BS EN ISO 17225-2:2014

BSI Standards Publication

Solid biofuels — Fuel specifications and classes

Part 2: Graded wood pellets

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National foreword

This British Standard is the UK implementation of EN ISO 17225-2:2014. It supersedes BS EN 14961-2:2011 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/17, Solid biofuels.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Solid biofuels - Fuel specifications and classes - Part 2: Graded wood pellets (ISO 17225-2:2014)

Biocombustibles solides - Classes et spécifications des combustibles - Partie 2: Classes de granulés de bois (ISO 17225-2:2014)

Feste Biobrennstoffe - Brennstoffspezifikationen und -klassen - Teil 2: Einteilung von Holzpellets (ISO 17225-2:2014)

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Foreword

This document (EN ISO 17225-2:2014) has been prepared by Technical Committee ISO/TC 238 “Solid biofuels” in collaboration with Technical Committee CEN/TC 335 “Solid biofuels” the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2014, and conflicting national standards shall be withdrawn at the latest by November 2014.

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This document supersedes EN 14961-2:2011.

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Endorsement notice

The text of ISO 17225-2:2014 has been approved by CEN as EN ISO 17225-2:2014 without any modification.

Contents

Page

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*.

ISO 17225 consists of the following parts, under the general title *Solid biofuels — Fuel specifications and classes*:

— *Part 1: General requirements*

— *Part 2: Graded wood pellets*

— *Part 3: Graded wood briquettes*

— *Part 4: Graded wood chips*

— *Part 5: Graded firewood*

— *Part 6: Graded non-woody pellets*

— *Part 7: Graded non-woody briquettes*

Introduction

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

This part of ISO 17225 supports the use of graded wood pellets 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 applications 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.

NOTE 1 Pellets produced according to this part of ISO 17225 may be used in pellet stoves, which are tested according to European Standard EN 14785[1], pellet burners tested according to EN 15270[2] and pellet boilers or integrated-pellet burner systems tested according to EN 303–5[3].

NOTE 2 For individual contracts, ISO 17225-1 can be used.

Although these product standards may be obtained separately, they require 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 these standards.

INTERNATIONAL STANDARD **ISO 17225-2:2014(E)**

Solid biofuels — Fuel specifications and classes —

Part 2: Graded wood pellets

1 Scope

This part of ISO 17225 determines the fuel quality classes and specifications of graded wood pellets for non-industrial and industrial use. This part of ISO 17225 covers only wood pellets produced from the following raw materials (see ISO 17225-1, Table 1):

— 1.1 Forest, plantation and other virgin wood;

— 1.2 By-products and residues from wood processing industry;

— 1.3.1 Chemically untreated used wood.

Thermally treated biomass pellets (e.g. torrefied pellets) are not included in the scope of this part of ISO 17225. Torrefaction is a mild pre-treatment of biomass at a temperature between 200 °C to 300 °C.

2 Normative references

The following referenced 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.

NOTE ISO standards describing methods for analysis of fuel properties listed in the Bibliography, will become normative references when they are published.

ISO 16559, *Solid biofuels — Terminology, definitions and descriptions*[1)]

ISO 16948, *Solid biofuels — Determination of total content of carbon, hydrogen and nitrogen*[2)]

ISO 16968, *Solid biofuels — Determination of minor elements*[3)]

ISO 16994, *Solid biofuels — Determination of total content of sulfur and chlorine*[4)]

ISO 17225-1, *Solid biofuels — Fuel specifications and classes — Part 1: General requirements*

ISO 17828, *Solid biofuels — Determination of bulk density*[5)]

ISO 17829, *Solid Biofuels — Determination of length and diameter of pellets*[6)]

ISO 17831-1, *Solid biofuels — Determination of mechanical durability of pellets and briquettes — Part 1: Pellets*[7)]

1) To be published.

2) To be published.

3) To be published..

4) To be published..

5) To be published.

6) To be published.

7) To be published.

ISO 18122, *Solid biofuels — Determination of ash content*[8)]

ISO 18134-1, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*[9)]

ISO 18134-2, *Solid biofuels — Determination of moisture content — Oven dry method — Part 2: Total moisture - Simplified method*[10)]

3 Terms and definitions

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

3.1
wood pellet
densified biofuel made from woody biomass with or without additives usually with a cylindrical form, random length typically 5 to 40 mm and diameter up to 25 mm and broken ends

Note 1 to entry: The raw material for wood pellets is woody biomass in accordance with Table 1 of ISO 17225-1. Pellets are usually manufactured in a die, with total moisture content usually less than 10 % of their mass on wet basis.

Note 2 to entry: The woody biomass used as feedstock for pellet making is milled to size in accordance with customer specification. Determination of the particle size distribution of the constituents of pellets is done by ISO 17830.

