BS EN 14961-5:2011

BSI Standards Publication

Solid biofuels — Fuel specifications and classes

Part 5: Firewood for non-industrial use

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National foreword

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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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English Version

Solid biofuels - Fuel specifications and classes - Part 5: Firewood for non-industrial use

Biocombustibles solides - Classes et spécifications des combustibles - Partie 5: Bois de chauffage à usage non industriel

Feste Biobrennstoffe - Brennstoffspezifikationen und -klassen - Teil 5: Stückholz für nichtindustrielle Verwendung

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Foreword

This document (EN 14961-5:2011) has been prepared by 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of an identical text or by endorsement, at the latest by September 2011, and conflicting national standards shall be withdrawn at the latest by September 2011.

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The European standard series EN 14961 *Solid biofuels — Fuel specifications and classes* are provided as general requirements and additional product standards. Additional product standards may extend this series over time.

EN 14961 consists of the following parts, under the general title *Solid biofuels — Fuel specifications and classes*:

— *Part 1: General requirements*;

— *Part 2: Wood pellets for non-industrial use*;

— *Part 3: Wood briquettes for non-industrial use*;

— *Part 4: Wood chips for non-industrial use*;

— *Part 5: Firewood for non-industrial use*;

— *Part 6: Non woody pellets for non-industrial use (under development)*.

Although these product standards may be obtained separately, they require a general understanding of the standards based on and supporting EN 14961-1. It is recommended to obtain and use EN 14961-1 in conjunction with these standards.

NOTE In these product standards, non-industrial use means fuel intended to be used in small-scale appliances, such as in households and small commercial and public sector buildings.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard for "Fuel Specifications and Classes — Part 5 Firewood for non-industrial use" has been produced by CEN/TC 335 Solid Biofuels Working group "Fuel Specifications, Classes and Quality Assurance".

The objective of this European Standard is to provide unambiguous and clear classification principles for solid biofuels, 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 European Standard is made to support the use of firewood in non-industrial situations and specifically for the domestic/householder market and smaller commercial boiler situations, where sensitivity to the fuel quality can cause major issues. These consumers need special consideration for the following reasons:

- small-scale equipment does not usually have advanced controls and flue gas cleaning;
- it is not generally managed by professional heating engineers;
- they are often located in living and populated districts.

NOTE Firewood produced according to this European Standard can be used in stoves, fireplaces, cookers, roomheaters and multifired sauna stoves, which are tested according to EN 13229, EN 12815, EN 12809, EN 13240, EN 15250 and EN 15821, and boilers systems tested according to EN 303-5 ($\leq$ 500 kW_{th}).

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1 Scope

This European standard determines the fuel quality classes and specifications for firewood for non-industrial use. This European standard covers only firewood produced from the following raw material (see EN 14961-1:2010, Table 1):

- 1.1.1 Whole trees without roots;
- 1.1.3 Stem wood;
- 1.1.4 Logging residues (thick branches, tops, etc.).
- 1.2.1 Chemically untreated wood residues;

NOTE For the avoidance of doubt, demolition wood is not included in the scope of this European Standard. Demolition wood is “used wood arising from demolition of buildings or civil engineering installations” (EN 14588:2010, 4.52).

2 Normative references

The following referenced document is 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.

EN 14588:2010, *Solid biofuels — Terminology, definitions and descriptions*

EN 14774-1, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*

EN 14774-2, *Solid biofuels — Determination of moisture content — Oven dry method — Part 2: Total moisture — Simplified method*

EN 14961-1:2010, *Solid biofuels — Fuel specification and classes — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14588:2010 and the following apply.

3.1
firewood
cut and split oven-ready fuelwood used in household wood burning appliances like stoves, fireplaces and central heating systems

NOTE Firewood usually has a uniform length, typically in the range of 15 cm to 100 cm.

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4 Symbols and abbreviations

The symbols and abbreviations used in this European Standard comply with the SI system of units as far as possible.

d dry (dry basis)

ar as received

w-% weight-percentage

D designation for diameter (*D*) as received [mm] 1)

E designation for energy density as received, E_{ar} [MJ/m^3 or kWh/m^3 loose or stacked volume or kWh/kg] 1)

L designation for length (*L*) as received [cm] 1)

M designation for moisture content as received on wet basis, M_{ar} [w-%] 1)

U designation for moisture content in dry basis (U_d),[w-%] 1)

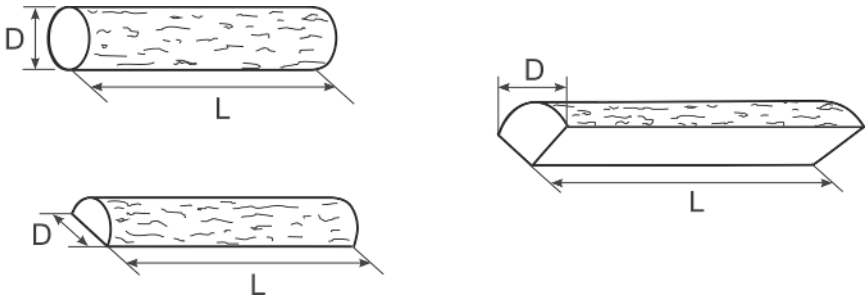
NOTE 1 MJ/kg equals to 0,277 8 kWh/kg (1 kWh/kg equals to 1 MWh/t and 1 MWh/t is 3,6 MJ/kg). 1 g/cm^3 equals 1 kg/dm^3.

