SLOVENSKI STANDARD
kSIST prEN 15150:2011

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Trdna biogoriva - Določevanje prostorninske mase

Solid biofuels - Determination of particle density

Feste Biobrennstoffe - Bestimmung der Partikeldichte

Combustibles solides - Détermination de la masse volumique des particules

Ta slovenski standard je istoveten z: **FprEN 15150**

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English Version

Solid biofuels - Determination of particle density

Combustibles solides - Détermination de la masse volumique des particules

Feste Biobrennstoffe - Bestimmung der Partikeldichte

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 335.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (FprEN 15150:2011) has been prepared by Technical Committee CEN/TC 335 “Solid biofuels”, the secretariat of which is held by SIS.

This document is currently submitted to the Unique Acceptance Procedure.

This European Standard will supersede CEN/TS 15150:2005.

1 Scope

This European Standard describes the 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 standardised to enable comparative determinations to be made.

NOTE Particle density is subject to variation due to the susceptibility of organic material to environmental or technical impacts such as air humidity, vibration, abrasion or biodegradation. Particle density can therefore vary during time, thus the measured values should be regarded as a momentary fuel property.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 14588:2010, *Solid biofuels – Terminology, definitions and descriptions*

EN 14961-1, *Solid biofuels – Fuel specifications and classes – Part 1: General requirements*

EN 14961-3, *Solid biofuels – Fuel specifications and classes – Part 3: Wood briquettes for non-industrial use*

FprEN 14778, *Solid biofuels – Sampling*

FprEN 14780, *Solid biofuels – Sample preparation*

EN 14774-1, *Solid biofuels – Determination of moisture content – Oven dry method – Part 1: Total moisture – Reference method*

EN 14774-2, *Solid biofuels – Determination of moisture content – Oven dry method – Part 2: Total moisture – Simplified procedure*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 14588 shall apply.

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 of a body is equal to the weight 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 sample body is calculated via the density of the applied liquid.

NOTE The particle density of briquettes could also be estimated by stereometric means (see informative Annex A). This estimation could also be made if pellets are cut to determine their volume by stereometric means. Be aware of a higher variability between the replications when applying the stereometric measuring principle.

5 Reagents

5.1 Water with low content of ions (e.g. drinking water quality) in a temperature range of 10 °C to 30 °C.

5.2 A detergent named O-[4-(1,1,3,3-Tetramethylbutyl)-phenyl]-deca(oxyethylen), Octylphenoldecaethylen-glycolether, Polyethylenglycol-mono-[p-(1,1,3,3-tetramethylbutyl)-phenyl]-ether.

NOTE The exclusive use of this specific detergent with given characteristics allows to apply a fixed value for the density of the liquid (mixture with water) and ensures constant properties as wetting agent. The detergent is for example traded under the name Triton® X-100. The density at 20 °C is 1,07 g/l.

5.3 Paraffin with a melting point of 52 °C to 54 °C**.**

6 Apparatus

6.1 General apparatus requirements

6.1.1 Thermometer for liquids having a measuring accuracy of 1 °C

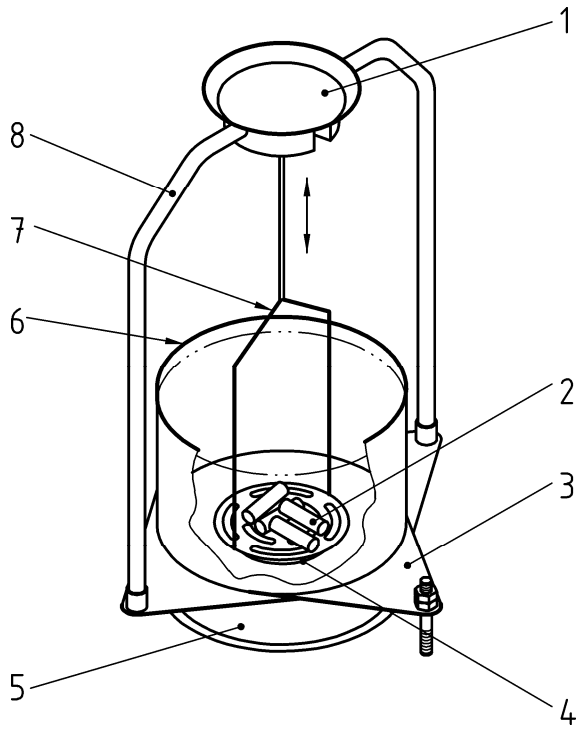
6.1.2 Facilities for moisture content determination according to EN 14774-1 or EN 14774-2

6.2 Apparatus for pellet testing

6.2.1 A balance, having sufficient accuracy to determine the weight to the nearest 0,001 g. Due to the high sensitivity of the balance the test rig shall be placed into a wind protection cabinet to allow undisturbed and immediate reading of the displayed values.

6.2.2 A transparent beaker glass of about 200 ml filling volume.

6.2.3 A density determination rig which can be placed on the balance. The rig consists of a bridge which overstretches the weighing plate of the balance in order to prevent the balance from being loaded. The bridge is capable of carrying the beaker glass (5.2.2). Through a supporting frame with suspension rods a weighing dish ("submergence dish") is hung into the beaker glass (Figure 1) which is filled with liquid. The dish shall be able to accommodate at least four pellets at once. Both, the supporting frame and the submergence dish are directly loaded on the balance plate. The submergence apparatus (the dish and the suspension) can be removed for being loaded with pellets. Through the dish suspension the submergence depth is always kept constant. The bottom of the submergence dish is perforated by openings which are smaller in diameter than the diameter of the pellets. This perforation allows the liquid to fill the dish from underneath when it is submerged. If sample material of low density shall be applied (below 1,0 g/cm^3) a modified suspension having an inverted submergence dish is required; this is to force the pellets underneath the liquid surface and prevent them from floating atop of the liquid. For the determination of the mass in air it is useful to use a combined test rig where an additional upper weighing dish is fixed to the suspension (Figure 1).



Key

1 weighing dish (weighing in air)

2 pellets

3 bridge

4 perforated submergence dish (weighing in water)

5 weighing plate (balance)

6 beaker glass

7 dish suspension

8 supporting frame

Figure 1 — Buoyancy determination rig on a balance (method for pellets)

6.3 Apparatus for briquette testing

6.3.1 A balance, having sufficient accuracy to determine the weight to the nearest 0,01 g. If briquettes of more than 500 g each are tested the accuracy of the balance can be reduced to 0,1 g. The balance must have a connecting point for hanging a weight to its load cell.

6.3.2 A transparent container for liquids having a sufficient filling volume to accommodate the liquid and the submerged briquette.

NOTE A sufficient filling volume is usually achieved when the container's cross section is about 8 times larger than the cross section of the briquette. In this case any effects by level changes of the liquid caused by submersion of the briquette are negligible. Such error would be due to a larger part of the holding steel string (see 6.3.3) being submerged.