3.2
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.

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

EXAMPLE Glue and paint.

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

3.4
commercial application
facility that utilises 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.

8) To be published.

9) To be published.

10) To be published.

4 Symbols and abbreviated terms

The symbols and abbreviated terms used in this part of ISO 17225 comply with the SI system of units as far as possible.

d dry (dry basis)

ar as received

w-% weight-percentage

A Designation for ash content on dry basis, A_d [w-%]

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

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

DU Designation for mechanical durability as received [w-%]

F Designation for amount of fines as received [w-%, 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} [w-%]

Q Designation for net calorific value as received, $q_{p,net,ar}$ [MJ/kg 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). 1 g/cm^3 equals 1 kg/dm^3. 1 mg/kg equals 0,000 1% or 1 ppm.

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

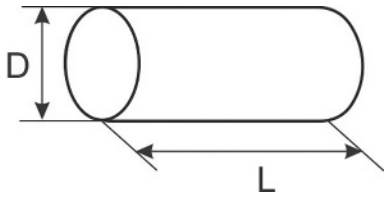
5 Specification of graded wood pellets

The specification of the wood pellets is stated in accordance with Table 1, Table 2 and Figure 1. Sampling and analysis of the properties shall be carried out in accordance with the methods mentioned in the normative references.

Property classes A1, A2, I1 and I2 represents virgin wood and chemically untreated wood residues. In Table 1 A1 represents fuels which are low in ash and nitrogen content, while class A2 has slightly higher ash and nitrogen content. Property classes I1 and I2 have similar ash and nitrogen content as A2. Property classes B and I3 allow chemically treated industrial wood by-products and residues and chemically untreated used wood.

Chemically treated wood by-products and residues from wood processing industry (1.2.2) and chemically untreated used wood (1.3.1) are included in class B and I3 as long as they do not contain heavy metals or halogenated organic compounds more than typical virgin material values or typical values of country of origin. In case of raw materials belonging to 1.2.2 (chemically treated wood according to ISO 17225-1, Table 1) the actual origin of the raw material shall be clearly described, e.g. 1.2.2, Residues from laminated wood production.

EXAMPLE Pellets of class B/I3 produced from 99 w-% sawdust from spruce 1.2.1.2, 1 w-% may contain glued wood from wood beam production (amount of glue < 0,1 %).



Key

D diameter

L length

Figure 1 — Dimension of pellets

If data for chemical or physical properties are available, further analysis may not be required.

To ensure resources are used appropriately and the declaration is accurate, use the most appropriate measure below:

1) using previous measured values or obtained by experience of same raw material;

2) calculation of properties, e.g. by using typical values and considering generally accepted and documented specific values;

3) carrying out of analysis:

   a) with simplified methods if available;

   b) with reference methods.

The responsibility of the producer or supplier to provide correct and accurate information is exactly the same whether laboratory analysis is performed or not. Typical values do not release the producer or supplier from providing accurate and reliable information.

NOTE It is important to carry out laboratory analysis, if the raw material basis is changed.

To ensure the end-user receives pellets with a low level of fines, the amount of fines shall be ≤ 1 % leaving the final point of loading for delivery to the end-user (see Table 1). Between factory gates and the end-user, distributors should take appropriate measures to maintain this low level of fines.

The quality shall be given either in the product declaration or by a corresponding label on the package.

Table 1 — Specification of graded wood pellets for commercial and residential applications

