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Australian Standard 2646.8—1984

SAMPLING OF SOLID MINERAL FUELS
Part 8—DETERMINATION OF PRECISION AND BIAS

STANDARDS ASSOCIATION OF AUSTRALIA
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The following interests are represented on Committee MN/1:

Australasian Institute of Mining and Metallurgy

Australian Coal Association

Australian Coal Industry Research Laboratories Ltd

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Coal Preparation Societies of New South Wales and Queensland

Confederation of Australian Industry

CSIRO, Division of Fossil Fuels

Department of Mineral Resources, N.S.W.

Department of Mines, Qld

Department of National Development

Electricity Supply Association of Australia

Institution of Engineers, Australia

Joint Coal Board

Queensland Coal Board

Royal Australian Chemical Institute

Standing Committee on Coalfield Geology, N.S.W.

State Chemical Laboratory, Vic.

Universities.

Representatives of the following interests also participated in the drafting of this standard:

Australian Iron and Steel Pty Ltd, Port Kembla

The Broken Hill Proprietary Co. Ltd, Central Research Laboratories

The Broken Hill Proprietary Co. Ltd, Newcastle

Cargo Superintendents Co. (A/Asia) Pty Ltd

Electricity Commission of New South Wales

Leveltec Engineering

SGS Australia Pty Ltd

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AUSTRALIAN STANDARD

SAMPLING OF SOLID MINERAL FUELS

Part 8
DETERMINATION OF PRECISION AND BIAS

AS 2646, Part 8—1984

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PREFACE

This standard was prepared by the Association's Committee on Coal and Coke under the direction of the Minerals Standards Board as a replacement for part of AS 1676—1975, Methods for the Sampling of Hard Coal. It is one of a series of standards prepared in the ongoing revision of AS 1676 and AS 1898, Methods for the Sampling of Coke.

This part of the standard is based on information contained in the appendices of AS 1676—1975, the appendices of BS 1017, Part 1 and the annexes of ISO 1988.

Other parts of this standard are as follows:

Part 1—Guide to the Use of Parts 2 to 8
Part 2—Hard Coal—Sampling from Moving Streams
Part 3—Coke—Sampling from Moving Streams*
Part 4—Hard Coal—Sampling from Stationary Situations
Part 5—Coke—Sampling from Stationary Situations*
Part 6—Hard Coal—Preparation of Samples
Part 7—Coke—Preparation of Samples*

*In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
SAMPLING OF SOLID MINERAL FUELS

PART 8—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 solid mineral fuels.

2 APPLICATION. The procedures described in this standard apply to the sampling of hard coal and coke 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 for the installation as a whole. The material to be used for the bias tests should be the most variable material which is likely to be sampled. Various parameters, e.g. ash, can be used as measures of the variability of the material. One measure of variability which has been developed is the size-ash index.

If a bias higher than the maximum acceptable bias is detected, then 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 using the properties deemed critical in the operation of the sampling system.

Design criteria of primary samplers for avoiding bias in a mechanical sampling system are given in AS 2646, Parts 2 and 3. 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.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1038 Methods for the Analysis and Testing of Coal and Coke
Part 16—Reporting of Results
AS 1152 Test Sieves
AS 2418 Glossary of Terms Relating to Solid Mineral Fuels
ISO 1988 Hard Coal—Sampling
ISO 2309 Coke—Sampling
ISO 3534 Statistics—Vocabulary and Symbols
BS 1017 Methods for the Sampling of Coal and Coke
Part 1—Sampling of Coal
Part 2—Sampling of Coke

4 DEFINITIONS AND SYMBOLS. For the purpose of this standard, the definitions and symbols given in AS 2418 and ISO 3534, and the following apply:

4.1 Definitions.

4.1.1 *Bias*—the tendency to obtain a value which is persistently higher or persistently lower than the true value. Alternatively, the difference between the true value and the average result obtained from a large number of determinations using a biased method.

4.1.2 *Coefficient of variation* (v)—in mass basis sampling, the percentage of the standard deviation (s) relative to the mean value ($\bar{x}$) of the mass of increments, as shown below:

$$v\,(\%) = \frac{s}{\bar{x}} \times 100$$

4.1.3 *Constant mass division*—the method of sample division in which the retained portion from individual increments is of uniform mass.

4.1.4 *Continuous sampling*—the taking of increments from every sampling unit to form a gross sample.

4.1.5 *Divided increment*—the quantity of coal or coke obtained by division of the increment in order to decrease its mass.

4.1.6 *Division*—the process of decreasing the sample mass (without modification of the particle size of the constituent pieces) where a representative part of the sample is retained while the remainder may be rejected.

4.1.7 *Duplicate sampling*—a particular case of replicate sampling (with only two replicate samples), for the purpose of estimating the average precision of sampling from a number of lots or sampling units.

4.1.8 *Fixed rate division*—a procedure for obtaining divided increments with masses proportional to the masses of the increments to be divided.

4.1.9 *Gross sample*—a sample formed when all the increments collected from a lot are combined for reduction to a laboratory sample; where two or more samples are formed from interleaved increments, these samples are designated duplicate samples or replicate samples as the case may be.

4.1.10 *Increment*—the quantity of coal or coke taken by the operation of the sampling implement.

4.1.11 *Lot*—a quantity of coal or coke delivered at one time. The lot may be composed of one or more sampling units.