

CERTIFICATE OF ANALYSIS

95X 136 (batch A)

Reference Material Information

Type: FUSIBLE ALLOY (CAST)
Form and Size: Disc 40mm Diameter x 15mm Thickness
Produced by: MBH Analytical Limited
Certified and supplied by: MBH Analytical Limited

Composition

Percentage element by weight

| Element | Sb | Sn | Cu | Bi | Ag |
|---------|-------|------|--------|------|--------|
| % | 0.023 | 12.0 | 0.0029 | 48.7 | 0.0057 |

| Element | Zn | Cd | In | Pb |
|---------|-------|--------|------|------|
| % | 0.030 | 0.0091 | 21.5 | 17.8 |

Notes

- ¹ The above values are the present best estimates of the true content for each element. Each value is based on the results from one or two laboratories, as detailed on page 3.
- ² These values are not certified (as defined by ISO), and should be treated with due caution.
- ³ Uncertainty values have not been derived, and are not given as part of this certification. However, the user may estimate uncertainties for each value, by reference to the tabulated data.

Certified by:

MBH ANALYTICAL LIMITED _____

on 7th June 2005

C Eveleigh

Method of Preparation

This reference material was produced from commercial-purity tin, cadmium, indium, lead and bismuth. The traces were added as individual elements, or as binary alloys. The melt was cast by sequential transfer of aliquots into iron chill moulds. 2mm has been removed from the working face to minimise any surface effects.

Sampling

At least 10% of all discs were sampled for non-destructive homogeneity testing. Chemical analysis was carried out on turnings taken from the working faces of the discs.

Homogeneity

The homogeneity of the batch was checked using an emission spectrometer, and found to be satisfactory.

Chemical Analysis

Analysis was carried out on millings taken from samples representative of the product. It was performed by participating laboratories using documented standard methods of analysis.

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

Traceability

The analytical work performed to assess this material has been carried out by laboratories using methods with the required 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: Alloys of this type are generally prepared by machining on a lathe. However, users are recommended to follow the calibration and sample preparation methods 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 provide the necessary sample size. 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

Percentage element by weight

| Sample | Sb | Sn | Cu | Bi | Ag |
|---------------|---------------|--------------|---------------|--------------|---------------|
| 1 | 0.0218 | 11.97 | 0.0028 | 48.68 | 0.0056 |
| 2 | 0.0246 | 12.05 | 0.0029 | 48.80 | 0.0057 |
| Mean | 0.0232 | 12.01 | 0.0029 | 48.74 | 0.0057 |

| Sample | Zn | Cd | In | Pb |
|---------------|---------------|---------------|--------------|--------------|
| 1 | 0.0295 | 0.0090 | 21.49 | 17.85 |
| 2 | 0.0306 | 0.0092 | 21.57 | - |
| Mean | 0.0301 | 0.0091 | 21.53 | 17.85 |

Participating Laboratories

Universal Scientific Laboratory Pty Ltd
Coleshill Laboratories Ltd

Milperra, NSW, Australia
Coleshill, England

NATA accreditation 0492

Note: to achieve Australian National Accreditation (NATA), 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 |
| Antimony | 1 | 2 | |
| Tin | 1 | - | 2 volumetric (iodate) |
| Copper | 2 | 1 | |
| Bismuth | 2 | 1 | |
| Silver | 1 | 2 | |
| Zinc | 1 | 2 | |
| Cadmium | 1 | 2 | |
| Indium | 2 | 1 | |
| Lead | 1 | - | |

Additional Notes

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 from the front face of the disc. Material to the rear of the disc, to a depth of ~5mm, is not certified.

This material is liable to superficial corrosion, and there is some possibility of microstructural changes due to recrystallisation; however, it will otherwise 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 2025, although we reserve the right to make changes as issue revisions, in the intervening period.

The manufacture, analysis and certification of this product were supervised by C Eveleigh, PhD, Technical Director, MBH Analytical Ltd.

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