Australian Standard™

Coal preparation

Part 6: Determination of dust/moisture relationship for coal

Standards Australia

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Australasian Institute of Mining and Metallurgy

Australian Coal Association

Australian Coal Preparation Society

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Coalfield Geology Council of N.S.W.

CSIRO, Energy Technology

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PREFACE

This Standard was prepared by the Standards Australia Committee MN/1, Coal and Coke and is based on the Rio Tinto Research and Technology Development* Tumbler Dust Test as an alternative to ASTM D 441.

The objective of this Standard is to provide a comprehensive procedure that will allow determination of the dustiness of coal with respect to moisture and determine a dust extinction moisture (DEM), and evaluation of chemical for dust suppression.

The procedures shown in this Standard are based on a standard air flow. However, it is also possible to determine dust extinction moisture (DEM) values at other flow rates using the equipment described provided the actual air flow rates are recorded with the results.

The term 'informative' has been used in this Standard to define the application of the Appendix to which it applies. An informative appendix is for guidance and information only.

* Rio Tinto Research and Technology Development is a unit of Rio Tinto Technology Group Legal Entity Technological Resources Pty Ltd ACN 002 183 557.

CONTENTS

FOREWORD

The development of the dust/moisture curve provides an indication of the likely response of different coal types to drying or water addition during mining and handling processes. The dust/moisture curve provides a good basis for comparing the response of different coal types. Understanding the dust/moisture characteristics of a coal will allow minimized water addition to the product for dust suppression. This will in turn assist in water conservation at mines and other handling facilities, as well as minimizing the total moisture of the product.

This Standard describes a reliable measurement of dustiness of coal and extends to cover the relationship between dust and total moisture utilizing the Rio Tinto Dust Tumbler Test. This test provides a quantitative measure of the dustiness of a coal that can be used to predict operational dust problems, and is suitable also, for the assessment of dust suppression chemicals . The Rio Tinto Dust Tumbler Test follows ealier work by Farrugia et al*.

The Rio Tinto Dust Tumbler Test was developed using rotating equipment in a controlled temperature and humidity environment, and uses a stream of air to remove particles which become airborne during the tumbling process. It is a batch test in which dust particles (−150 µm particles) are collected into a pre-weighed filter bag and weighed. From this weight a dust number, calculated as the mass yield of dust multiplied by 100 000, is determined for the test total moisture. Only one kilogram of sample is required for each dust test, but eight sample lots are required to develop the dust/moisture curve for a particular coal, i.e. approximately 10 kg is required for each coal type.

This dust test can be repeated with sub-samples at different coal total moisture levels to develop a dust/moisture curve. The slope of the curve provides information on how sensitive the dustiness is to changes in total moisture and a dust number of 10 has been used to provide a comparison between coals.

The test has been successfully used for several years on many coals and other bulk materials. The results have been correlated with operating practice. The method has been applied to the evaluation of dust control products, and the determination of dust elimination total moisture requirements for coal handling systems.

* FARRUGIA, T.R., AHMED, N. and JAMESON, G.J., A new technique for measuring dustiness of coal, Journal of Coal Quality, Vol. 8, No. 2, pp. 51-55, April-June 1989.

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1 SCOPE

This Standard sets out a laboratory procedure for the dust testing of higher rank coals. The procedure defines a means of evaluating the dust/moisture relationship characteristic of a coal and a dust extinction moisture (DEM).

NOTE: In this Standard an experimental dust number of 10 has been used in the example given in Appendix A.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
1038 Coal and coke—Analysis and testing
1038.1 Part 1: Higher rank coal—Total moisture
2706 Numerical values—Rounding and interpretation of limiting values
3881 Higher rank coal—Size analysis

3 DEFINITIONS

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

3.1 Dust

Particles of 150 µm or less diameter entrained in an air stream.

3.2 Dust extinction moisture (DEM)

The total moisture at which a dust number of 10 is attained on the dust/moisture curve. DEM is a useful point for comparing different coals and the effectiveness of reagents.

4 SAFETY

The following safety precautions shall be observed:

(a) To prevent nitrogen build up within the laboratory, the exhaust tube of the minimum free space oven shall remain clear of obstruction.

(b) Safety glasses shall be worn at all times.

(c) The minimum head space oven's exhaust tube shall remain free of obstruction to prevent nitrogen build up within the laboratory.

(d) A dust mask shall be worn when handling coal. Coal with less than 5% quartz has been assigned a time weighted average exposure standard of 3 mg/m^3 (respirable) by the National Occupational Health and Safety Commission.

(e) Cloth or leather gloves shall be worn when using ovens.

(f) The hazards associated with a reagent shall be determined prior to use. Instructions on all relevant Material Safety Data Sheets (MSDS) shall be followed.