AS 2292.2—1987
Reconfirmed 2016

Australian Standard®

METHODS FOR THE ANALYSIS OF SOLDERS

Part 2—DETERMINATION OF SILVER, BISMUTH, CADMIUM, COPPER ANTIMONY, IRON AND ZINC— FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

This Australian Standard was prepared by Committee CH/10, Analysis of Metals under the direction of the Chemicals Standards Board. It was approved on behalf of the Council of the Standards Association of Australia on 3 June 1987 and published on 6 July 1987.

The following interests are represented on Committee CH/10:

Aluminium Development Council
Australasian Institute of Mining and Metallurgy
Australian Lead Development Association
Australian Mineral Development Laboratories
Australian Tin Information Centre
Australian Zinc Development Association
Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Copper Technical Data Centre
Department of Defence
Electricity Supply Association of Australia
Metal Trades Industry Association of Australia
National Association of Testing Authorities
Railways of Australia Committee
Royal Australian Chemical Institute

Review of Australian Standards. *To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.*

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

This Standard was issued in draft form for comment as DR 86087.

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 2292.2—1987

Methods for the analysis of solders

Part 2: Determination of silver, bismuth, cadmium, copper, antimony, iron and zinc—Flame atomic absorption spectrometric method

RECONFIRMATION NOTICE

Technical Committee CH-010 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 31 July 2016.

The following are represented on Technical Committee CH-010:

Australian Aluminium Council
Bureau of Steel Manufacturers of Australia
International Copper Association Australia
International Precious Metals Institute
National Association of Testing Authorities Australia

NOTES

Australian Standard®

METHODS FOR THE ANALYSIS OF SOLDERS

Part 2—DETERMINATION OF SILVER, BISMUTH, CADMIUM, COPPER ANTIMONY, IRON AND ZINC— FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

First published 1987

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 4678 6

PREFACE

This Standard was prepared by the Association's Committee on Analysis of Metals, under the direction of the Chemical Standards Board. It is Part 2 of the AS 2292 series—Methods for the Analysis of Solders.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS FOR THE ANALYSIS OF SOLDERS

PART 2—DETERMINATION OF SILVER, BISMUTH, CADMIUM, COPPER, ANTIMONY, IRON AND ZINC— FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

1 SCOPE. This Standard sets out a flame atomic absorption spectrometric method for the determination of silver, bismuth, cadmium, copper, antimony, iron and zinc in solders. Two dilution procedures are described in the method: the top-loading balance dilution procedure and the volumetric dilution procedure.

2 APPLICATION. This method is applicable to solders with trace element contents in the following ranges:

Silver, 0.001 to 0.08 percent
Bismuth, 0.02 to 0.10 percent
Cadmium, 0.0001 to 0.007 percent
Copper, 0.001 to 0.10 percent
Antimony, 0.002 to 0.60 percent
Iron, 0.0005 to 0.02 percent
Zinc, 0.0001 to 0.004 percent.

Typical element concentrations found in solders are shown in Table 2.

3 REFERENCED DOCUMENTS. The following Standards are referred to in this Standard:

AS 2134 Recommended Practice for Chemical Analysis of Materials by Atomic Absorption Spectrometry
Part 1— Flame Atomic Absorption Spectrometry

AS 2164 One-mark Volumetric Flasks.

ISO 5725 Precision of Test Methods — Determination of Repeatability and Reproducibility by Inter-laboratory Tests.

4 PRINCIPLE. The sample is dissolved in a mixture of nitric and hydrofluoric acids, and boric acid is added. Dilution may be carried out on a mass basis or volumetrically. The concentration of each element in the acid solution is determined by flame atomic absorption spectrometry.

5 REAGENTS.

5.1 General requirements. During the analysis, only reagents of recognized analytical reagent grade and distilled water or water of an equivalent purity shall be used.

5.2 Solid reagents.

5.2.1 *Silver metal* (purity > 99.9 percent silver).

5.2.2 *Bismuth metal* (purity > 99.9 percent bismuth).

5.2.3 *Cadmium metal* (purity > 99.9 percent cadmium).

5.2.4 *Copper metal* (purity > 99.9 percent copper).

5.2.5 *Antimony metal* (purity > 99.5 percent antimony).

5.2.6 *Iron metal* (purity > 99.9 percent iron).

5.2.7 *Zinc metal* (purity > 99.9 percent zinc).

5.2.8 *Tin metal* (purity > 99.99 percent tin).

5.2.9 *Lead metal* (purity > 99.99 percent lead).

5.3 Solutions.

5.3.1 *Hydrofluoric acid* (ϱ_{20} 1.15 g/mL).

CAUTION: Note when diluted, hydrofluoric acid is extremely dangerous and harmful to the eyes and skin; rubber gloves and goggles should be worn when using this acid.

5.3.2 *Nitric acid* (ϱ_{20} 1.42 g/mL).

5.3.3 *Nitric acid (400 mL/L).* Add 400 mL of nitric acid (5.3.2) to 600 mL of water.

5.3.4 *Nitric acid-hydrofluoric acid mixture.* To 650 mL of water add 100 mL of hydrofluoric acid (5.3.1) and 250 mL of nitric acid (5.3.2). Store in a plastics bottle.

CAUTION: This acid mixture is extremely corrosive. All operations involving it should be conducted in a fume cupboard. The operator should wear rubber gloves and safety glasses.

5.3.5 *Boric acid solution (40 g/L).* Dissolve 40 g of boric acid powder (H_3BO_3) in hot water. Dilute to 1 L.

5.3.6 *Mercury (II) nitrate solution (50 g/L).* Dissolve 5 g of mercury(II) nitrate ($Hg(NO_3)_2.H_2O$) in water. Add 2 mL of nitric acid (5.3.2) and dilute to 100 mL with water.

5.4 Standard solutions.

5.4.1 *Standard metals solution (1 mL ≡ 2.0 mg Bi, 1.2 mg Cu, 1.6 mg Ag, 0.5 mg Fe, 0.2 mg Cd, 0.1 mg Zn).* Weigh to the nearest 0.0001 g, 2.0 g of bismuth (5.2.2), 1.2 g of copper (5.2.4), 1.6 g of silver (5.2.1), 0.50 g of iron (5.2.6), 0.20 g of cadmium (5.2.3), and 0.10 g of zinc (5.2.7). Add 5 mL of mercury(II) nitrate solution (5.3.6). Dissolve in 200 mL of nitric acid (5.3.3), transfer to a volumetric flask and dilute to 1 L with water.

5.4.2 *Working standard metals solution (1 mL ≡ 1.2 mg Sb, 0.2 mg Bi, 0.12 mg Cu, 0.16 mg Ag, 0.05 mg Fe, 0.02 mg Cd, 0.01 mg Zn).* Weigh, to the nearest 0.0001 g, 0.3 g of antimony (5.2.5) into a plastics beaker. Add 5 mL of nitric acid-hydrofluoric acid mixture (5.3.4) and heat to 50°C to 60°C using a water bath, to complete solution. Cool.