

Australian Standard[®]

**Heavy mineral sand concentrates—
Sampling**

**Part 4: Determination of precision
and bias**

This Australian Standard was prepared by Committee MN/4, Heavy Mineral Sands. It was approved on behalf of the Council of Standards Australia on 15 November 1996 and published on 5 January 1997.

The following interests are represented on Committee MN/4:

Chamber of Mines of W.A.
CSIRO, Division of Minerals
University of Queensland

Additional interests participating in preparation of Standard:

Mineral sands producer companies
Superintending companies

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 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which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.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 94006.

Australian Standard[®]

**Heavy mineral sand concentrates—
Sampling**

**Part 4: Determination of precision
and bias**

PREFACE

This Standard was prepared by the Standards Australia Committee on Heavy Mineral Sands. It is one of a series of Standards prepared for the sampling of heavy mineral sands.

Other parts of this Standard are as follows:

- Part 1: Sampling from moving streams
- Part 2: Sampling from stationary situations
- Part 3: Preparation of samples

The objective of this Standard is to provide those responsible for sampling heavy mineral sands with means for checking and adjusting the precision and bias of sampling.

The term 'normative' is used in this Standard to define the application of the Appendix to which it applies. A 'normative' appendix is an integral part of a Standard.

CONTENTS

| | <i>Page</i> |
|---|-------------|
| 1 SCOPE | 3 |
| 2 REFERENCED DOCUMENTS | 3 |
| 3 DEFINITIONS | 3 |
| 4 NOTATION | 5 |
| 5 ACCURACY AND PRECISION OF SAMPLING | 6 |
| 6 DETERMINATION OF PRECISION OF SAMPLING, SAMPLE PREPARATION AND MEASUREMENT | 10 |
| 7 DETERMINATION OF PRECISION OF SAMPLE PREPARATION AND MEASUREMENT | 18 |
| 8 TESTING FOR BIAS IN SAMPLING, SAMPLE PREPARATION AND MEASUREMENT | 20 |
| APPENDIX A THEORY OF CHECKING SAMPLE PREPARATION ERRORS | 31 |

First published as AS 2884.4— 1997.

© Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

STANDARDS AUSTRALIA

Australian Standard

Heavy mineral sand concentrates—Sampling

Part 4: Determination of precision and bias

1 SCOPE This Standard sets out methods for checking and adjusting the precision of sampling, checking the precision of sample preparation and testing, and testing for bias in the sampling of heavy mineral sands.

The procedures described in this Standard apply to sampling from both moving streams and stationary situations, and to the subsequent sample preparation.

Experiments to check for precision and bias should be carried out for all sampling programs, whether manual or employing mechanical elements, implemented on a regular basis. Procedures should be repeated whenever significant change in the character of materials being sampled, especially in nominal top size or particle size distribution, has occurred.

When a mechanical installation is commissioned or when principal parts are modified, check experiments for precision and bias should be carried out on the installation as a whole. The material to be used for the bias tests should be the most variable material that is likely to be sampled. Various parameters can be used as measures of the variability of the material.

Where a bias higher than the maximum acceptable bias is detected, checks of individual elements of the system should be made, to determine which part or parts of the installation may require modification.

The preferred method of testing for bias (see Clause 8) is by comparison with 'stopped-belt' sampling and using the critical properties in the operation of the sampling system.

Design criteria of primary sampler for avoiding bias in a mechanical sampling system are given in AS 2884.1 and AS 2884.2. Reference is made to the geometry of cutter opening design and aperture, cutting speeds, measures for prevention of sample change and contamination, and procedures for examination of the performance of mechanical sampling equipment.

2 REFERENCE DOCUMENTS The following documents are referred to in this Standard:

- 1152 Specification for test sieves
- 2884 Heavy mineral sand concentrates—Sampling
- 2884.1 Part 1: Sampling from moving streams
- 2884.2 Part 2: Sampling from stationary situations
- 2884.3 Part 3: Preparation of samples
- ISO 5534 Statistics—Vocabulary and symbols

3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

3.1 Bias—the tendency to obtain a value that is either persistently higher or persistently lower than the reference value. Alternatively, the difference between the reference value and the average result obtained from a large number of determinations using a biased method.