



SLOVENSKI STANDARD

SIST-TS CEN/TS 15210-2:2006

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Trda goriva - Metode za določanje mehanikalne trdnosti
pelletov in briketov - Del 2: Briketov

Solid biofuels - Methods for the determination of mechanical durability of pellets and briquettes - Part 2: Briquettes

Feste Biobrennstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets und Briketts - Teil 2: Briketts

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ICS:

75.160.10 Trda goriva Solid fuels

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English Version

Solid biofuels - Methods for the determination of mechanical durability of pellets and briquettes - Part 2: Briquettes

Feste Biobrennstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets und Presslingen - Teil 2: Presslinge

This Technical Specification (CEN/TS) was approved by CEN on 1 August 2005 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

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Contents		page
Foreword		3
1 Scope		4
2 Normative references		4
3 Terms and definitions		4
4 Principle.....		4
5 Apparatus		5
6 Sample preparation.....		6
7 Procedure		7
8 Calculation.....		7
9 Test report		8
10 Precision and bias		8

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<https://standards.iteh.ai/catalog/standards/sist/1ac954b8-72d8-41bf-9639-81a5563253c1/sist-ts-cen-ts-15210-2-2006>

Foreword

This Technical Specification (CEN/TS 15210-2:2005) has been prepared by Technical Committee CEN/TC 335 "Solid biofuels", the secretariat of which is held by SIS.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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CEN/TS 15210-2:2005 (E)**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 in 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.

CEN/TS 14588:2003, *Solid biofuels – Terminology, definitions and descriptions*

CEN/TS 14774-1, *Solid biofuels - Methods for determination of moisture content - Oven dry method - Part 1: Total moisture - Reference method*

CEN/TS 14774-2, *Solid biofuels - Methods for the determination of moisture content - Oven dry method - Part 2: Total moisture - Simplified method*

CEN/TS 14778-1, *Solid biofuels – Sampling – Part 1: Methods for sampling*

CEN/TS 14778-2, *Solid biofuels – Sampling – Part 2: Methods for sampling particulate material transported in lorries*

CEN/TS 14779, *Solid biofuels – Sampling – Methods for preparing sampling plans and sampling certificates*

CEN/TS 14780, *Solid biofuels – Methods for 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 Technical Specification, the terms and definitions given in CEN/TS 14588:2003 apply.

4 Principle

The test sample is subjected to controlled shocks by collision of briquettes against each other and against the walls of a defined rotating test chamber. The durability is calculated from the mass of 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

Height: (200 ± 2) mm

Thickness: 1 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 sagged in a smooth curve to obtain a rim perpendicular to the baffle.

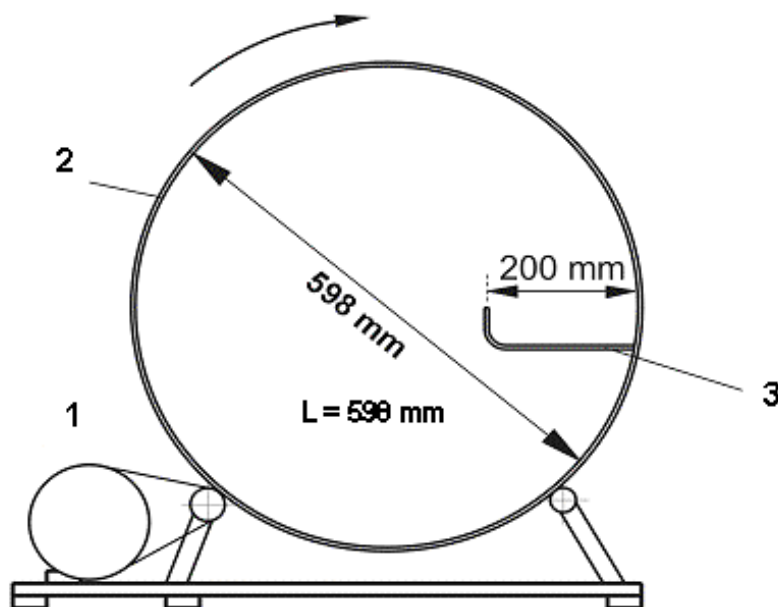
The drum shall be open on one of the ends. This opening shall be fitted with a dustproof lid of the same diameter than the internal diameter of the drum (598 ± 8) mm. When the lid is in position, it shall be approximately flush with the side of the cylinder. This lid shall be made of minimum 1 mm steel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

It shall be possible to fasten the lid securely by four rotating bolts (or any other suitable fixation) 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.

CEN/TS 15210-2:2005 (E)



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Key

- 1 Motor
- 2 Drum
- 3 Baffle

SIST-TS CEN/TS 15210-2:2006

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Figure 1 - Principle of the durability drum

5.2 Sieve

Depending on the briquette diameter, an ISO 3310-1 metal wire cloth is chosen so that the aperture size is approximately equivalent to the 2/3 of the briquettes diameter or diagonal but not exceeding 45 mm.

5.3 Balance

A balance capable of measuring the mass of the sample to the nearest 0,1 g.

6 Sample preparation

The sample used for the determination of mechanical durability shall be sampled and if necessary divided in mass according to CEN/TS 14778 Part 1 and 2, CEN/TS 14779 and CEN/TS 14780. The size of the sample shall conform to the requirements of this Technical Specification (depending on the nominal top size) but shall be at least 15 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 kg x 2 kg = 10 kg). The moisture content as received shall be determined on a non-sieved sample simultaneously with the durability test according to CEN/TS 14774 Part 1 or 2.

The sample shall be tested at the moisture content as received. The sample shall be stored in airtight containers for avoiding moisture changes. During the time of durability test, the sample shall be at room temperature.

The cylindrical briquettes with a length above two times the diameter shall be cut to a length equivalent to two times the diameter. The briquette is cut by a blade or a band saw, at the right angles to the axis of the briquette. Other shaped briquettes shall be tested as received.

The sample shall not contain any fines. 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 1 The length of the briquette has an influence on the briquettes behaviour in the durability drum, and therefore on the mechanical durability.

NOTE 2 The choice of the saw and type of teeth should be made in favour of an as smooth as possible cutting surface or typical to the briquette to be tested.

7 Procedure

A prepared sample, of $(2 \pm 0,1)$ kg is placed in the durability drum. Rotate the sample at $(21 \pm 0,1)$ rpm for 5 min or 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 is carried out by mechanical or manual oscillation during a period that allows a complete separation of the particles.

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

The sample remaining on the sieve shall be weighed. The percent of whole briquettes (particles remaining on the selected sieve) shall be calculated. Briquettes durability will be defined according to Clause 8.

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8 Calculation

The mechanical durability of briquettes shall be calculated using the following equation:

$$DU = \frac{m_A}{m_E} \times 100$$

where

DU is the mechanical durability in percent

m_E is the mass of pre-sieved briquettes before the drum treatment in grams;

m_A is the mass of sieved briquettes after the drum treatment in grams.

Calculate the mean value from the results of the 5 replications and report to the nearest 0,1 percent.