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Hard coal — Determination of abrasiveness

Houille — Détermination de l'abrasivité

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 5, *Methods of analysis*.

This third edition cancels and replaces the second edition (ISO 12900:2015), of which it constitutes a minor revision to provide clarification on how to operate the abrasion test machine in Clause 7.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The abrasiveness of coal is recognized as a factor in coal operations, from mining to utilization, requiring a standard method of measurement and evaluation, as some coals are more abrasive than others.

The interaction between coal and conveying, storage, and crushing equipment results in component wear. In particular, higher contact pressures in some coal pulverizers result in significant wear.

For the ranking or relative comparison of the abrasiveness of coals, a test was developed[1] which standardized the following equipment variables:

a) test equipment dimensions and tolerances;

b) speed of rotation of wearing components;

c) properties of the wearing components;

d) mass of the test portion;

e) top particle size of the test portion;

f) duration of the test.

The abrasiveness of coal is generally a function of two factors: the physical properties of the coal, in particular, moisture content, mineral content, and mineral characteristics[1][2][3][4][5][6]; the mechanics of the operations to which the coal is subjected.

NOTE Moisture contents over 10 % in the test sample after air-drying and laboratory equilibration might give anomalous results; the reason for this has not been established.

Wear on coal-pulverizing elements in industrial mills is influenced by the physical characteristics of the coal and its mineral constituents, the mechanical characteristics of the mill, including the milling pressures, alloy material properties and coal feed flow, and the operation of the mill. Abrasiveness as determined by this document has been demonstrated to provide initial empirical estimates of specific wear rates in certain types of industrial tube-ball mills, vertical spindle mills, and high-speed hammer mills[3][6], with different coefficients for each mill type.

Abrasiveness as determined by this document might be of value in providing an initial estimate of the likely wear in other applications, giving the relative effect of different coals.

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Hard coal — Determination of abrasiveness

1 Scope

This document describes a method for determining the abrasiveness of hard coal.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 589, *Hard coal — Determination of total moisture*

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

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 13909-2, *Hard coal and coke — Mechanical sampling — Part 2: Coal — Sampling from moving streams*

ISO 13909-3, *Hard coal and coke — Mechanical sampling — Part 3: Coal — Sampling from stationary lots*

ISO 13909-4, *Hard coal and coke — Mechanical sampling — Part 4: Coal — Preparation of test samples*

ISO 18283, *Hard coal and coke — Manual sampling*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

Four standard steel blades are rotated under specified conditions in a 2 kg mass of prepared coal in a test machine. The abrasiveness is calculated from the mass of steel lost during the test.

5 Apparatus

5.1 Abrasion test machine, comprising the following components:

5.1.1 Blades, of the following types:

a) **A set of four reference blades**[1)], having a Vickers hardness of 160 ± 15 when tested in accordance with ISO 6507-1. When new, the blades, machined with the bar rolling direction parallel to the line of the bolt holes, from a bar of carbon steel, shall have the shape, dimensions, and surface finish

1) Suitable blades are available from Mitsui Babcock Energy Ltd., Technology Centre, Renfrew, U.K. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products. Equivalent products may be used if they can be shown to lead to the same results.

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