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Solid biofuels — Fuel specifications and classes —

Part 6: Graded non-woody pellets

Biocombustibles solides — Classes et spécifications des combustibles —

Partie 6: Classes de granulés d'origine agricole

Reference number
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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 ISO/TC 238, *Solid biofuels*.

This second edition cancels and replaces the first edition (ISO 17225-6:2014), which has been technically revised. The main changes compared to the previous edition are as follows:

— Arsenic and chlorine values changed in Class B

— Ash melting behaviour added as an informative property

— Specification of pellets produced from cereal straw, miscanthus and reed canary grass has been included in Table 1.

A list of all parts in the ISO 17225 series can be found on the ISO website.

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.

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Introduction

The objective of the ISO 17225 series is to provide unambiguous and clear classification principles for solid biofuels and to serve as a tool to enable efficient trading of biofuels and to enable good understanding between seller and buyer as well as a tool for communication with equipment manufacturers. It will also facilitate authority permission procedures and reporting.

This document supports the use of graded non-woody pellets in specially designed appliances for residential, small commercial and public buildings as well as industrial energy generation applications, which require classified pellet quality.

The residential, small commercial and public building appliances require higher quality fuel for the following reasons:

— Small-scale equipment does not usually have advanced controls and flue gas cleaning

— Appliances are not generally managed by professional heating engineers

— Appliances are often located in residential and populated districts

Non-woody pellets have high ash, chlorine (Cl), nitrogen (N) and sulfur (S) content and major element contents, so non-woody pellets are recommended to be used in appliances, which are specially designed or adjusted for this kind of pellet.

In general, non-woody biomass materials have higher content of ash forming elements and produces ashes with lower melting temperature compared to most woody biomass. Be aware that herbaceous or fruit biomass may influence the fuel ash composition differently depending on growth and soil conditions. This may result in fouling, slagging and corrosion inside boilers. These problems are especially related to materials that have high content of potassium (K) and silicate (Si) and low content of calcium (Ca). The content of chlorine (Cl), phosphate (P) and potassium (K) in the material may form chlorides and phosphorous and other chemical compounds resulting in high hydrochloric emissions and chemically active ash causing corrosion. Special attention should be paid to the risk of corrosion in small and medium scale boilers and flue gas systems. Blending with woody biomass can improve the combustion characteristics.

NOTE For individual contracts ISO 17225-1 can be used.

Although this document may be obtained separately, it requires a general understanding of the standards based on and supporting ISO 17225-1. It is recommended to obtain and use ISO 17225-1 in conjunction with this document.

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Solid biofuels — Fuel specifications and classes —

Part 6: Graded non-woody pellets

1 Scope

This document determines the fuel quality classes and specifications of graded non-woody pellets. This document covers only non-woody pellets produced from the following raw material (see ISO 17225-1:2021, Table 1):

— 2 Herbaceous biomass

— 3 Fruit biomass

— 4 Aquatic biomass

— 5 Biomass blends and mixtures

NOTE 1 Herbaceous biomass originates from plants that have a non-woody stem and which die back at the end of the growing season. It includes grains or seeds crops from food production or processing industry and their by-products such as cereals.

NOTE 2 Blends and mixtures include blends and mixtures from the main origin-based solid biofuel groups woody biomass, herbaceous biomass, fruit biomass and aquatic biomass.

Blends are intentionally mixed biofuels, whereas mixtures are unintentionally mixed biofuels. The origin of the blend and mixture is to be described using ISO 17225-1:2021, Table 1.

If solid biofuel blend or mixture contains chemically treated material it shall be stated.

NOTE 3 Thermally treated biomass pellets (e.g. torrefied pellets) are not included in the scope of this document.

