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Solid biofuels — Determination of fines content in samples of pellets

Biocombustibles solides — Détermination de la teneur en fines dans des échantillons de granulés

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Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 238, *Solid biofuels*.

Introduction

This International Standard describes a method for manual determination of the fines content in samples of pellets. The fines content is defined as the percentage in mass of material below 3,15 mm in size. The fines content is an important parameter since excessive amounts of fines in consignments of pellets increases the risk for dust explosions and is also a health problem if the dust is inhaled.

Solid biofuels — Determination of fines content in samples of pellets

1 Scope

This International Standard specifies a method for determining the amount of material passing through a sieve with 3,15 mm diameter round hole.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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[1)], *Solid biofuels — Sample preparation*

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

ISO 18135[2)], *Solid biofuels — Sampling*

3 Terms and definitions

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

4 Principle

A test sample is subjected to sieving by means of manually shaking a sieve with 3,15 mm diameter round holes by horizontal movements and the mass of the material passing through is determined.

5 Apparatus

5.1 Sieve. The sieve 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. The frame of the sieve shall have a height that enable the sieves to contain a sample and allows a free movement of the sample during the sieving process. Other sizes of sieves may be used for practical reasons but it is important to make sure the sieve is not overloaded which may result in insufficient agitation of the test sample which may impact the flow of fines through the apertures of the sieve.

5.2 Collecting pan, for collection of material passing through the sieve, a collecting pan of adequate size is required.

5.3 Weighing container, for weighing of the fractions, the collecting pan or a separate container of adequate size is required.

1) To be published.

2) To be published. (Until ISO 18135 is published, EN 14778 should be used.)

5.4 Balance. The balance shall be capable of reading to the nearest 0,1 g.

The balance shall have a weighing capacity of 2 kg or a weighing capacity equal to the selected size of the sieve fractions and the mass of the weighing container.

6 Sample preparation

6.1 Sample reduction

The laboratory sample used for the determination of the fines content shall be obtained in accordance with ISO 18135. 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 sampled in order to obtain a representative test sample. Due to the special provisions necessary regarding sampling for fines determination, the combined (raw) sample may end up being very large. The combined sample may be divided into one or more smaller test portions using a procedure for sample division in accordance with ISO 14780[3)].

NOTE In bulk handling of large volumes of pellets, there is often a risk for stratification of materials in storage bins. There is also the risk of incremental variations of fines in volumes of pellets due to batch-wise operation during transportation with rail cars, trucks and ocean vessels.

6.2 Size of the test portion

The size of the test portion shall be selected in relation to pellets diameter as given in Table 1.

NOTE A larger size of the test portion will yield a higher accuracy (e.g. 1 % according to ISO 17225-1, ISO 17225-2 and ISO 17225-6).

Table 1 — Minimum mass of test portion for pellet diameter classes in accordance with ISO 17225-1, ISO 17225-2 and ISO 17225-6

Pellet diameter mm	Sample size kg	
	Minimum	Recommended
<6	3	5 to 10
6 to 12	5	10 to 15
>12 (up to 25)	10	15 to 20

The total mass of the test portion shall be weighed to the nearest 0,1 g and recorded for the quality control calculation in 8.3.

7 Procedure

7.1 Sieving

The sieving shall be done in such a way that the fine particles are separated from the pellets but at the same time avoiding new fines being created. This is best achieved by 5 to 10 circular horizontal rotations of 0,5 kg of material in the sieve. If a sieve with a diameter other than 400 mm is used, the size of the sieved sub-portions (of the test portion) shall be adjusted to achieve the same degree of filling of the sieve.

After each sub-portion is sieved, the fines in the collecting pan shall be transferred to a weighing container or if practical the fines may be left in the collecting pan as fines from subsequent sub-portions

3) To be published. (Until ISO 14780 is published, EN 14780 should be used.)

collected. The coarse material retained on the sieve from each sub-portion shall be transferred to another container.

7.2 Weighing

After completing the sieving of all sub-portions of the test portion, weigh the total amount of material which passed through the sieve (the fines fraction) and weigh the total amount of material retained on the sieve (the coarse fraction).

The weighing of the fines fraction can be performed either by weighing the collecting pan with the fines fraction and subtracting the mass of the empty collecting pan, or the fines fraction can be transferred to a tared weighing container for determining the mass of the fraction.

8 Calculations

8.1 Total mass of all fractions

Calculate the total mass of all fractions as the sum of the mass of the fines fraction and the mass of the coarse fraction.

8.2 Proportion of fines

Calculate the *w*-% of fines by dividing the mass of the fraction by the mass of all fractions (as per 8.1) and multiply by 100.

8.3 Quality control

Calculate the difference between the mass of the test portion (as per 8.2) and the total mass of all fractions (as per 8.1) and express the difference in percent of the mass of the test portion. If the difference is larger than 2 *w*-%, the causes for the deviation shall be investigated and the determination shall be repeated. If this is impractical or the difference after repeated determination still exceeds a mass fraction of 2 % of the mass of the test portion, the size of the difference in % mass fraction of the test portion shall be reported together with the fines content as per 8.2.

9 Performance characteristics

For the time being, not enough data are available for a precision statement regarding this test method.

10 Test report

The test report shall include at least the following information:

a) the identification of the laboratory performing the test and the date of the test;

b) the identification of product (or sample) tested;

c) a reference to this International Standard, i.e. ISO 18846;

d) the mass of the test portion (as per 6.2);

e) the result of the test on an as-received basis;

f) the difference between the mass of the test portion and the total mass of all fractions, in percent of the mass of the test portion if the difference exceeds a mass fraction of 2 %;

g) any unusual features noted during the determination, which may affect the result;

h) any deviation from this International Standard, or operations regarded as optional.