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Australian Standard 1050, Part 30—1978

METHODS FOR THE ANALYSIS OF IRON AND STEEL

PART 30—BORON IN STEEL

(Spectrophotometric Method using Curcumin)

STANDARDS ASSOCIATION OF AUSTRALIA
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Incorporated by Royal Charter

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THE FOLLOWING INDUSTRIAL, SCIENTIFIC AND GOVERNMENTAL organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

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 Producers Association of Australia
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

This standard, prepared under the direction of Committee CH/10, Analysis of Metals, was approved on behalf of the Council of the Standards Association on 30 March 1978, and was published on 1 July 1978.

In order to keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for the improvement to published standards, addressed to the head office of the Association, are welcomed.

First published 1978

This standard was issued in draft form for public review as DR 76127.

PREFACE

This standard requires reference to the following Australian and British standards:

AS 1213	Methods for the Sampling of Iron, Steel, Permanent Magnet Alloys and Ferro-alloys
AS 2162	SAA Volumetric Glassware Code*
AS CK19	Code of Recommended Practice for the Chemical Analysis of Materials by Ultraviolet/Visible Spectrophotometry
BS 3875	Optical Spectrophotometric Cells
BS 4237	Report on Reproducibility of Methods of Chemical Analysis used in the Iron and Steel Industry.

*In course of preparation as a revision of AS CR1.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Method for THE DETERMINATION OF BORON IN STEEL (Spectrophotometric Method using Curcumin)

1 SCOPE. This standard describes a distillation and spectrophotometric method for the determination of boron in steels.

2 APPLICATION. The method is applicable to total boron contents between 0.0005 and 0.0060 percent boron.

3 REPRODUCIBILITY. A planned trial of the method was carried out in accordance with BS 4237.*

The reproducibility index ($2s$) is obtained from the formula—

$$2s = 2\sqrt{(s_b^2 + s_w^2)}$$

where

s_b = between-operator standard deviation

s_w = within-operator standard deviation

95 percent of the results obtained by any one analyst should be reproducible to within two standard deviations of the overall mean value derived from all laboratories (i.e. $\bar{x} \pm 2s$).

For further information see BS 4237.

The planned trial was carried out by five analysts, each from a different laboratory. Five tests were carried out by each analyst on each of five samples.

From the results obtained the 95 percent confidence limits ($2s$, Table 1) have been calculated.

4 PRINCIPLE. The sample is dissolved in dilute sulphuric acid under reflux. Hydrogen peroxide is added, the insoluble residue is fused with sodium carbonate, and the extract is added to the main solution. Methanol is added and the boron distilled as methyl borate into dilute sodium hydroxide solution.

Following evaporation, the boron-curcumin complex is developed in the presence of acetic and sulphuric acids and the determination is completed spectrophotometrically.

*BS 4237, Report on Reproducibility of Methods of Chemical Analysis used in the Iron and Steel Industry.