

# CERTIFICATE OF ANALYSIS

**511X G05H3 (batch H)**

## Certified Reference Material Information

Type: ALUMINIUM / MAGNESIUM (CAST)  
Form and Size: Disc 40-50mm diameter x 15-20mm thick  
Supplied by: MBH Analytical Limited  
Produced by: Coleshill Laboratories Limited

## Certified Analysis

### Percentage element by weight

Element	Cu	Mg	Si	Fe	Mn	Ni
%	0.093	3.97	0.21	0.41	0.40	0.090

Element	Zn	Pb	Sn	Ti	Cr	Be
%	0.092	0.107	0.096	0.25	0.095	0.0074

## Usage

Intended use: With optical emission and X-ray fluorescence spectrometers.

Recommended method of use: Aluminium and aluminium alloys are generally prepared by machining on a lathe. However, users are recommended to follow the calibration and sample preparation procedures specified by the relevant instrument manufacturer.

Preparation should be the same for reference materials and the samples for test.

A minimum of three consistent replicate analyses is recommended to optimise precision and accuracy. Users are advised to check against possible bias between reference materials and production samples due to differences in metallurgical history, and be aware of possible inter-element effects.

## Certified by:

MBH ANALYTICAL LIMITED \_\_\_\_\_

on 12th January 1999

## **Method of Preparation**

This reference material was produced from master alloys and commercial-purity aluminium. The melt was degassed using sodium-free flux, and was cast into iron moulds. 2mm has been removed from the cast face to minimise any surface effects.

## **Sampling**

Samples for chemical analysis, and discs for homogeneity checks, were taken from the start, middle and end of the casting process

## **Homogeneity**

For a series of three discs, 2mm was removed from the chilled face and then each disc checked for vertical uniformity using an optical emission spectrometer.

Multiple measurements were taken from each surface under test, and averaged.

The mean value of the material was then calculated from these averages.

For each of the surfaces checked, the differences between the averaged result and the overall mean value were checked to ensure that the homogeneity met the acceptance criteria defined in ISO guide 30 - 1992.

## **Chemical Analysis**

Analysis was carried out on millings taken from samples representative of the cast product. For analysis purposes, the selected participating laboratories normally followed the requirements of ISO guide 25 - 1990. The individual values listed overpage are usually the average of each analyst's results.

## **Confidence Limits**

These are the upper and lower values between which the actual measurements will fall, with the stated probabilities, assuming a Gaussian distribution.

68.3% of the results will fall within  $\pm 1$  x Standard Deviation of the mean.

95.4% of the results will fall within  $\pm 2$  x Standard Deviation of the mean.

99.7% of the results will fall within  $\pm 3$  x Standard Deviation of the mean.

## Analytical Data

### Percentage element by weight

<b>Sample</b>	<b>Cu</b>	<b>Mg</b>	<b>Si</b>	<b>Fe</b>	<b>Mn</b>	<b>Ni</b>
<b>1</b>	0.09	3.98	-	0.40	0.38	0.087
<b>2</b>	0.092	3.92	0.21	0.41	0.41	0.098
<b>3</b>	0.09	3.98	0.23	0.39	0.38	0.09
<b>4</b>	0.092	4.02	0.20	0.42	0.41	0.087
<b>5</b>	0.09	3.96	-	0.40	0.39	0.09
<b>6</b>	0.098	-	0.22	0.42	0.40	-
<b>7</b>	0.09	-	0.20	0.40	0.39	0.09
<b>8</b>	0.098	3.951	0.18	0.401	0.408	-
<b>Mean</b>	<b>0.093</b>	<b>3.969</b>	<b>0.207</b>	<b>0.405</b>	<b>0.396</b>	<b>0.090</b>
<b>Std Dev</b>	<b>0.004</b>	<b>0.034</b>	<b>0.018</b>	<b>0.011</b>	<b>0.013</b>	<b>0.004</b>

<b>Sample</b>	<b>Zn</b>	<b>Pb</b>	<b>Sn</b>	<b>Ti</b>	<b>Cr</b>	<b>Be</b>
<b>1</b>	0.089	-	0.091	0.242	0.093	0.007
<b>2</b>	0.096	0.115	0.10	0.26	0.087	0.008
<b>3</b>	0.09	0.11	0.10	0.24	0.09	0.008
<b>4</b>	0.095	0.11	0.10	0.27	0.10	0.007
<b>5</b>	0.09	0.10	0.09	0.25	0.10	-
<b>6</b>	0.097	0.11	0.080	0.25	0.10	-
<b>7</b>	-	0.10	0.10	0.23	0.09	0.007
<b>8</b>	0.085	0.102	0.106	0.250	0.101	-
<b>Mean</b>	<b>0.092</b>	<b>0.107</b>	<b>0.096</b>	<b>0.249</b>	<b>0.095</b>	<b>0.0074</b>
<b>Std Dev</b>	<b>0.004</b>	<b>0.006</b>	<b>0.008</b>	<b>0.012</b>	<b>0.006</b>	<b>0.0005</b>

## **Participating Laboratories**

Coleshill Laboratories Ltd	Birmingham, England	NAMAS Approval 0121
Birmingham Assay Office	Birmingham, England	NAMAS Approval 0667
RoTech Laboratories	Wednesbury, England	NAMAS Approval 0366
University Metals Advisory Centre	Sheffield, England	NAMAS Approval 0411
Metals Technology Testing Ltd	Sheffield, England	NAMAS Approval 0963
London & Scandinavian Met Co	Rotherham, England	NAMAS Approval 1091
Sheffield Assay Office	Sheffield, England	NAMAS Approval 0012
Central Iron & Steel Research Inst	Beijing, China	National Reg. E0584
Shiva Analyticals Ltd	Bangalore, India	

## **Analytical Methods Used**

Copper:	FAAS	ICP	photometric (oxalyl dihydrazide)
Magnesium:	FAAS	ICP	gravimetric (pyrophosphate)
Silicon:	FAAS	ICP	gravimetric photometric (molybdenum blue)
Iron:	FAAS	ICP	photometric (orthophenanthroline)
Manganese:	FAAS	ICP	photometric (periodate)
Nickel:	FAAS	ICP	
Zinc:	FAAS	ICP	photometric (dithizone)
Lead:	FAAS	ICP	
Tin:	FAAS	ICP	photometric (phenylfluorone)
Titanium:	FAAS	ICP	photometric (diantipyryl methane)
Chromium:	FAAS	ICP	photometric (diphenylcarbazide)
Beryllium:	FAAS	ICP	

## **Notes**

This Certified Reference Material has been produced in accordance with the general principles of ISO Guide 34 - 1996. The certification conforms with the guidelines given in ISO Guide 31 - 1981.

To achieve NAMAS (UK National Measurement Accreditation Scheme) approval, test houses must demonstrate conformity to the general requirements of BS EN 45001, ISO Guide 25 and ISO9002.

Some cast discs may exhibit shrinkage cavities on their upper surfaces. The above certification is therefore only applicable to the front face of the disc. Material to the rear (engraved) face of the disc, to a depth of 5mm, is not certified.

This material will remain stable provided adequate precautions are taken to protect it from cross-contamination, extremes of temperature and atmospheric moisture.

The material to which this certificate of analysis refers is supplied subject to our general conditions of sale.