

CERTIFICATE OF ANALYSIS

55X G26H1 (batch F)

Certified Reference Material Information

Type: ALUMINIUM/SILICON/COPPER (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	Zn
%	4.34	0.29	7.69	1.78	0.015	0.012	1.14

Element	Pb	Sn	Ti	Cr	Co	V	Bi
%	0.24	(0.008)	0.21	0.20	0.022	0.012	0.07

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 four 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 9th August 2000

Method of Preparation

This reference material was produced from commercial-purity aluminium, with the main and trace elements added as master alloys or pure elements. The melt was degassed using sodium-free flux, and was cast into iron chill 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 several positions throughout the casting process

Homogeneity

Samples representative of the batch were checked for vertical 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.

Chemical Analysis

Analysis was carried out on millings taken from samples representative of the product. It was performed by participating laboratories operating within the terms of ISO guide 25 - 1990, using documented standard methods of analysis.

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 ± 1 x Standard Deviation of the mean.

95.4% of the results will fall within ± 2 x Standard Deviation of the mean.

99.7% of the results will fall within ± 3 x Standard Deviation of the mean.

Analytical Data

Percentage element by weight

Sample	Cu	Mg	Si	Fe	Mn	Ni	Zn
1	4.27	0.260	7.63	1.72	0.010	0.011	1.13
2	4.30	0.28	7.64	1.76	0.013	0.011	1.13
3	4.32	0.28	7.68	1.78	0.013	0.012	1.13
4	4.34	0.283	7.70	1.784	0.016	0.013	1.14
5	4.36	0.288	7.80	1.82	0.016	0.014	1.15
6	4.39	0.29		1.84	0.017		1.17
7	4.396	0.298			0.02		
8		0.31					
Mean	4.339	0.286	7.69	1.784	0.015	0.012	1.142
Std Dev	0.046	0.015	0.07	0.043	0.003	0.001	0.016

Sample	Pb	Sn	Ti	Cr	Co	V	Bi
1	0.222	0.003	0.183	0.18	0.0209	0.010	0.06
2	0.23	0.005	0.20	0.182	0.021	0.010	0.061
3	0.24	0.0073	0.208	0.19	0.0220	0.0114	0.074
4	0.245	0.01	0.21	0.20	0.022	0.012	0.077
5	0.248	0.014	0.21	0.202	0.024	0.0125	0.08
6	0.25		0.217	0.207	0.024	0.015	
7	0.25		0.23	0.208			
8				0.22			
Mean	0.241	0.008	0.208	0.199	0.022	0.012	0.070
Std Dev	0.011	0.004	0.014	0.014	0.001	0.002	0.009

Participating Laboratories

Coleshill Laboratories Ltd
Birmingham Assay Office
LGC
RoTech Laboratories
University Metals Advisory Centre
Metals Technology Testing Ltd
Laboratory Testing Inc
Central Iron & Steel Research Inst
Scientifics Ltd

Birmingham, England
Birmingham, England
Runcorn, England
Wednesbury, England
Sheffield, England
Sheffield, England
Hatfield, Pa, USA
Beijing, China
Derby, England

NAMAS Approval 0121
NAMAS Approval 0667
NAMAS approval 1214
NAMAS Approval 0366
NAMAS Approval 0411
NAMAS Approval 0963
A2LA approval 0117
National Reg. E0584
I*

Analytical Methods Used

Copper:	FAAS	ICP	
Magnesium:	FAAS	ICP	volumetric (EDTA)
Silicon:	FAAS	ICP	gravimetric
Iron:	FAAS	ICP	photometric (orthophenanthroline)
Manganese:	FAAS	ICP	photometric (periodate)
Nickel:	FAAS	ICP	photometric (dimethyl glyoxime)
Zinc:	FAAS	ICP	photometric (dithizone extraction)
Lead:	FAAS	ICP	
Tin:	FAAS	ICP	
Titanium:	FAAS	ICP	photometric (diantipyryl methane)
Chromium:	FAAS	ICP	photometric (diphenyl carbazide)
Cobalt:	FAAS	ICP	
Vanadium:	FAAS	ICP	
Bismuth:	FAAS	ICP	

Notes

This Certified Reference Material has been produced in accordance with the requirements of ISO Guide 34-2000, ISO Guide 31-1981, ISO Guide 35-1989, and ASTM Guides E1724 and E1831.

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.

I* - an ISO9000-approved company.

The combination of alloying elements used in a complex cast material of this type may produce a structure which exhibits micro-porosity on the rear (engraved) surface of the disc. In addition, the unidirectional solidification effects associated with semi-chill casting may lead to the formation of inhomogeneous segregates in the rear portion of the disc. The above certification is therefore only applicable to the front face of the disc. Material to the rear of the disc, to a depth of 5mm, is not certified.

Figures shown in brackets are not certified; they are provided for information only.

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.