

Methods of test for

Magnetite for use in coal preparation

Committees responsible for this British Standard

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- Association of British Mining Equipment Companies
- British Coal Corporation
- Coal Preparation Plant Association
- Minerals Engineering Society

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National foreword

This British Standard has been prepared under the direction of the Solid Mineral Fuels Standards Policy Committee. It is identical with ISO 8833:1989 “*Magnetite for use in coal preparation — Test methods*” prepared by Technical Committee ISO/TC 27, Solid mineral fuels, of the International Organization for Standardization (ISO).

Cross-references

International Standard	Corresponding British Standard
ISO 2597:1985	BS 7020 <i>Analysis of iron ores</i> Part 4 <i>Methods for the determination of total iron content</i> Section 4.1:1988 <i>Titrimetric methods</i> (Identical)
ISO 3081:1986	BS 5660 <i>Methods of sampling iron ores</i> Part 1:1987 <i>Manual method of increment sampling</i> (Identical)
ISO 3083:1986	BS 5661:1987 <i>Method for preparation of samples of iron ores by manual means</i> (Identical)

With reference to clause 2 and 10.3.5, the relevant requirements in BS 1583:1986 “*Specification for one-mark pipettes*” are equivalent to those in ISO 648:1977. With reference to clause 2 and 6.2, the relevant requirements in BS 410:1986 “*Specification for test sieves*” and BS 1796:1976 “*Method for test sieving*” are equivalent to those in ISO 3310-1:1982 and ISO 2591:1973.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, 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

The basic requirements for a material to be used in dense medium suspension are that it should be inert, have a high relative density and be easy to recover. In coal preparation, the mineral magnetite (FeO , Fe_2O_3) has become the most commonly used material, not only because it fulfils all the above criteria, but also because of its worldwide occurrence either as an iron ore or as a by-product of mining operations for other minerals. Like any mineral, magnetite rarely occurs in the pure state and the presence of gangue minerals may lower the relative density and affect the ferromagnetic properties. In addition, like other minerals in the spinel group, there may be substitution of either or both the divalent and/or trivalent ions by ions of other metals (e.g. Mg^{2+} , Mn^{2+} , Al^{3+} , Cr^{3+} , Mn^{3+}). These variations may seriously affect the efficiency of recovery operations and it is important when designing a coal preparation plant that the manufacturer of the magnetic separators be informed of the source of magnetite to be used and if possible be provided with a sample.

The purpose of this International Standard is to provide a basis for the testing of magnetite for use in coal preparation. It is intended for use by contracting parties in the sale and purchase of magnetite and for coal preparation engineers engaged in the design and quality control fields.

The tests specified in this International Standard will assist the user in the selection of magnetite for use in dense medium suspension and provide a basis for quality control testing. No attempt is made to formulate the requirements for particular plant applications.

The specified tests should ensure that the properties which make magnetite suitable for coal preparation purposes are simply and adequately tested.

These properties are

- a) moisture content;
- b) particle size distribution;
- c) total magnetics content;
- d) relative density;
- e) total iron content;
- f) iron(II) content;
- g) fundamental magnetic properties.

All the above tests may be required for the assessment of magnetite from a new source, but for routine checking of regular supplies, moisture, particle size distribution, total magnetics content and relative density should be sufficient.

Tests for fundamental magnetic properties are not described because the determination of suitable parameters requires very specialized apparatus and techniques and is probably best undertaken by a University or Research Institute whose staff are experienced in making such measurements. There is a lack of consensus as to which magnetic parameters are relevant in the context of this International Standard. Therefore, it is left open for the interested parties to decide which property to measure. However, there is some evidence to suggest that the coercivity is a guide to the ease of recovery of a magnetite and that the saturation magnetic moment is a measure of the purity of the actual magnetite grains.

This International Standard applies exclusively to the testing of magnetite and no attempt is made to recommend specific tests for the dense medium suspensions of which magnetite forms the solid phase.

1 Scope

This International Standard specifies methods for the sampling and testing of magnetite for use in coal preparation.

The test methods are intended primarily for the testing of milled magnetite, the largest particle size of which is usually less than 250 μm . However, the tests are also applicable to unmilled magnetite with an upper particle size limit of about 500 μm .

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were 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 editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 648:1977, *Laboratory glassware — One-mark pipettes*.

ISO 2591:1973, *Test sieving*.

ISO 2597:1985, *Iron ores — Determination of total iron content — Titrimetric methods*.

ISO 3081:1986, *Iron ores — Increment sampling — Manual method*.

ISO 3083:1986, *Iron ores — Preparation of samples — Manual method*.

ISO 3310-1:1982, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*.