

# DRAFT INTERNATIONAL STANDARD

## ISO/DIS 17831-1

ISO/TC 238

Secretariat: SIS

Voting begins on:  
2013-09-12

Voting terminates on:  
2014-02-12

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

### Part 1: Pellets

*Titre manque*

ICS: 27.190;75.160.10

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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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Reference number  
ISO/DIS 17831-1:2013(E)

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**Contents**

Page

Foreword .....	4
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Principle.....	6
5 Apparatus.....	6
6 Sample preparation .....	8
7 Procedure.....	8
8 Calculation of the mechanical durability: .....	8
9 Precision and bias.....	9
10 Test report.....	9
Bibliography.....	11
Annex A (informative) Example of pellet tester with two boxes.....	12

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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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 1: Pellets

### 1 Scope

This 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 compressed 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: Sampling*

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

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

ISO CD 18846 *Solid Biofuels – Determination of fines content in quantities of pellets – Manual sieve method using 3.15 mm sieve aperture*

### 3 Terms and definitions

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

### 4 Principle

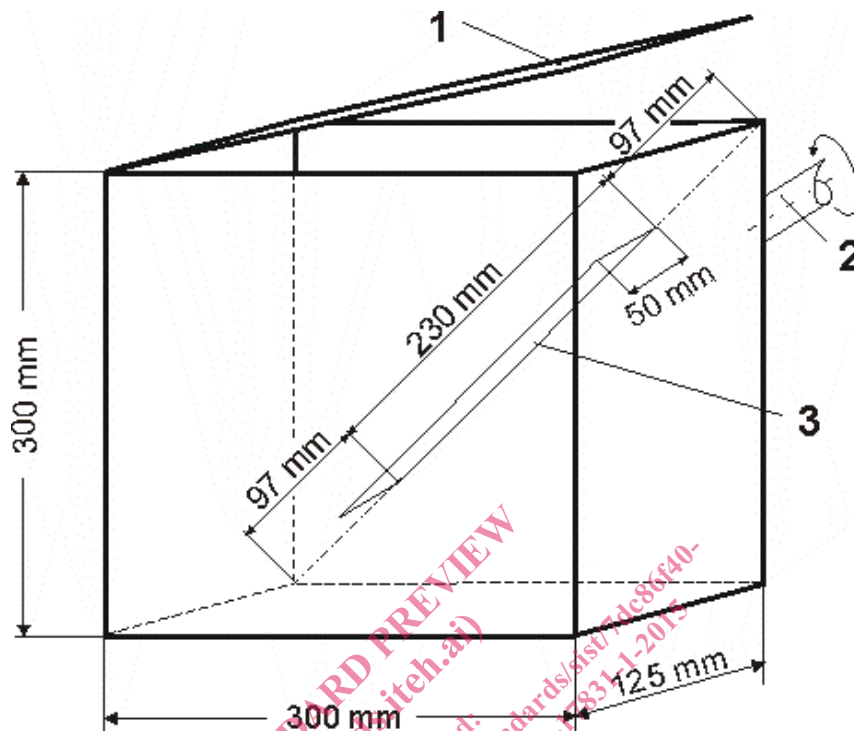
The test sample is subjected to controlled shocks by collision of pellets against each other and against the walls of a specified rotating test chamber. The durability is calculated from the mass of sample remaining after separation of abraded and fine broken particles.

### 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).



- 1 Filling door
- 2 Drive shaft
- 3 Baffle

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

The pellet tester shall consist of a dust tight box. This box shall be made of stainless steel (thickness: 1,5 +/- 0,1) mm). The inner dimensions of the box shall be of ((300 +/- 3) X (300 +/- 3) X (125 +/- 1,3)) mm; it shall rotate at 50 rpm around an axis, which is perpendicular to and centred in the 300 mm sides. A 230 +/- 2,3 mm long baffle is affixed symmetrically to a diagonal of one 300 mm X 300 mm side of the box. The baffle extends 50 +/- 1,0 mm into the box (see figure 1) and is securely fastened to the back of the box. The edges of the baffle shall not be sharp but rounded to avoid any cutting effect. A door may be placed in any side. Projections, such as rivets and screws, shall be kept to a minimum and well rounded (alternatively flathead screws may be used).

## 5.2 Sieve

A sieve with round screen holes of 3,15 mm diameter and suitable for manual screening (see ISO 3310-2). The recommended sieve diameter should be of 400 mm or above.

## 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 taken according to ISO WD XXXXX (14778). If it is necessary divide the mass of the sample use coning and quartering method according to ISO WD XXXXX (14780). The minimum size of the sample shall be 2,5 kg. Divide the sample into four equal portions according to ISO WD XXXXX (14780). Take one portion for the determination of the total moisture content according to ISO DIS 18134 (14774 Part 1 or 2). The remaining three quarters of the sample are then processed by sieving in order to remove the fines less than 3,15 mm. This is done using a sieve as described in 5.2. The sieving is performed by shaking the sample in about 5-10 circular movements. The recommended amount of sample shall be less than 0,8 g per cm<sup>2</sup> of sieve area. This requirement would for example be achieved using a sample of 1,0 kg on a sieve 400 mm diameter .

Note 1: If a sieve with a different diameter is used, the size of the test portion shall be adjusted to achieve the same degree of filling.

Weigh the amount of pellets retained on the 3,15 mm sieve and use for the durability testing.

Note 1: The amount of material removed from the sample by the sieving is not to be confused with the content of "Fines" according to ISO DIS 18846.

## 7 Procedure

A duplicate determination shall be carried out on the test sample.

### 7.1 Tumbling procedure

Take a test portion of (500 ± 10) g. For pellets above 12 mm diameter (500 ± 50) g is allowed. Weigh the test portion to the nearest 0,1 g and place it in the pellet tester. Tumble the sample at (50 ± 2) rpm for 500 rotations. After this the sample is removed and sieved.

### 7.2 Sieving procedure

The sieving of the test portion after the durability testing procedure shall be done in a way that the fine particles are separated but the creation of new fine particles is avoided. This is done using a sieve as described in 5.2. The sieving is performed by shaking the sample in about 5-10 circular movements. The recommended sieve diameter should be chosen in order to achieve a load of less than 0,8 g per cm<sup>2</sup> of sieve area.

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. Pellet durability is 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