SLOVENSKI STANDARD
oSIST prEN ISO 5370:2022

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Trdna biogoriva - Določanje vsebnosti drobnih snovi v peletih (ISO/DIS 5370:2022)

Solid biofuels - Determination of fines content in pellets (ISO/DIS 5370:2022)

Biogene Festbrennstoffe - Bestimmung des Gehaltes von Feingut in Pellets (ISO/DIS 5370:2022)

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Solid biofuels — Determination of fines content in pellets.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee 238, *Solid biofuels*.

This second edition cancels and replaces the first edition (ISO 18846:2016), which has been technically revised.

The main changes are as follows:

— Changes in the analytical procedure to assure a more complete removal of fines (e.g. if fines are expected to exceed 1% than additional sieving is required). It is expected that testing per ISO 5370 will result in a larger amount of fines reported than would have been reported using ISO 18846 in certain circumstances.

— An Annex with performance data was inserted.

— An Annex with a procedure for the determination of coarse pellet fines was inserted.

— An Annex with a procedure for the determination of additional fines fractions was inserted.

— An Annex on data from a research study has been included.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document describes a method for manual determination of the fines content in pellets. The fines content is defined as the percentage in mass of material below 3,15 mm in size (round hole perforated metal plate sieve per ISO 3310-2). The fines content is an important parameter since excessive amounts of fines in consignments of pellets can cause problems either in transportation systems or during combustion, or both, can cause health problems if the dust is inhaled and also increases the risk for dust explosions. Many of these problems are connected to the tendency of stratification of fines by any movement of the pellets.

The informative Annex A describes a procedure for determining the amount of coarse pellet fines (3,15 mm ≤ CPF < 5,6 mm). The determination of the amounts of smaller fines particles, e.g. the fractions < 1 mm and < 0,5 mm is given in the informative Annex B.

NOTE 1 The upper limit of 5,6 mm for coarse pellet fines was chosen because the sieve with an aperture size of 5,6 mm is the standard commercial sieve with the next smaller aperture size than 6 mm, which corresponds to the diameter of the standard pellet size. When conducting the procedure for coarse pellet fines as outlined in Annex A, additional coarse pellet fines are created as a result of the sieving procedure. Test results should therefore be considered indicative and best used for comparative purposes rather than treated as empirical values.

Solid biofuels — Determination of fines content in pellets.

1 Scope

This document specifies a method for determining the amount of material passing through a sieve with 3,15 mm diameter round holes. It is intended for use in all applications (e.g. laboratories, production sites, field locations) where the measurement of fines is required.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ISO 14780, *Solid biofuels — Sample preparation*

ISO 16559, *Solid biofuels — Terminology, definitions and descriptions*

ISO 18135, *Solid Biofuels — Sampling*

ISO 21945, *Solid biofuels — Simplified sampling method for small scale applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16559 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
coarse pellet fines
particles with a size ranging from ≥ 3,15 mm to < 5,6 mm resulting from breakage of pellets during production or handling

Note 1 to entry: The fraction of coarse pellet fines contains all particles which pass through a sieve with an aperture size of 5,6 mm round holes and which are retained on a sieve with an aperture size of 3,15 mm round holes (ISO 3310-2).

4 Principle

A test portion is subjected to manual screening by means of a sieve with 3,15 mm diameter round holes while utilizing specific test conditions (e.g. a template is used to guide the sieving process, rotational speed is specified, number of rotations is dependent on the nature of the material being tested, etc.) and the mass of the material passing through the sieve is determined as a weight percentage of the total mass of the test portion.

