



SLOVENSKI STANDARD

SIST-TS CEN/TS 15149-3:2006

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Številka: SIST-TS CEN/TS 15149-3:2006
Naslov: Festi biobrennstoffe - Verfahren zur Bestimmung der Teilchengrößenverteilung - Teil 3: Verfahren mit rotierendem Sieb

Solid biofuels - Methods for the determination of particle size distribution - Part 3: Rotary screen method

Feste Biobrennstoffe - Verfahren zur Bestimmung der Teilchengrößenverteilung - Teil 3: Verfahren mit rotierendem Sieb

Biocombustibles solides - Méthode de détermination de la distribution granulométrique - Partie 3 : Méthode au tamis rotatif

Ta slovenski standard je istoveten z: CEN/TS 15149-3:2006

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TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 15149-3

January 2006

ICS 75.160.10

English Version

**Solid biofuels - Methods for the determination of particle size
distribution - Part 3: Rotary screen method**

Combustibles solides - Méthode de détermination de la
granularité - Partie 3 : Méthode au tamis rotatif

Feste Biobrennstoffe - Verfahren zur Bestimmung der
Teilchengrößenverteilung - Teil 3: Verfahren mit
rotierendem Sieb

This Technical Specification (CEN/TS) was approved by CEN on 4 June 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.

CEN members are the national standards bodies of 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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Foreword

This Technical Specification (CEN/TS 15149-3:2006) has been prepared by Technical Committee CEN/TC 335 "Solid Biofuels", the secretariat of which is held by SIS.

CEN/TS 15149 consists of the following parts under the general title *Solid biofuels - Methods for the determination of particle size distribution*:

Part 1: Oscillating screen method using sieve apertures of 3,15 mm and above

Part 2: Vibrating screen method using sieve apertures of 3,15 mm and below

Part 3: Rotary screen method

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 15149-3:2006 (E)**Introduction**

Part 1 describes the reference method for size classification of samples with a nominal top size of 3,15 mm and over.

Part 2 describes the reference methods for all samples with a nominal top size below 3,15 mm.

Part 3 describes an innovative method, by which the degree of overestimating the fine particle fractions is reduced. As it is currently not generally available, it is here proposed, for research and development purposes or for individual quality management processes, that the quality requirements are bilaterally defined between the suppliers and consumers based on this method.

NOTE The nominal top size is defined as the aperture size of the sieve where at least 95 % by mass of the material passes (see bibliography)

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1 Scope

This Technical Specification specifies a method for the determination of the size distribution of particulate biofuels by the rotary screen method. The method described is meant for particulate biofuels only, namely materials that either have been reduced in size, such as most wood fuels, or are physically in a particulate form e.g. olive stones, nutshells, grain etc. This document applies to particulate uncompressed fuels with a nominal top size of 3,15 mm and over, e.g. wood chips, hog fuel, olive stones etc.

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

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

CEN/TS 14779, *Solid biofuels – Sampling – Part 3: Method for preparing sampling plans and sampling certificates*

CEN/TS 14780, *Solid biofuels – Methods for sample reduction*

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

CEN/TS 14774-2, *Solid biofuels – Determination of moisture content – Oven dry method, Part 2: Total moisture – Simplified procedure*

CEN/TS 15149-2, *Solid biofuels - Methods for the determination of particle size distribution - Part 2: Vibrating screen method using sieve apertures of 3,15 mm and below*

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.

3.1

nominal top size

aperture size of the sieve where at least 95 % by mass of the material passes

CEN/TS 15149-3:2006 (E)

4 Principle

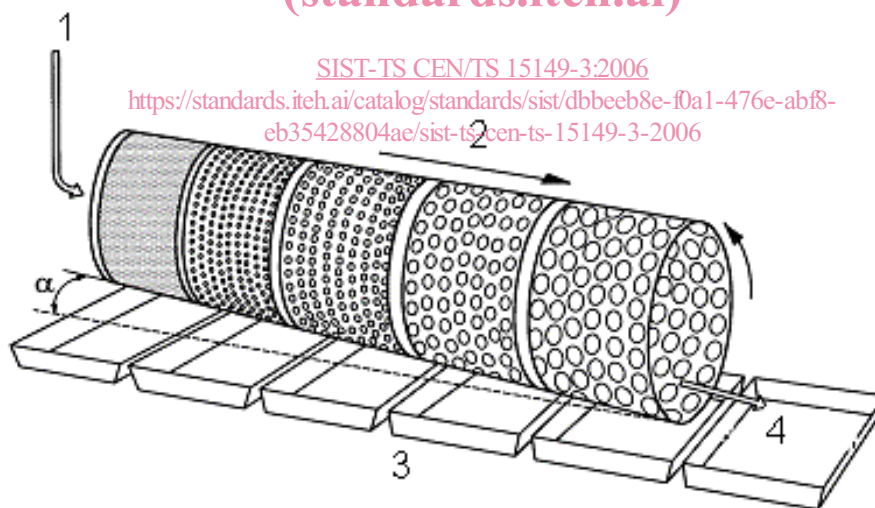
A sample is subjected to sieving through sieves in a rotary sieving machine sorting the particles by increasing size.

