International Standard

ISO 18847

Solid biofuels — Determination of particle density of pellets and briquettes

Biocombustibles solides — Détermination de la masse volumique unitaire des granulés et des briquettes

Second edition
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 document 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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This document was prepared by Technical Committee ISO/TC 238, *Solid biofuels,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 335, *Solid biofuels,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18847:2016), which has been technically revised.

The main changes are as follows:

— editorial changes made;

— ISO 21945 inserted as a normative reference;

— method for the determination of particle density is specified in more detail;

— informative Annex B on a liquid displacement method to estimate the particle density of pellets added.

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

Particle density is a fuel parameter of pellets and briquettes which is often considered when describing the degree of compaction of the raw material used. Particle density can be highly specific for the respective type or species of biomass and thus, it also characterizes the material's general ability to be compacted. High particle density is often associated with high resistance to abrasion or low susceptibility towards fracturing during handling and storage. A high particle density also generally leads to reduced storage volume demands and to a lower filling level in a combustion chamber at constant fuel mass flow. Particle density can also affect the heat transfer rate within the fuel and thus, it can have an impact on fuel ignition and on the dynamics of gasification.

Apart from the buoyancy method which is described in this document as a reference method, larger particles (briquettes) are sometimes easier tested by simple stereometric means. For internal laboratory practices, such a procedure is also presented in Annex A. For small particles (pellets), this procedure is not recommended.

For pellets, a simplified method using the displacement of a liquid by the pellets is available, which can be used as an on-site method, and is described in Annex B.

Pellets disintegrate in water relatively fast, but with the buoyancy method the particle density is sufficiently stable for about 30 s (see [3]). To improve reproducibility, the reading of the results is fixed at 5 s. This also ensures synchronization with the results of the estimation method by liquid displacement.

For the determination of particle density, several other methods are available. Normally the results show only minor deviations.

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Solid biofuels — Determination of particle density of pellets and briquettes

1 Scope

This document specifies a method for determining the particle density of compressed fuels such as pellets or briquettes. Particle density is not an absolute value and conditions for its determination have to be standardized to enable comparative determinations to be made.

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 14780, *Solid biofuels — Sample preparation*

ISO 16559, *Solid biofuels — Vocabulary*

ISO 18135, *Solid Biofuels — Sampling*

ISO 21945, *Solid biofuels — Simplified sampling method for small scale applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16559 apply.

ISO and IEC maintain terminology 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/

4 Principle

Both mass and volume of an individual particle or a group of particles are determined. The volume is measured by determining the buoyancy in a liquid. This procedure follows the physical principle that the buoyancy is equal to the mass of the displaced volume of a liquid. The apparent loss in weight between a measurement in air and a subsequent measurement in liquid marks its buoyancy. The volume of the test portion body is calculated via the density of the applied liquid.

NOTE 1 The particle density of briquettes can alternatively be estimated by stereometric means (see Annex A).

NOTE 2 As an on-site method the particle density of pellets can be estimated by a displacement method (see Annex B).

5 Reagents

5.1 Water, with a conductivity < 1 000 µS/cm (e.g. typical drinking water quality) in a temperature range of 10 °C to 30 °C.

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