

# CERTIFICATE OF ANALYSIS

**55X G28J6 (batch A)**

## Certified Reference Material Information

Type: ALUMINIUM / SILICON (SPRAY CAST and FORGED)  
Form and Size: Disc 65mm diameter x 30mm thick  
Manufactured by: Osprey Metals Limited **batch 00M00057**  
Certified and Supplied by: MBH Analytical Limited

## Certified Analysis

### Percentage element by weight

Element	Si	Cu	Mg	Fe	Mn	Ni	Zn
Value <sup>1</sup>	27.15	(0.035)	(0.032)	(0.26)	(0.12)	(<0.01)	(0.052)
Uncertainty <sup>2</sup>	0.19	-	-	-	-	-	-

Element	Pb	Sn	Ti	Cr	Ca	Sr
Value <sup>1</sup>	(0.008)	(<0.002)	(0.024)	(0.006)	(0.007)	(0.038)
Uncertainty <sup>2</sup>	-	-	-	-	-	-

Note: values given in parentheses are not certified - they are provided for information only.

## Definitions

- <sup>1</sup> The certified value is derived from the results of an interlaboratory testing programme, detailed on page 3.
- <sup>2</sup> The uncertainty value is generated from the 95% confidence interval derived from the wet analysis results (page 3). This value has been modified to account for additional information from the material homogeneity checks.

## Certified by:

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

on 15th June 2001

## **Method of Preparation**

This certified reference material was produced from commercial-purity aluminium and silicon metal. The minor elements were added using master alloys. The melt was spray-cast, and hot forged into blocks. Discs were machined from the solid blocks.

## **Sampling**

Samples for chemical analysis, and discs for homogeneity checks, were taken from various blocks arising from the spray-cast batch.

## **Homogeneity**

Samples representative of the batch were checked for lateral and through-thickness uniformity using an optical emission spectrometer.

Multiple measurements were taken from each surface under test.

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

For each of the surfaces checked, the differences between the averaged result and the overall mean value were evaluated to ensure that the homogeneity of the material satisfied the acceptance criteria defined in ISO guide 30 - 1992, and fell within 95% probability limits.

For silicon, the relative standard deviation of all individual results was 0.62%.

## **Chemical Analysis**

Analysis was carried out on millings taken from samples representative of the product. It was performed by participating laboratories mostly operating within the terms of EN ISO/IEC 17025 - 2000, using documented standard methods of analysis.

The individual values listed overpage are the average of each analyst's results.

## **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.

## Analytical Data

### 1) Silicon

Sample	1	2	3	4	5	6	7	Mean	SD	C <sub>(95%)</sub>
Si, %	26.93	27.10	27.12	27.20	27.2	27.25	27.25	27.15	0.12	0.09

Notes: C<sub>(95%)</sub> is the 95% half-width confidence interval derived from the equation:

$$C_{(95\%)} = (t \times SD) / \sqrt{n}$$

where n is the number of available values, t is the Student's t value for n-1 degrees of freedom, and SD is the standard deviation of the test results.

Each of the silicon results given above is the average of values from duplicated tests.

### 2) Other Elements

	<u>Percentage element by weight</u>					
Sample	Cu	Mg	Fe	Mn	Ni	Zn
1	0.034	0.034	0.27	0.12	<0.002	0.054
2	0.036	0.030	0.25	0.11	0.006	0.050
<b>Mean</b>	<b>0.035</b>	<b>0.032</b>	<b>0.26</b>	<b>0.12</b>	<b>&lt;0.01</b>	<b>0.052</b>

  

Sample	Pb	Sn	Ti	Cr	Ca	Sr
1	0.010	<0.002	0.022	0.007	0.007	0.040
2	0.006	<0.001	0.026	0.005	0.006	0.036
<b>Mean</b>	<b>0.008</b>	<b>&lt;0.002</b>	<b>0.024</b>	<b>0.006</b>	<b>0.007</b>	<b>0.038</b>

## **Participating Laboratories**

Bodycote Materials Testing Ltd  
London & Scandinavian Met Co Ltd  
Rotech Laboratories Ltd  
Coleshill Laboratories Ltd  
Metals Technology (Testing) Ltd  
Universal Scientific Laboratory Pty  
Central Iron & Steel Research Inst  
Dubai Aluminium Co (DUBAL)  
Thermo-ARL

Middlesbrough, England  
Rotherham, England  
Wednesbury, England  
Birmingham, England  
Sheffield, England  
Milperra, NSW, Australia  
Beijing, China  
Jebel Ali, Dubai, UAE  
Ecublens, Switzerland

UKAS approval 0239  
UKAS approval 1091  
UKAS approval 0366  
UKAS approval 0121  
UKAS approval 0963  
NATA approval 492  
National reg. E0584

## **Analytical Methods Used**

Silicon:	ICP	FAAS	gravimetric (perchloric acid)
Copper:	ICP	OES	
Magnesium:	ICP	OES	
Iron:	ICP	OES	
Manganese:	ICP	OES	
Nickel:	ICP	OES	
Zinc:	ICP	OES	
Lead:	ICP	OES	
Tin:	ICP	OES	
Titanium:	ICP	OES	
Chromium:	ICP	OES	
Calcium:	ICP	OES	
Strontium:	ICP	OES	

## **Notes**

This Certified Reference Material has been produced in accordance with the requirements of ISO Guide 34-2000, ISO Guide 31-2000, ISO Guide 35-1989, and ASTM Guides E1724 and E1831.

To achieve UKAS (UK Accreditation Scheme) approval, test houses must demonstrate conformity to the general requirements of EN ISO/IEC 17025 and ISO9002.

This material does not have the normal cast structure that would be expected for this alloy composition. If the certified value for Si is to be used for calibration purposes, caution should be exercised when comparing it with cast alloys of similar composition.

Apart from the Si value, the analytical data presented on the heading page are not certified, but are supplied for information only.

This certification is applicable to all of the disc.

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.