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Solid biofuels — Determination of mechanical durability of pellets and briquettes —

Part 2: Briquettes

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This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

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Foreword

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ISO 17831 Standard was prepared by Technical Committee ISO/TC 238, *Solid biofuels*, Working Group WG 4, Physical and Mechanical Test Methods.

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Introduction

ISO DIS 17831 (15210) consists of the following parts under the general title Solid Biofuels – Determination of mechanical durability of pellets and briquettes.

Part 1 - Determination of mechanical durability of pellets

Part 2 – Determination of mechanical durability of briquettes

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Solid biofuels — Determination of mechanical durability of pellets and briquettes —

Part 2: Briquettes

1 Scope

This working document aims to define the requirements and method used for testing the mechanical durability of briquettes. It is intended for persons and organisations that manufacture, plan, sell, erect or use machinery, equipment, tools and entire plants related to such briquettes, and to all persons and organisations involved in producing, purchasing, selling and utilising briquettes.

The durability is the measure of the resistance of densified fuels towards shocks and/or abrasion as a consequence of handling and transportation processes.

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.

ISO DIS 16559 (14588), *Solid biofuels – Terminology, definitions and descriptions*

ISO DIS 18134-1 (14774-1), *Solid biofuels - Determination of moisture content - Oven dry method - Part 1: Total moisture - Reference method*

ISO DIS 18134-2 (14774-2), *Solid biofuels - Determination of moisture content - Oven dry method - Part 2: Total moisture - Simplified method*

ISO WD XXXXX (14778), *Solid biofuels – Sampling – Part 1: Sampling*

ISO WD XXXXX (14780), *Solid biofuels – Sample preparation*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO DIS 16559 (14588) apply.

4 Principle

The test sample is subjected to controlled shocks by collision of briquettes against each other and against the walls of a specified rotating test chamber. The durability is calculated from the mass of the sample remaining after separation of abraded and fine broken particles.

5 Apparatus

5.1 Briquette tester

The durability drum is a cylindrical steel drum with a nominal volume of 160 l having the following dimensions (see Figure 1).

Internal length, or depth: (598 ± 8) mm

Internal diameter: (598 ± 8) mm

The drum shall be made of minimum 1 mm steel plate. The internal surface area of the drum shall be smooth and any disturbances of the surface such as ridges or furrows shall be avoided.

The durability drum is equipped with a rectangular steel baffle having the following dimensions:

Length: (598 ± 8) mm

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Height: (200 ± 2) mm

Thickness: 2 mm

The baffle shall be welded on its length to the full height of the internal curved surface of the drum, parallel to the axis of the drum and perpendicular to the tangent of the curve. The baffle tip is shaped in a smooth curve of 90° to obtain a rim perpendicular to the baffle. The curve shall have a radius of $r = 10$ mm and the curved tip shall have a total vertical height of 30 mm (Figure 1).

The drum can be open on one of the ends. This opening shall be fitted with a dustproof lid of the same diameter as the internal diameter of the drum (598 ± 8) mm. When the lid is in position, it shall be approximately flush with the side of the cylinder. This lid shall be made of minimum 1 mm steel plate.

It shall be possible to fasten the lid securely by four rotating bolts (or any other suitable mechanism) fixed on the external part of the drum.

The drum shall be capable of being constantly driven at $(21 \pm 0,1)$ rpm by an electric motor, by suitable pulleys or gearings, in order to avoid vibrations. A rotation counter should be connected to the drum.

The rotation counter may also be connected to the motor so that the latter is automatically switched off after a defined number of rotations.