5 Apparatus

5.1 Sieve Template

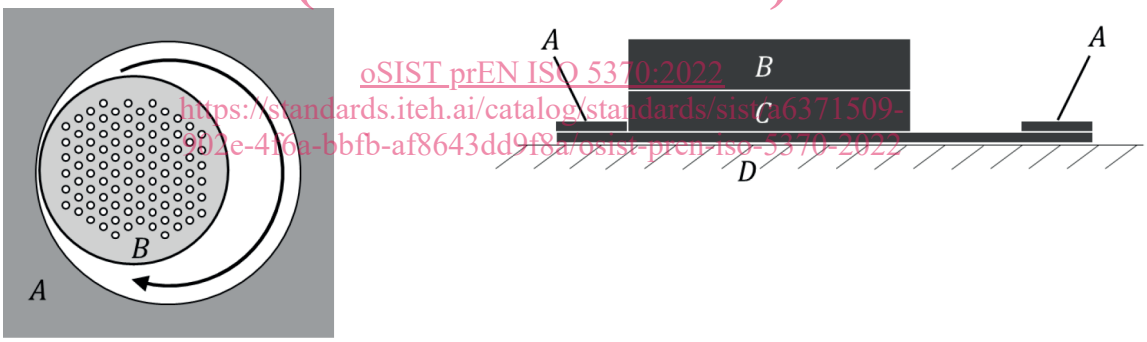
Sieve Template, as illustrated in Figure 1, consisting of a (14 ± 2) mm thick wooden board with a hole cut in the centre to receive the sieve with collecting pan, all mounted on a base panel with the same size dimensions. The sieve template is for guiding the sieve during the screening process to assure consistent motion of the sieve. The inner circle should have a smooth surface to enable smooth circular movements of the sieve with collecting pan within the template. Template size (inner diameter) is based on a factor of 1,4 multiplied by the sieve diameter.

The size of the sieve and the template, the target size of the sub-portion used for a single screening operation and the rotational speed are given in Table 1.

Table 1 — Size of sieve and the template, size of the sub-portion and rotational speed

Sieve size (mm)	Inner diameter of template (mm)	Mass of sub-portion		Approximate rotational speed (rpm)
		Recommended (g)	Minimum/maximum (g)	
Recommended sieve size				
400	560	500	300 -600	80
Alternative sieve sizes				
300	420	280	170 - 340	95
450	630	630	380 - 760	77

The template shall be secured to the workplace (table), e.g. by clamps.



a) **b)**

Key

A Template, with a wooden base
B Sieve
C Collecting pan
D Workplace, Table

Figure 1 — Sieving apparatus with template: Top view (a) and front view (b)

NOTE For an easy operation a lubricant may be used to improve sliding properties of the collection pan in the template e.g. graphite powder or silicon lubricant. Additionally, roller tables could be used.

5.2 Sieves

5.2.1 Sieve with 3,15 mm diameter round holes.

A circular sieve which shall have round holes with a diameter of 3,15 mm and aperture geometry in accordance with ISO 3310-2.

A sieve with a diameter of 400 mm is recommended. Other sieve diameters within the range from 300 mm to 450 mm may be used, but it is important to make sure the sieving criteria is adjusted for the specific sieve to be used (see Table 1). The frame of the sieve shall have a height which allows for free movement of the sample without losing material during the sieving process.

5.2.2 Sieve with 5,6 mm diameter round holes

If coarse pellet fines (3,15 mm ≤ CPF < 5,6 mm) are determined in accordance with informative Annex A, the circular sieve shall have round holes with a diameter of 5,6 mm and aperture geometry in accordance with ISO 3310-2. All other requirements are given in 5.1.1.

5.2.3 Sieves with metal wire cloth having aperture sizes smaller than 3,15 mm

If fines fractions smaller than 3,15 mm, e.g. < 1 mm or < 0,5 mm, are determined in accordance with informative Annex B, the circular or rectangle sieves shall have an aperture geometry in accordance with ISO 3310-1 and shall have a minimum effective sieve area of 250 cm^2.

5.3 Collecting pan

Collecting pan, for collection of material passing through the sieve, a collecting pan with the same diameter as the sieve is required.

5.4 Weighing container(s)

Weighing container(s) of adequate size for weighing of the fractions. The collecting pan may also be used as weighing container.

5.5 Balance

The balance shall have suitable capacity to weigh the total mass of the sample plus any container used to hold the sample and shall be capable of reading to the nearest 0,1 g.

5.6 Metronome or stopwatch

Metronome or stopwatch, for confirmation of the rotational speed when performing the sieving procedure.

NOTE Use of a simple metronome, e.g. mobile phone app, has shown to be a convenient method for speed control.

6 Sample preparation

6.1 Sample size reduction

The laboratory sample used for the determination of the fines content shall be obtained in accordance with ISO 18135 or ISO 21945. The sampling strategy shall be such that special provisions are taken regarding the tendency for stratification of the fines in a consignment of pellets. For example, the entire quantity of pellets in a bag shall be taken as the laboratory sample. Due to the special provisions necessary regarding sampling for fines determination, the combined (raw) sample can end up being very large. The combined sample may be divided into one or more smaller test portion using appropriate