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 14780, *Solid biofuels — Sample preparation*

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

ISO 16948, *Solid biofuels — Determination of total content of carbon, hydrogen and nitrogen*

ISO 16968, *Solid biofuels — Determination of minor elements*

ISO 16994, *Solid biofuels — Determination of total content of sulfur and chlorine*

ISO 17225-1:2021, *Solid biofuels —Solid biofuels – Part 1 – General requirements*

ISO 17828, *Solid biofuels — Determination of bulk density*

ISO 17829, *Solid Biofuels — Determination of length and diameter of pellets*

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ISO 17831-1, *Solid biofuels — Determination of mechanical durability of pellets and briquettes — Part 1: Pellets*

ISO 18122, *Solid biofuels — Determination of ash content*

ISO 18125, *Solid biofuels — Determination of calorific value*

ISO 18134-1, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*

ISO 18134-2, *Solid biofuels — Determination of moisture content — Oven dry method — Part 2: Total moisture — Simplified method*

ISO 18135, *Solid Biofuels — Sampling*

ISO 21404, *Solid biofuels — Determination of ash melting behaviour*

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

ISO 18846, *Solid biofuels — Determination of fines content in quantities of pellets*

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 http://www.electropedia.org/

3.1
additive
material which has been intentionally introduced into the fuel feed stock to improve quality of fuel (e.g. combustion properties), to reduce emissions or to make production more efficient

Note 1 to entry: Trace amounts of e.g. grease or other lubricants that are introduced into the fuel processing stream as part of normal mill operations are not considered as additives.

3.2
biofuel pellet
densified biofuel made with or without additives usually with a cylindrical form, random length typically 5 mm to 40 mm and diameter up to 25 mm and broken ends, produced by compressing biomass

3.3
chemical treatment
any treatment with chemicals other than air, water or heat

Note 1 to entry: Examples of chemical treatment are listed in informative Annex C of ISO 17225-1.

3.4
commercial application
facility that utilizes solid biofuel burning appliances or equipment that have similar fuel requirements as residential appliances

Note 1 to entry: Commercial applications should not be confused with industrial applications, which can utilize a much wider array of materials and have vastly different fuel requirements.

3.5
non-woody biomass
biomass originating from herbaceous, fruit or aquatic biomass as well as blends or mixtures of woody and non-woody biomass

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3.6
non-woody pellet
biofuel pellet (3.2) made from non-*woody biomass* (3.5)

4 Symbols and abbreviated terms

The symbols and abbreviated terms used in this document conform with the SI system of units as far as possible.

A Designation for ash content on dry basis, A_d [% in mass]

ar as received

BD Designation for bulk density as received [kg/m^3]

D Designation for diameter as received, *D* [mm]

d dry (dry basis)

DU Designation for mechanical durability as received [% in mass]

F Designation for amount of fines as received [% in mass, particles less than 3,15 mm]

L Designation for length as received, *L* [mm]

M Designation for moisture content as received on wet basis, M_{ar} [% in mass]

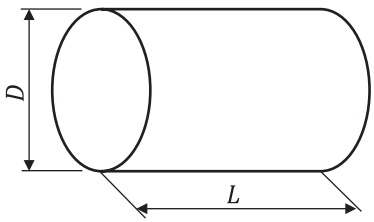
Q Designation for net calorific value as received, $q_{p,net,ar}$ [MJ/kg or GJ/t or kWh/kg or MWh/t] at constant pressure

NOTE 1 1 MJ/kg equals 0,2778 kWh/kg (1 kWh/kg equals 1 MWh/t and 1 MWh/t is 3,6 MJ/kg or GJ/t). 1 g/cm^3 equals 1 kg/dm^3. 1 mg/kg equals 0,000 1 %.

NOTE 2 Designation symbols are used in combination with a number to specify property levels in Table 1. For designation of chemical properties, chemical symbols like S (sulfur), Cl (chlorine), N (nitrogen) are used and the property class is added at the end of the symbol.

5 Specification of graded non-woody pellets

Specifications of the non-woody pellets are stated in accordance with Table 1 and Figure 1. Sampling (ISO 18135 or ISO 21945), sample preparation (ISO 14780) and analysis of the properties of solid biofuels shall be carried out in accordance with the methods mentioned in the normative references in Clause 2.



Key
D diameter
L length

Figure 1 — Dimension of pellets

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