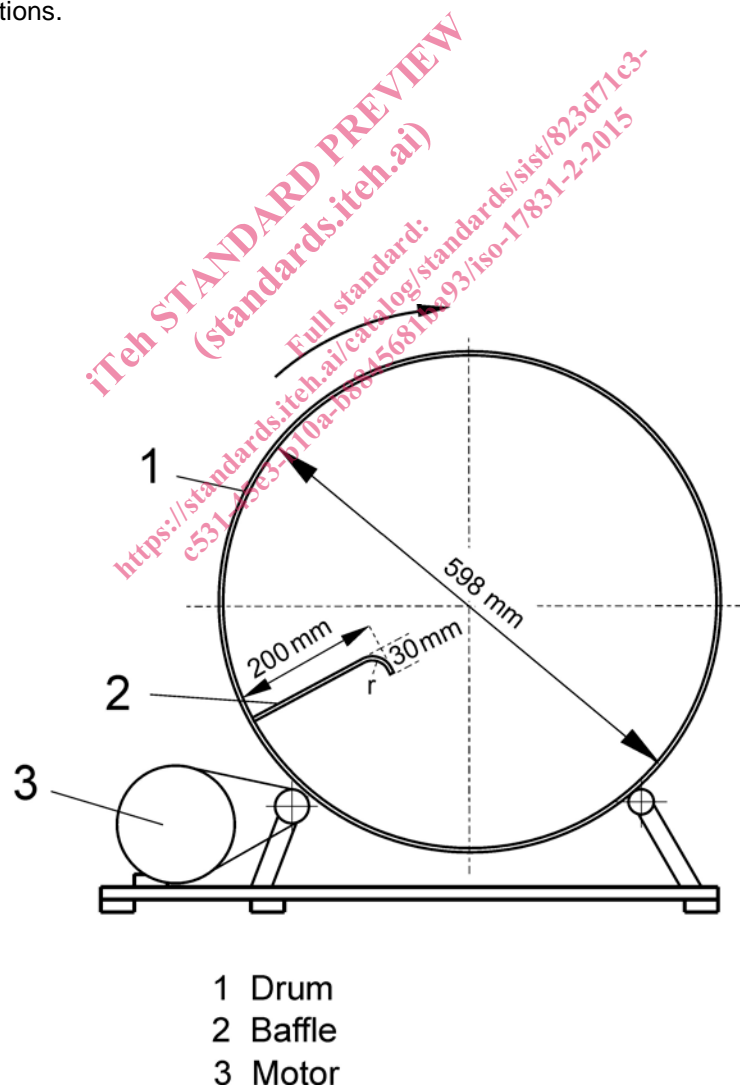


Figure 1 - Principle of the durability drum

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Date: 2013-07-01

5.2 Sieve

Depending on the briquette diameter, a sieve with a metal wire cloth conforming to ISO 3310-1 is chosen so that the aperture size is approximately equivalent to 2/3 of the briquettes diameter or diagonal but not exceeding 45 mm. The sieve should have a diameter of 400 mm or above.

5.3 Balance

A balance with a weighing capability of at least 2 kg and capable of measuring the mass to the nearest 0,1 g.

6 Sample preparation

The sample used for the determination of mechanical durability shall be taken and if necessary divided in mass according to ISO WD XXXXX (14778) and ISO WD XXXXX (14780). The size of the sample shall conform to the requirements of this document (depending on the nominal top size) but shall be at least 25 kg.

Divide the sample to obtain two parts: one to be used for moisture content determination (5 kg), the other for the mechanical durability test (5 x 4 kg = 20 kg). The moisture content as received shall be determined on a non-sieved sample simultaneously with the durability test according to ISO DIS 18134 (14774) Part 1 or 2.

The sample shall be tested at the moisture content as received. It shall be stored in airtight containers to avoid moisture changes. While the test is being conducted the sample shall be at room temperature.

Cylindrical briquettes with a length over twice their diameter shall be cut to a length equivalent to twice their diameter. Oversize briquettes shall be cut down to size using a blade or a band saw. Cuts shall be at right angles to the axis of the briquette. Other shaped briquettes shall be tested as received.

The minimum test portion shall be 2 kg, add as many full briquette portions to exceed this limit.

Note 1: The use of a single briquette portion with a minimum of 2 kg mass is acceptable

The sample shall not contain any small, broken particles. Small particles shall be separated from the sample by the use of the sieve mentioned in 5.2 or by sorting out briquettes manually.

Note 2: The length of the briquette has an influence on the briquettes behaviour in the durability drum, and therefore on the mechanical durability.

Note 3: The saw and type of teeth should be chosen to produce as smooth cut surface, consistent with the composition of the briquette under test.

7 Procedure

A prepared test portion of minimum 2 kg as described in Clause 6 is placed in the durability drum and rotated at $(21 \pm 0,1)$ rpm for 5 min (i.e. for 105 rotations $\pm 0,5$ rotations).

Afterwards, the sample is passed through a sieve with dimensions approximately equivalent to 2/3 of the diameter of the briquettes but not exceeding 45 mm. This sieve is selected from the series between 16 mm and 45 mm according to ISO 3310-1. The sieving shall be done in a way such that the fine particles are separated but the creation of new fine particles is avoided. This is best achieved when the sample is manually shaken by 5-10 circular movements on the sieve as defined in Clause 5.2. .

Note 4. Attention is drawn to the fact that rough treatment during screening might influence the result.