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Brown coals and lignites — Determination of true relative density and apparent relative density

Charbons bruns et lignites — Détermination de la densité relative vraie et de la densité relative apparente

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Contents

Page

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, *Coal and Coke*, Subcommittee SC 5, *Methods of analysis*.

This third edition cancels and replaces the second edition (ISO 5072:2013), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— referenced documents have been updated;

— terms and definitions have been added;

— sample has been added;

— calculation and expression of results have been amended;

— precision has been amended;

— test report has been amended.

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

Brown coals and lignites — Determination of true relative density and apparent relative density

1 Scope

This document describes methods for the determination of true relative density and the apparent relative density of brown coals and lignites.

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 5068-1, *Brown coals and lignites — Determination of moisture content — Part 1: Indirect gravimetric method for total moisture*

ISO 5068-2, *Brown coals and lignites — Determination of moisture content — Part 2: Indirect gravimetric method for moisture in the analysis sample*

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

ISO 18283, *Coal and coke — Manual sampling*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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 https://www.electropedia.org/

3.1
true relative density
ratio of the mass of a sample of dry coal ground to pass through a 212 µm sieve to the mass of an equal volume of water at a specified temperature

3.2
apparent relative density
ratio of the mass of a dry coal to the mass of a volume of water equal to the apparent volume of the coal at a specified temperature

4 Determination of the true relative density by the water method

4.1 Principle

The true relative density is determined pycnometrically by water displacement, with the inclusion of a wetting agent to ensure dispersion of the solid in the displacement medium.

NOTE The use of other displacement media such as methanol is not recommended because of possible swelling of some brown coals and lignites in such liquids.

4.2 Reagents

4.2.1 Distilled or deionized water, freshly boiled.

4.2.2 Wetting agent, 5 % (volume fraction) solution of detergent (such as sodium dodecyl sulfate) is suitable.

4.2.3 Potassium dichromate-sulfuric acid mixture, for cleaning pycnometers.

4.3 Apparatus

4.3.1 Analytical balance, with a resolution of 0,1 mg.

4.3.2 Camel hair brush, of such a diameter that bristles can pass completely through the stem of the funnel (4.3.4).

4.3.3 Filter paper, for drying the necks of the pycnometers.

4.3.4 Funnel, with a stem of sufficient length to reach the middle of the pycnometer flask.

4.3.5 Glass cleaning cloth, fibre free for polishing the pycnometers prior to mass determination.

4.3.6 Glass syringe, with a needle to bring the pycnometer liquid to the mark of the pycnometer.

4.3.7 Earthing point, to remove static charge from pycnometers.

4.3.8 Thermometer, capable of measuring the temperature in the range of 20 °C to 30 °C with a minimum scale spacing of 0,1 °C.

4.3.9 Pycnometers, of capacity 50 ml, with capillary-bored ground stoppers, internal diameter of the neck no greater than 5 mm.

4.3.10 Vacuum desiccator, with protective cage.

NOTE The use of a vacuum desiccator is preferable for the purpose of degassing samples.

4.3.11 Vacuum pump, capable of attaining a vacuum of residual pressure from 0 kPa to 5 kPa.

4.3.12 Water bath, thermostatically controlled, the temperature of which shall be maintained at 25 °C ± 0,1 °C as measured by a thermometer (4.3.8) permanently placed in the water bath.

4.3.13 Sample boat, with a capacity of not less than 2 g.

4.4 Sample

The sample shall be the general analysis test sample, prepared to a nominal top size of 212 µm by the preparation procedures specified in ISO 13909-4 or ISO 18283.

The sample should be brought in moisture equilibrium with the laboratory atmosphere by exposure in a thin layer on a tray. Exposure time shall be kept to a minimum.

The sample shall be thoroughly mixed immediately before analysis, preferably by mechanical means.