SLOVENSKI STANDARD
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Trdna biogoriva ï Metode za doloļ anje mehanske trdnosti pelet in briketov ï 1. del: Peleti

Solid biofuels - Methods for the determination of mechanical durability of pellets and briquettes - Part 1: Pellets

Feste Biobrennstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets und Briketts - Teil 1: Pellets

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Solid biofuels - Methods for the determination of mechanical durability of pellets and briquettes - Part 1: Pellets

Feste Biobrennstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets und Presslingen - Teil 1: Pellets

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Foreword

This Technical Specification (CEN/TS 15210-1:2005) 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.

1 Scope

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

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 3310-2, *Test sieves – Technical requirements and testing – Part 2: Test sieves of perforated metal plate*

3 Terms and definitions

For the purposes of this Technical Specification, the terms and definitions given in CEN/TS 14588:2003 apply.

4 Principle

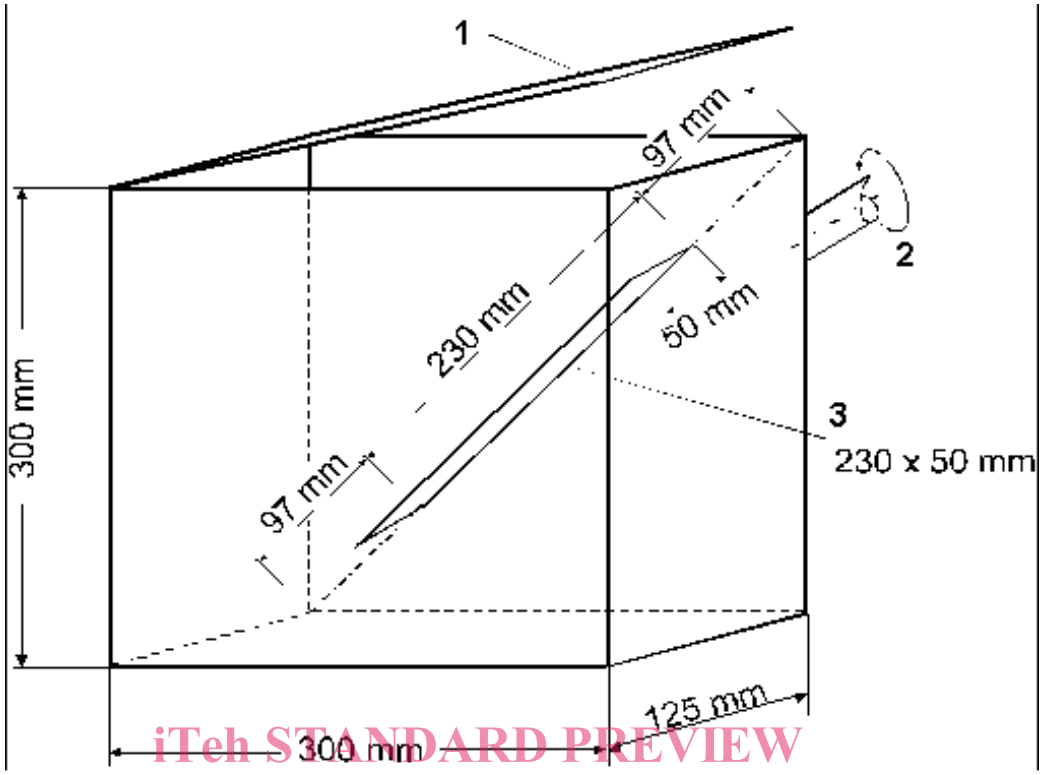
The test sample is subjected to controlled shocks by collision of pellets against each others and against the walls of a defined rotating test chamber. The durability is calculated from the mass of sample remaining after separation of abraded and fine broken particles.

5 Apparatus

5.1 Pellet tester

Description

The structure and dimensions of the pellets tester are shown in Figure 1 (see also informative Annex A).



Key

1 Filling door
2 Drive shaft
3 Baffle

Figure 1 - Structure of the main parts of the pellet tester

The pellets tester shall consist of a dust tight enclosure. This box shall be made of rigid material (e.g. steel plate aluminium or plexiglas) with smooth and flat surfaces, and it has the dimensions of (300 X 300 X 125) mm; it shall rotate at 50 rpm about an axis, which is perpendicular to and centred in the 300 mm sides. A 230 mm long baffle is affixed symmetrically to a diagonal of one 300 mm X 300 mm side of the box. One leg of this formed angle baffle extends 50 mm into the box and the other leg is securely fastened to the back of the box. A door may be placed in any side. Projections, such as rivets and screws, shall be kept to a minimum and well rounded.

5.2 Sieve

A sieve with round screen holes of 3,15 mm diameter and suitable for manual screening (see ISO 3310-2).

5.3 Balance

A balance with weighing capacity of 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 sampled according to CEN/TS 14778 Part 1 and 2 and CEN/TS 14779; if necessary divided in mass using coning and quartering method according to CEN/TS 14780. The minimum size of the sample shall be 2,5 kg. Divide the sample into four equal portions according to CEN/TS 14780. Take one portion for the determination of the total moisture content according to CEN/TS 14774 Part 1 or 2. Weigh two of the remaining sample portions and then separate fines by hand sieving using a sieve as described in 5.2. The sieving has to be done completely.

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

7 Procedure

A minimum of two determinations shall be carried out on the test sample.

Take a test portion of (500 ± 10) g. For pellets above 12 mm diameter (500 ± 50) g is allowed. Place the test portion of the sieved pellets, weighed to the nearest 0,1g, in the tumbling box device. Tumble the sample at (50 ± 2) rpm for 500 rotations. After this number of rotations the sample is removed and passed manually through a sieve according to 5.2. The sieving has to be done completely. The sample remaining on the sieve shall be weighed. The percent of whole pellets (particles remaining on the sieve) shall be calculated (particles remaining on the 3,15 mm sieve). Pellet durability will be defined according to Clause 8.

8 Calculation of the mechanical durability:

The mechanical durability of pellets 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 pellets before the tumbling treatment in grams

m_A is the mass of sieved pellets after the tumbling treatment in grams

The result shall be calculated to two decimal places and the mean result shall be rounded to the nearest 0,1 percent for reporting.

9 Precision and bias

9.1 General

Table 1

Durability	Maximum acceptable differences between results obtained	
	Repeatability limit	Reproducibility critical difference
Durability above or equal to 97,5%	0,2 % absolute or of the mean result	0,5 % absolute or of the mean result
Durability under 97,5%	1 % absolute or of the mean result	2 % absolute or of the mean result

9.2 Repeatability

The results of the duplicate determinations (performed within a short period of time, but not simultaneously) in the same laboratory by the same operator using the same apparatus on two representative test portions taken from the same general analysis sample, shall not differ by more than the values given in Table 1.

9.3 Reproducibility

The means of the results of duplicate determinations, performed in each of two different laboratories on representative test portions taken from the same general analysis sample shall not differ by more than the values given in Table 1.

10 Test report

The test report shall include at least the following information:

- Identification of laboratory performing test and the date when the test was undertaken;
- identification of product or sample tested (see CEN/TS 14779) and the number of duplicates tested;
- reference to this Technical Specification;
- result of the mechanical durability (as received) as mean value and the moisture content (as received);
- any unusual features noted during the determination;
- any operation not included in this Technical Specification, or regarded as optional;
- amount of fines, in weight % separated from the sample before the determination.

Additional reporting (informative)

- result of the mechanical durability (as received) for all individual replications.