	Property class, Analysis method	**Unit**	**A1**	**A2**	**B**
Normative	**Origin and source,** ISO 17225-1		1.1.3 Stemwood 1.2.1 Chemically untreated wood residues [a]	1.1.1 Whole trees without roots 1.1.3 Stemwood 1.1.4 Logging residues 1.2.1 Chemically untreated wood residues [a]	1.1 Forest, plantation and other virgin wood 1.2 By-products and residues from wood processing industry 1.3.1 Chemically untreated used wood
	Diameter, D [b] and **Length L**, [c] ISO 17829 According to Figure 1	mm	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40
	Moisture, M, ISO 18134-1, ISO 18134-2	w-% as received, wet basis	M10 ≤ 10	M10 ≤ 10	M10 ≤ 10
	Ash, A [d], ISO 18122	w-% dry	A0.7 ≤ 0,7	A1.2 ≤ 1,2	A2.0 ≤ 2,0
	Mechanical durability, DU, ISO 17831-1	w-% as received	DU97.5 ≥ 97,5	DU97.5 ≥ 97,5	DU96.5 ≥ 96,5
	Fines, F [e], ISO 18846	w-% as received	F1.0 ≤ 1,0	F1.0 ≤ 1,0	F1.0 ≤ 1,0
	Additives [f]	w-% as received	≤ 2 Type and amount to be stated	≤ 2 Type and amount to be stated	≤ 2 Type and amount to be stated
	Net calorific value, Q, ISO 18125	MJ/kg or kWh/kg as received	Q16.5 ≥ 16,5 or Q4.6 ≥ 4,6	Q16.5 ≥ 16,5 or Q4.6 ≥ 4,6	Q16.5 ≥ 16,5 or Q4.6 ≥ 4,6
	Bulk density, BD [g], ISO 17828	kg/m^3 as received	BD600 ≥ 600	BD600 ≥ 600	BD600 ≥ 600
	Nitrogen, N, ISO 16948	w-% dry	N0.3 ≤ 0,3	N0.5 ≤ 0,5	N1.0 ≤ 1,0
	Sulfur, S, ISO 16994	w-% dry	S0.04 ≤ 0,04	S0.05 ≤ 0,05	S0.05 ≤ 0,05
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.02 ≤ 0,02	Cl0.02 ≤ 0,02	Cl0.03 ≤ 0,03
	Arsenic, As, ISO 16968	mg/kg dry	≤ 1	≤ 1	≤ 1
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10
	Copper, Cu, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10
	Lead, Pb, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1
	Nickel, Ni, ISO 16968	mg/kg dry	≤ 10	≤ 10	≤ 10
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 100	≤ 100	≤ 100

Table 1 *(continued)*

	Property class, Analysis method	**Unit**	**A1**	**A2**	**B**
Informative	**Ash melting behaviour** [h], CEN/TS 15370–1 [4]	°C	Should be stated	Should be stated	Should be stated

[a] Negligible levels of glue, grease and other timber production additives used in sawmills during production of timber and timber product from virgin wood are acceptable, if all chemical parameters of the pellets are clearly within the limits and/or concentrations are too small to be concerned with.

[b] Selected size D06 or D08 of pellets to be stated.

[c] Amount of pellets longer than 40 mm can be 1 w-%. Maximum length shall be ≤ 45 mm. Pellets are longer than 3,15 mm, if they stay on a round hole-sieve of 3,15 mm. Amount of pellets shorter than 10 mm, w-% recommended to be stated.

[d] For household burners and stoves an ash content < 0.5 % is recommended.

[e] At factory gate in bulk transport (at the time of loading) and in small (up to 20 kg) and big bags (at time of packing) or when delivering to end-user.

[f] Type of additives to aid production, delivery or combustion (e.g. pressing aids, slagging inhibitors or any other additives like starch, corn flour, potato flour, vegetable oil, lignin).

[g] It is recommended actual value of bulk density to be stated. This is especially important for household burners and stoves with no automatic control of air supply and thus are sensitive to variations in bulk density. Maximum value of bulk density 750 kg/m^3.

[h] It is recommended that all characteristic temperatures (shrinkage starting temperature (SST), deformation temperature (DT), hemisphere temperature (HT) and flow temperature (FT)) in oxidizing conditions should be stated. Pre-ashing temperature other than 550 °C should be stated.