5 Apparatus

5.1 Rotary screen

For the test a rotary sieving device is required for which the operating principle is shown in Figure 1. The rotary sieving device consists of five joined cylindrical sieve rings each with an inner diameter of 500 mm (+/- 15 mm). The height (length) of each of the 5 sieve rings is 400 mm with a maximum of 20 mm imperforated ("blind") surface at each side; as a consequence each ring is having an effective sieving length of 360 mm or higher. All five cylinder rings (sieves) are evenly long and consecutively connected to each other, thus forming a drum. The inner surface of the drum shall be constructed in a way, which allows the particles to slide from one ring to another without interruption. Downward to the direction of flow the drum is inclined at an angle of 3 degrees (+/- 0,2 degrees) towards the horizontal ground. The drum shall be rotating at a speed 16 rotations per minute.

Due to both inclination and rotation of the drum, the sample is continuously being transported forward in the drum over the rotating sieves. Thereby the particles are separated by their size by passing through the sieve holes and falling into individual collecting pans underneath each sieve cylinder. Large particles, which have not passed through any sieve holes, are finally being discharged from the drum into a final collecting pan. The size of each individual pan should be at least 70% of the initial test sample volume.



Key

- 1 Material addition
- 2 Increasing hole diameter
- 3 Collecting pans
- 4 Material-flow direction

Figure 1: Operating principle of rotating sieves

The geometry of the apertures and the thickness of the sieves shall be in accordance with ISO 3310-2. The aperture sizes of the sieves shall be chosen according to the size specification of the sample material. It is

recommended that the diameters of the holes in the sieves are 3,15 mm, 8 mm, 16 mm, 45 mm and 63 mm. On the rotating drum the cylinders shall be arranged by increasing sieve hole diameters, starting with the smallest sieve holes where the sample material shall be fed on (see Figure 1).

5.2 Balance

A balance capable of measuring the mass of the sample to be sieved to the nearest 0.1 g is required.

6 Sample preparation

6.1 Sample size

The minimum size of the test sample for the determination of the size distribution shall be 8 l and shall have been sampled according to CEN/TS 14778-1, CEN/TS 14778-2 and CEN/TS 14779. For fine grade biofuels, where 100 % of the particles pass sieve holes of 45 mm diameter, a smaller sample size of minimum 4 l can be used.

NOTE The sample should include material for determination of size distribution and moisture content.

6.2 Sample preparation

The sample shall be sieved at a moisture content below 20 % wet base, thus preventing the particles from sticking together or losing moisture during the sieving process. If necessary the sample has to be pre-dried. Drying is done according to CEN/TS 14780.

NOTE By pre-drying, as described in CEN/TS 14780, the sample is brought into equilibrium with the humidity of the surrounding atmosphere.

Determine the moisture content of the material to be sieved on a separate sub-sample following the procedure given in CEN/TS 14774-1 or CEN/TS 14774-2. The moisture content shall be determined and reported concurrently with the particle size distribution determination.

7 Procedure

Assemble and operate the rotary sieve with the appropriate sieves in accordance with Clause 5.1.

Weigh the sample to the nearest 0,1 g of the total sample mass.

Feed the sample material continuously into the rotating sieve at a constant feeding rate of 1 litre per minute. This can, for example, be achieved by letting the sample material fall over an infeed slide onto the edge of the first cylinder.

NOTE 1 The homogeneous feeding rate can be achieved either by a mechanical feeding mechanism or by hand feeding onto the slide. If feeding is done by hand, the sample should be divided into several portions (for example 8 portions) of equal volume; these portions are then dropped onto the slide sequentially in a way that ensures an even and uninterrupted flow throughout the total feeding time (e.g. 8 x 1 min).

NOTE 2 If a larger sample size (more than 8 l) is processed, the capacity of the collecting pans may be exceeded or the sample may have to be separated in two or more portions and be processed subsequently.

Stop the rotation when no more material is remaining in the rotating drum. In case that a particle sticks in a sieving hole, the sieve shall be stopped and the particle shall be re-fed in the sieve. Restart the rotary sieve and let the sieve empty.

All particles larger than 100 mm (maximum dimension) shall be hand sorted into one or more fractions regardless from which sieve or collecting pan they are collected.