

CERTIFICATE OF ANALYSIS

41X ZMn1 (batch A)

Reference Material Information

Type:	ZINC / MANGANESE BINARY (CAST)
Form and Size:	Disc 50mm Diameter x 20mm Thickness
Manufactured by:	G Rhodes
Certified and Supplied by:	MBH Analytical Limited

Assigned Values

Percentage element by weight

Element	Mn	Pb	Mg	Al	Cd	Fe	Cu	Ni
Value ¹	1.07	(0.0026)	(0.0001)	(0.0001)	(0.0002)	(0.0025)	(0.0005)	(0.0009)
Uncertainty ²	0.02							

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

Definitions

- ¹ The above value for manganese is the present best estimate of the true content for this element. The given value is a panel consensus, based on the averaged results of an interlaboratory testing programme, detailed on page 3.
- ² The uncertainty value is generated from the 95% confidence interval derived from the wet analysis results only.

Certified by:

MBH ANALYTICAL LIMITED _____

on 2nd June 2002

C Eveleigh



Method of Preparation

This reference material was produced by soaking commercial-purity zinc with manganese flake. The metal was cast from the bulk melt by sequential transfer of aliquots into individual iron chill moulds. At least 1mm was machined from the upper and lower surfaces of each disc, to minimise surface effects.

Sampling

Samples for chemical analysis were taken from throughout the casting process. By this means, 50% of all discs, chosen at random from the complete cast, were checked for homogeneity.

Homogeneity

The discs were checked for batch uniformity by wet chemical analysis only.

Chemical Analysis

Analysis was carried out on millings taken from samples representative of the product. It was performed by a panel of laboratories mostly operating within the terms of EN ISO/IEC 17025 - 2000, using documented standard reference methods and validated by appropriate reference materials.

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

Traceability

Most of the analytical work performed to assess this material has been carried out by laboratories with proven competence, as indicated by their accreditation to a national authority. It is part of the requirement for this accreditation that analytical work should be performed with due traceability, via an unbroken chain of comparisons, each with stated uncertainty, to primary standards such as the mole, or to nationally- or internationally-recognised primary reference materials.

Usage

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

Recommended method of use: Zinc and zinc alloys are generally prepared by machining on a mill or 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.

For OES the sample should be of sufficient mass to prevent excess heating during sparking, and the discharge chamber should be regularly cleaned as directed by the instrument manufacturer.

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

Sample	<u>Percentage element by weight</u>							
	Mn	Pb	Mg	Al	Cd	Fe	Cu	Ni
1	1.05	0.0026	0.0001	0.0001	0.0002	0.0025	0.0005	0.0009
2	1.057							
3	1.06							
4	1.06							
5	1.06							
6	1.064							
7	1.08							
8	1.10							
Mean	1.066	(0.0026)	(0.0001)	(0.0001)	(0.0002)	(0.0025)	(0.0005)	(0.0009)
Std Dev	0.016	-	-	-	-	-	-	-
C_(95%)	1.013	-	-	-	-	-	-	-

Note: $C_{(95\%)}$ 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.

Participating Laboratories

RoTech Laboratories	Wednesbury, England	UKAS accreditation 0366
L B Elds Ltd	Stoke, England	UKAS accreditation 1173
Universal Scientific Laboratory Pty Ltd	Milperra, NSW, Australia	NATA accreditation 0492
Central Iron & Steel Research Inst	Beijing, China	CNAL accreditation 0435
University Dept of Science and Eng	Shanghai, China	
Shiva Analyticals Pvt Ltd	Bangalore, India	

Note: to achieve National Accreditation (eg UKAS, NATA, CNAL), test houses must demonstrate conformity to the general requirements of EN ISO/IEC 17025

Analytical Methods Used

ELEMENT	RESULT No. & METHOD		
	ICP-AES	FAAS	OTHER
Manganese	7	3-5, 8	1, 2 volumetric (arsenite)
Lead	-	1	
Magnesium	-	1	
Aluminium	-	1	
Cadmium	-	1	
Iron	-	1	
Copper	-	1	
Nickel	-	1	

Notes

This Reference Material has been produced and certified largely in accordance with the requirements of ISO Guide 34-2000, ISO Guide 31-2000 and ISO Guide 35-1989, taking into account the requirements of ASTM E1724 and the ISO Guide to the Expression of Uncertainty in Measurement (GUM, when appropriate).

This material will remain stable provided adequate precautions are taken to protect it from cross-contamination, extremes of temperature and atmospheric moisture. All production records will be retained for a period of 20 years from the date of this certificate. This certification will therefore expire in June 2022, although we reserve the right to make changes as issue revisions, in the intervening period.

This material is also available as chippings.

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