Australian Standard®

Guide to the determination of desorbable gas content of coal seams—Direct method

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The following interests are represented on Committee MN/1:

Australasian Institute of Mining and Metallurgy

Australian Coal Association

Australian Coal Preparation Society

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

CSIRO, Division of Coal and Energy Technology

Department of Minerals and Energy, N.S.W.

Department of Resource Industries, Queensland

Electricity Supply Association of Australia

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Joint Coal Board

National Association of Testing Authorities, Australia

Queensland Coal Board

Royal Australian Chemical Institute

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PREFACE

This Standard was prepared by the Standards Australia Subcommittee on Coal Mining and Geology, under the supervision of the Committee on Coal and Coke and the direction of the Minerals Standards Board, to provide guidelines on the testing of coal seam samples for gas content.

The method outlined in this Standard is based upon the direct method developed by the US Bureau of Mines*.

In the future, the scope may be extended to include other direct and indirect methods. Consideration would also be given to the measurement of the desorbable gas quantity to zero absolute gas pressure.

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* DIAMOND, W.P. and LEVINE, J.R., *Direct method determination of the gas content of coal: Procedure and results.* Report of Investigations 8815, US Bureau of Mines.

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FOREWORD

Underground coal mining in Australia is undergoing a gradual change towards more advanced production techniques and deeper seams. The impact of seam gas on the increased mine production and safety is thus becoming more apparent and, as a consequence, more companies and individuals are gathering data on gas.

Gas content measurements have relevance in such fields as gas emission control, gas outburst control and gas utilization.

Methods for the estimation of the gas content of coal seams can be grouped into two categories, viz. direct and indirect.

Direct methods are based upon extracting a coal sample, enclosing it in a sealed container and measuring the volume of the gas evolved.

Indirect methods are based upon either the gas absorption characteristics of coal under a given pressure and temperature condition, or upon other empirical data, obtained from existing mines, that relate the gas content of coal to such other parameters as coal rank, depth of cover or gas emission rate.

The direct method as set out in this Standard will provide a uniform basis for comparison of gas content within and between coal mining areas. The Standard seeks to ensure that comparable data are collected and reported in a variety of forms to satisfy the characterization of the seam gas content.

STANDARDS AUSTRALIA

Australian Standard

Guide to the determination of desorbable gas content of coal seams—Direct method

1 SCOPE This Standard is intended for the determination of the total desorbable gas content of coal seams, using samples obtained by surface drilling and from underground. It sets out guidelines for the equipment construction, sampling and testing procedure, and method of calculation.

The Standard is confined to the direct method, using lump or core samples. The gas content determination using cuttings from drilling is not covered in this document, nor is the quantity of gas desorbed from atmospheric pressure to zero absolute pressure.

The interpretation of the results does not fall within the scope of the document.

2 APPLICATION The purpose of this Standard is to provide guidelines to enable a uniform testing procedure. It is intended that the guidelines be implemented in a flexible manner. Variations from the testing procedure should be reported so that the basis for the particular method used is easily understood.

This Standard will find application among mine operators and exploration personnel in both the coal mining industry and the associated field of the commercialization of gas reserves contained within coal seams.

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

AS
1038 Methods for the analysis and testing of coal and coke
1038.3 Part 3: Proximate analysis of higher rank coal
1038.16 Part 16: Acceptance and reporting of results
1038.21 Part 21: Determination of the relative density and apparent relative density of hard coal
1210 Unfired pressure vessels

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

NOTE: The gas quantities defined refer to standard temperature and pressure (STP).

4.1 'Lost gas' (Q_1)—gas lost from the sample, subsequent to its being removed from its *in-situ* position and prior to its containment and measurement of Q_2; expressed as the quantity per unit mass of coal.

4.2 'Measurable gas' (Q_2)—measurable gas desorbed at atmospheric pressure from the non-pulverized coal sample; expressed as the quantity per unit mass of coal.

4.3 'Residual gas' (Q_3)—further gas desorbed at atmospheric pressure from the pulverized coal sample; expressed as the quantity per unit mass of coal.

4.4 Desorbable gas content (Q_D)—the sum of Q_1 and Q_2.

4.5 Total desorbable gas content (Q_{TD})—the sum of Q_1, Q_2 and Q_3.

4.6 Lump samples—coal samples, other than drill cores, having a particle size of approximately 50 mm.

4.7 Zero time (t_0)—that point in time at which desorption is deemed to have commenced.

4.8 Time on test (t_1)—that point in time at which the canister is connected to the measuring apparatus.

4.9 Elapsed time (t_e)—duration, in minutes, between zero time and time on test, i.e. $t_1 - t_0$.

5 PRINCIPLE The method consists of sampling the coal seam by coring or underground face sampling, placing the sample in a canister and putting it on test with minimum delay. The initial desorption rate is measured and used for the calculation of Q_1. The total quantity of gas evolved from the canister is measured volumetrically to determine Q_2.

Subsamples are then taken from the canister and crushed, at approximately atmospheric pressure, in a ball mill, until gas evolution ceases. The quantity of gas evolved by crushing is measured to determine residual gas (Q_3).

The amount of gas lost (Q_1) is determined by extrapolation of the desorption trend to zero time.

The total desorbable gas content (Q_{TD}) is then calculated.

As determined, the total desorbable gas content is on an air-dry coal basis. For comparison purposes, the result may have to be converted to other bases, e.g. dry, ash-free (see AS 1038.16).