



**SLOVENSKI STANDARD**  
**SIST-TS CEN/TS 15639:2007**

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Solid recovered fuels - Methods for the determination of mechanical durability of pellets

Feste Sekundärrohstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets

Méthodes pour la détermination de la résistance des briquettes et des granulés

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**Ta slovenski standard je istoveten z: CEN/TS 15639:2007**

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**ICS:**

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Solid fuels

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**en**

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English Version

## Solid recovered fuels - Methods for the determination of mechanical durability of pellets

Combustibles solides de récupération - Méthodes pour la détermination de la résistance des granulés

Feste Sekundärbrennstoffe - Verfahren zur Bestimmung der mechanischen Festigkeit von Pellets

This Technical Specification (CEN/TS) was approved by CEN on 23 July 2007 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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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.....	5
5 Apparatus .....	5
6 Sampling and sample preparation .....	6
7 Procedure .....	7
8 Calculations.....	7
9 Test report .....	7
Bibliography .....	9

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[SIST-TS CEN/TS 15639:2007](https://standards.iteh.ai/catalog/standards/sist/145b9894-b03b-4935-b2db-cb9f0f90df04/sist-ts-cen-ts-15639-2007)

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## Foreword

This document (CEN/TS 15639:2007) has been prepared by Technical Committee CEN/TC 343 “Solid recovered fuels”, the secretariat of which is held by SFS.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

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## 1 Scope

This document specifies a test method for the determination of the mechanical durability of pellets. It is intended to be applied by persons and organisations that manufacture, plan, sell, erect or use machinery, equipment, tools and entire plants related to such pellets, and that are involved in producing, purchasing, selling and utilising pellets.

The method is not applicable to soft pellets.

## 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 15357:2006, *Solid recovered fuels — Terminology, definitions and descriptions*

CEN/TS 15359, *Solid recovered fuels — Specifications and classes*

CEN/TS 15442, *Solid recovered fuels — Methods for sampling*

CEN/TS 15443, *Solid recovered fuels — Methods for laboratory sample preparation*

CEN/TS 15414-1, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 1: Determination of total moisture by a reference method*

CEN/TS 15414-2, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 2: Determination of total moisture by a simplified method*

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 document, the terms and definitions given in CEN/TS 15357:2006 and the following apply.

### 3.1 mechanical durability

measure of resistance of densified fuels towards shocks and/or abrasion as a consequence of handling and transportation processes, characterized by pellets disintegration and fines formation

### 3.2 fines

particles with a diameter less than 1 mm

NOTE Fines characterize the potential of high dust emission.

### 3.3 soft pellet

pellet with a density less than 600 kg/m<sup>3</sup>

## 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 mechanical durability is calculated from the mass of sample remaining after separation of abraded and fine broken particles.

## 5 Apparatus

**5.1 Pellet tester**, consisting of a dust tight enclosure, made of rigid material, e.g. a steel plate, aluminium plate or plexiglass, with smooth and flat surfaces, dimensions of 300 mm × 300 mm × 125 mm; capable of rotations of  $(50 \pm 2) \text{ min}^{-1}$  about an axis perpendicular to and centred in the 300 mm sides, with a 230 mm long baffle affixed symmetrically to a diagonal of one 300 mm × 300 mm side of the pellet tester (see Figure 1 and Figure 2).

One leg of this formed angle baffle shall be extended 50 mm into the pellet tester and the other leg securely fastened to the back of the tester. A door may be placed in any side provided that is dustproof. Projections, such as rivets and screws, shall be kept to a minimum and well rounded.