Table 2 — Specification of graded wood pellets for industrial use

	Property class, Analysis method	**Unit**	**I1**	**I2**	**I3**
Normative	**Origin and source,** ISO 17225-1		1.1 Forest, plantation and other virgin wood 1.2.1 Chemically untreated wood residues [a]	1.1 Forest, plantation and other virgin wood 1.2.1 Chemically untreated wood residues [a]	1.1 Forest, plantation and other virgin wood 1.2 By-products and residues from wood processing industry 1.3.1 Chemically untreated used wood
	Diameter, D [b] and **Length L** [c], ISO 17829 According Figure 1	mm	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40 D10, 10 ± 1; 3,15 < L ≤ 40	D06, 6 ± 1; 3,15 < L ≤ 40 D08, 8 ± 1; 3,15 < L ≤ 40 D10, 10 ± 1; 3,15 < L ≤ 40 D12, 12 ± 1; 3,15 < L ≤ 40
	Moisture, M, ISO 18134-1, ISO 18134-2	w-% as received, wet basis	M10 ≤ 10	M10 ≤ 10	M10 ≤ 10
	Ash, A, ISO 18122	w-% dry	A1.0 ≤ 1,0	A1.5 ≤ 1,5	A3.0 ≤ 3,0
	Mechanical durability, DU, ISO 17831-1	w-% as received	97,5 ≤ DU ≤ 99,0	97,0 ≤ DU ≤ 99,0	96,5 ≤ DU ≤ 99,0
	Fines, F [d], ISO 18846	w-% as received	F4.0 ≤ 4,0	F5.0 ≤ 5,0	F6.0 ≤ 6,0
	Additives [e]	w-% as received	< 3 Type and amount to be stated	< 3 Type and amount to be stated	< 3 Type and amount to be stated
	Net calorific value, Q, ISO 18125	MJ/kg as received	Q16.5 ≥ 16,5	Q16.5 ≥ 16,5	Q16.5 ≥ 16,5
	Bulk density, BD [f], ISO 17828	kg/m^3	BD600 ≥ 600	BD600 ≥ 600	BD600 ≥ 600
	Nitrogen, N, ISO 16948	w-% dry	N0.3 ≤ 0,3	N0.3 ≤ 0,3	N0.6 ≤ 0,6
	Particle size distribution of disintegrated pellets, ISO 17830	w-% equilibrated basis	≥ 99 % (<3,15 mm) ≥ 95 % (<2,0 mm) ≥ 60 % (<1,0 mm)	≥ 98 % (<3,15 mm) ≥ 90 % (<2,0 mm) ≥ 50 % (<1,0 mm)	≥ 97 % (<3,15 mm) ≥ 85 % (<2,0 mm) ≥ 40 % (<1,0 mm)
	Sulfur, S, ISO 16994	w-% dry	S0.05 ≤ 0,05	S0.05 ≤ 0,05	S0.05 ≤ 0,05
	Chlorine, Cl, ISO 16994	w-% dry	Cl0.03 ≤ 0,03	Cl0.05 ≤ 0,05	Cl0.1 ≤ 0,1
	Arsenic, As, ISO 16968	mg/kg dry	≤ 2	≤ 2	≤ 2
	Cadmium, Cd, ISO 16968	mg/kg dry	≤ 1,0	≤ 1,0	≤ 1,0
	Chromium, Cr, ISO 16968	mg/kg dry	≤ 15	≤ 15	≤ 15
	Copper, Cu, ISO 16968	mg/kg dry	≤ 20	≤ 20	≤ 20
	Lead, Pb, ISO 16968	mg/kg dry	≤ 20	≤ 20	≤ 20
	Mercury, Hg, ISO 16968	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1
	Zinc, Zn, ISO 16968	mg/kg dry	≤ 200	≤ 200	≤ 200

Table 2 *(continued)*

	Property class, Analysis method	**Unit**	**I1**	**I2**	**I3**
Informative	**Ash melting behaviour** [g], CEN/TS 15370–1 [4]	°C	Should be stated	Should be stated	Should be stated

[a] Negligible levels of glue, grease and other timber production additives used in sawmills during production of timber and timber product from virgin wood are acceptable if all chemical parameters of the pellets are clearly within the limits and/or concentrations are too small to be concerned with.

[b] Selected size D06, D08, D10 or D12 of pellets to be stated.

[c] Amount of pellets longer than 40 mm can be 1 w-%. Maximum length shall be ≤ 45 mm. Pellets are longer than 3,15 mm, if they stay on a round hole-sieve of 3,15 mm. Amount of pellets shorter than 10 mm, w-% recommended to be stated.

[d] At factory gate in bulk transport (at the time of loading) and large sacks (at time of packing or when delivering to end-user).

[e] Type of additives to aid production, delivery or combustion (e.g. pressing aids, slagging inhibitors or any other additives like starch, corn flour, potato flour, vegetable oil, lignin).

[f] Maximum bulk density is 750 kg/m^3.

[g] It is recommended that all characteristic temperatures (shrinkage starting temperature (SST), deformation temperature (DT), hemisphere temperature (HT) and flow temperature (FT)) in oxidizing conditions should be stated.

Bibliography

[1] EN 14785:2006, *Residential space heating appliances fired by wood pellets - Requirements and test methods*

[2] EN 15270:2007, *Pellet burners for small heating boilers – Definitions, requirements, testing, marking*

[3] EN 303-5:2012, *Heating boilers. Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW. Terminology, requirements, testing and marking*

[4] CEN/TS 15370-1:2006, *Solid Biofuels — Determination of ash melting behaviour – Part 1: Characteristic temperatures method*

[5] ISO 14780, *Solid Biofuels — Sample preparation*[11)]

[6] ISO 18135, *Solid Biofuels — Sampling*[12)]

[7] ISO 17830, *Solid Biofuels — Determination of particle size distribution of disintegrated pellets*[13)]

[8] ISO 18125, *Solid Biofuels — Determination of calorific value*[14)]

[9] ISO 18846, *Solid biofuels — Determination of fines content in quantities of pellets — Manual sieve method using 3,15 mm sieve aperture*[15)]

11) Under preparation.

12) Under preparation.

13) Under preparation.

14) Under preparation.

15) Under preparation.

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