

# Method of assessment of the liability to breakdown in water of materials associated with coal seams

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Solid Mineral Fuels Standards Policy Committee (SFC/-) to Technical Committee SFC/5, upon which the following bodies were represented:

- British Coal Corporation
- Coal Preparation Plant Association
- Low Temperature Coal Distillers' Association of Great Britain Ltd.
- Minerals Engineering Society

This British Standard, having been prepared under the direction of the Solid Mineral Fuels Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 June 1994

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The following BSI references relate to the work on this standard:  
Committee reference SFC/5  
Draft for comment 90/52205 DC

ISBN 0 580 23160 7

## Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
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## National foreword

This British Standard has been prepared under the direction of the Solid Mineral Fuels Standards Policy Committee and is identical with ISO 10753:1994 *Coal preparation plant — Assessment of the liability to breakdown in water of materials associated with coal seams*, published by the International Organization for Standardization (ISO) and in the preparation of which the United Kingdom played a full part.

### Cross-reference

The Technical Committee has reviewed the provisions of ISO 3310-1:1990 to which normative reference is made in the text and has decided that they are acceptable for use in conjunction with this standard.

A British Standard related to ISO 3310-1:1990 is BS 410:1986 *Specification for test sieves*. Test sieves of nominal size of openings 500 µm complying with BS 410:1986 are technically equivalent to, and may be used in place of, those complying with ISO 3310-1:1990 (see 5.3).

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

## Introduction

In this International Standard, the materials associated with coal seams are collectively referred to as “shale”, although they may contain a variety of rocks and minerals. This International Standard describes a method of assessing the liability of these materials to breakdown on agitation with water. Future activity on this subject could involve a method for simulating the breakdown that is likely to occur, in practice, in different types of coal preparation plants, to generate samples for further testing.

The liability of the shale to breakdown is measured by the proportion of the degraded material passing through a test sieve having a nominal size of openings of 500  $\mu\text{m}$ .

The method described in this International Standard also enables the liability of the shale to form slimes to be assessed, by determining the proportion that is below a nominal particle size of 10  $\mu\text{m}$ , using a simplified sedimentation technique. This technique is based on the assumption that, in the size range being examined, all the particles are spherical, have a relative density of 2,5, and fall freely through the suspending liquid according to Stokes's Law. These conditions are not entirely fulfilled in practice and the particle size is, therefore, referred to as a nominal value. The extent of breakdown, as measured by this method, will be affected by whether the shale exhibits any self-flocculation. In the described test, distilled water (or the equivalent) is used to avoid possible flocculation of the shale by any soluble salts in the water. The test may be adapted to assess the relative tendencies of shales to break down in a particular plant, by using the same water as is used in that plant. However, it is emphasized that the results of such tests, using plant water, have to be treated with caution because the extent of breakdown that will occur in practice is influenced by the interaction of all the components present during the washing process, including, for example, any accumulation of soluble salts in the circuit, and by other factors, such as the residence time in the plant.

The relationship between the proportion of degraded material passing a 500  $\mu\text{m}$  test sieve and the proportion of slimes provides useful information on the character of the breakdown, and is therefore included in the results that are reported.

The amount of breakdown occurring in practice and in the test will be affected by the history of the sample. For this reason, the sample is placed in a sealed container as soon as is practicable after being taken.

## 1 Scope

This International Standard specifies a method for assessing the liability of materials associated with coal seams to breakdown on agitation with water.

## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3310-1:1990, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*.

## 3 Principle

Degradation of a test portion of shale in the size range 5,6 mm to 2,8 mm, by controlled agitation in water. Determination of the proportion of degraded material passing through a 500  $\mu\text{m}$  sieve, and determination of the proportion of degraded material of nominal top size less than 10  $\mu\text{m}$  by sedimentation.

## 4 Reagent

During the test, use only distilled water or water of equivalent purity.

## 5 Apparatus

**5.1 Rigid cylindrical jar**, of non-corrodible material and of capacity 1,0 litre  $\pm$  0,1 litre, with an internal height of approximately 170 mm (internal diameter approximately 85 mm) and a height/diameter ratio 2,0  $\pm$  0,1.

The jar shall have a hard lid which can be secured to form a watertight seal.

**5.2 Rotation machine**, capable of rotating the jar about a transverse axis at a rotational frequency of 40  $\text{min}^{-1} \pm 1 \text{ min}^{-1}$  (speed of 40 r/min  $\pm$  1 r/min).

A typical assembly is shown in Figure 1.

NOTE 1 A suitable drive can be provided by a 0,1 kW single-phase motor running at 1 500 r/min, geared down to 40 r/min.

**5.3 Test sieve**, having nominal size of openings 500  $\mu\text{m}$ , complying with ISO 3310-1.

NOTE 2 This sieve is liable to suffer minor distortion when heated to 105 °C (see 7.5), and should therefore be reserved exclusively for use in this test. Furthermore, it is important to ensure that the sieve is constructed of materials that are stable at the temperature of drying.