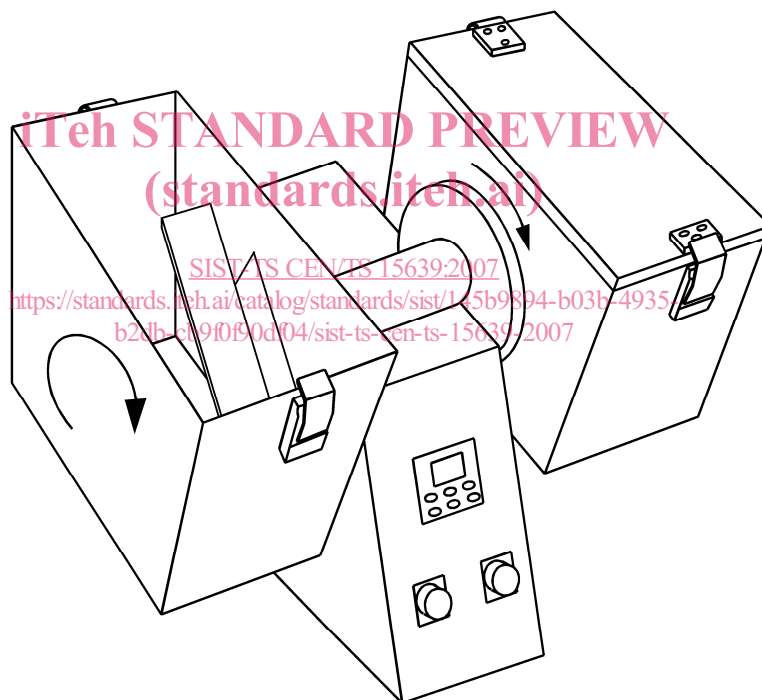
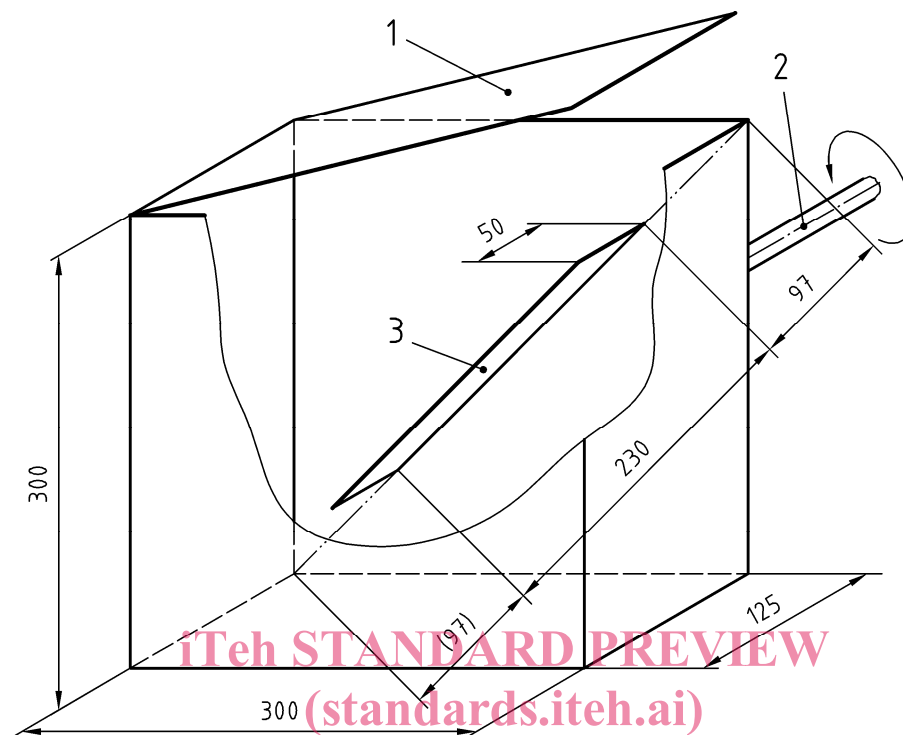


Figure 1 — Schematic of an example of pellet tester with two boxes

Dimensions in millimetres



**Key**

- 1 Filling door
- 2 Drive shaft
- 3 Baffle

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**Figure 2 — Structure of the main parts of the pellet tester**

**5.2 Two sieves**, with round screen holes, one two thirds of the pellet diameter and the second of 1 mm, suitable for manual screening in accordance with ISO 3310-2.

**5.3 Balance**, capable of weighing 2 kg and measuring the mass to the nearest 0,1 g.

**6 Sampling and sample preparation**

The sample shall be taken and prepared in accordance with CEN/TS 15442 and CEN/TS 15443; if necessary, it shall be divided into test portions using the coning and quartering method. The minimum size of the sample shall be 2,5 kg. The sample shall be divided into four equal portions in accordance with CEN/TS 15443. Take one portion for the determination of the total moisture content in accordance with CEN/TS 15414-1 and CEN/TS 15414-2. Weigh two of the remaining sample portions and then separate the pellets carefully by manual sieving using the greater sieve (see 5.2).

**NOTE** Attention should be paid to the fact that rough treatment during sample reduction and screening can influence the result.

Weigh the remaining pellets and determine the initial portion of fines as mass fraction in percent.



## 7 Procedure

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

Take a test portion of  $(500 \pm 10)$  g. Place the test portion of the sieved pellets weighed to the nearest 0,1 g in the pellet tester (5.1). Tumble the sample with 500 rotations of  $(50 \pm 2) \text{ min}^{-1}$ . After this number of rotations, the sample shall be removed and passed manually through the sieves (5.2). Weigh the sample remaining on the greater sieve and, if required, the mass of fines less than 1 mm to the nearest 0,1 g.

## 8 Calculations

Calculate the percentage of the whole pellets remaining on the greater sieve. The mechanical durability,  $D_p$ , of pellets shall be calculated by equation (1):

$$D_p = \frac{m_{Ap}}{m_{Ep}} \times 100 \quad (1)$$

where

$D_p$  is the mechanical durability related to the mass of pre-sieved pellets, in percent;

$m_{Ep}$  is the mass of pre-sieved pellets before tumbling in the pellet tester, in grams;

$m_{Ap}$  is the mass of sieved pellets after tumbling in the pellet tester, in grams.

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

If required, calculate the mass fraction of fines,  $F_D$ , expressed as percent, using equation (2):

$$F_D = \frac{m_f}{m_{Ep}} \times 100 \quad (2)$$

where

$m_f$  is the mass of fines less than 1 mm, in grams.

The mass fraction of fines,  $F_D$ , shall be calculated to two decimal places and the mean value rounded to the nearest 0,1 % for reporting.

## 9 Test report

The test report shall include at least the following information:

- a) name of the testing establishment;
- b) date of the test;
- c) reference to this document, i.e. "determined in accordance with CEN/TS 15639:2007";
- d) identification of the product or sample tested;
- e) number of duplicates tested;