMs are used in the calibration curves for the instrumental techniques.

Revised: 06/25/2002

Certified By :

A handwritten signature in black ink, appearing to read "J. Fortier".
Jean-Luc Fortier, Ph. D.

For questions or additional information regarding this Certificate of Analysis, please contact:
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