5 Specification of firewood for non-industrial use

Specification of the firewood is stated in accordance with Table 1. The determination of the properties shall be carried out in accordance with the methods mentioned in the normative references.

The threshold values for ash, N, S, Cl and minor elements are not required as firewood is produced from virgin material which has been grown on uncontaminated land and therefore the likely hood of contamination is very low.

Firewood specified according to classes A1 and A2 are suitable to be used in stoves and fireplaces and class B in log wood boilers.



Key
D maximum diameter
L maximum length

Figure 1 — Dimensions of firewood

1) Designation symbols are used in combination with a number to specify property levels in Table 1.

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How to state the dimensions of firewood is expressed in Figure 1. If the properties being specified are sufficiently known through information about the origin and handling (or preparation method combined with experience), then analysis may not be needed.

NOTE Firewood amounts are given in cubic metres or in kilograms. A cubic metre of stacked wood means a stack of wood that occupies a space of one cubic metre. A cubic metre of loose wood is equal to a box one cubic metre in size into which the split logs are “thrown”. This is also referred to as an “unstacked cubic metre”. Naturally, the conversion rates between the volumes will be affected by the size of the logs and how they are arranged. Comparison of different cubic meters is shown in informative Annex B.

To minimise resources needed, one of the measures in the following order is recommended:

a) Using typical values, e.g. laid down in Annex B of EN 14961-1:2010, or obtained by experience;

b) Calculation of properties, e.g. by using typical values and considering documented specific values;

c) Carrying out of analysis:

   1) With simplified methods if available,

   2) 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.

Chemical treatment before the harvesting of biomass does not need to be stated. Where any operator in the fuel supply chain has reason to suspects serious contamination of land (e.g. coal slag heaps) or if planting has been used specifically for the sequestration of chemicals or biomass is fertilized by sewage sludge (issued from waste water treatment or chemical process), fuel analysis should be carried out to identify chemical impurities such as halogenated organic compounds or heavy metals.

Decay means a lost of mass and energy. Damage of insects, almost in sap-wood, and mould is considered to be no lost of mass or energy. Mould can result on the surface of wood. The amount of mould depends on the conditions of drying or storing or ambient climate. Discolouration can result by chemical reactions between Fe-Ions and tannins (e.g. white oak) or by air and kiln drying.

The quality shall be given either in the product declaration (prEN 15234-5) or by a corresponding label in the package.

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Table 1 — Specification of oven-ready firewood for non-industrial use

Property class/Analysis method	Units	A1	A2	B
Origin and source EN 14961-1		1.1.3 Stemwood 1.2.1 Chemically untreated wood residues	1.1.1 Whole trees without roots 1.1.3 Stemwood 1.1.4 Logging residues	1.1.1 Whole trees without roots 1.1.3 Stemwood 1.1.4 Logging residues
Wood species [a]		To be stated		To be stated
Diameter, D [b, c]	cm	D2 ≤ 2 D5 2 ≤ D ≤ 5 D10 5 ≤ D ≤10 D15 10 ≤ D ≤15 D15+ >15 (actual value to be stated)		D15 ≤ 15 D15+ >15 (actual value to be stated)
Length, L [b, d]	cm	L20 ≤ 20 L25 ≤ 25 L33 ≤ 33 L50 ≤ 50 L100 ≤ 100		L33 ≤ 33 L50 ≤ 50 L100 ≤ 100
Moisture, M [b,f] EN 14774-1, EN 14774-2	w-% wet basis	M20 ≤ 20 M25 ≤ 25		M25 ≤ 25 M35 ≤ 35
Moisture, U [b,f]	w-% dry basis	U25 ≤ 25 U33 ≤ 33		U33 ≤ 33 U54 ≤ 54
Volume or weight	m^3 stacked or m^3 loose or kg	To be stated which volume or weight is used when retailed		
Proportion of split volume	% of pieces	≥ 90 %	≥ 50 %	No requirements
The cut-off surface		Even and smooth [e]	No requirements	No requirements
Decay	% of pieces	No visible decay	≤ 5 %	If significant amount (more than 10 % of pieces) of decay exists it should be stated. In case of doubt particle density or net calorific value could be used as indicator.
Energy density, E [g]	kWh/m^3 loose or stacked kWh/kg	Recommended to be stated.		
Drying		Recommended to be stated, if firewood is dried by natural seasoning by ambient air or artificially by hot air.		

[a] Wood species (e.g. spruce, birch, beech) can be stated by using the EN 13556 round and sawn timber nomenclature [6]. If firewood includes different wood species, the main wood species should be mentioned first.
[b] The selected diameter, length and moisture contents of firewood have to be stated.
[c] 85 % of the firewood should be kept in specified diameter property class. For stoves it is recommended to use firewood with a diameter less than 15 cm. D2 and D5 are recommended for cookers and as kindling (ignition wood).
[d] Length should be in the limits of ± 2 cm. It is allowed to have 15 % firewood shorter than requested length including the limit value.
[e] Use of chainsaw is considered to be smooth and even.
[f] Both determination of moisture contents have to be stated: M (w-%) on wet basis and U (w-%) on dry basis. Moisture content should not be less 12 w-% on wet basis (M) or 13,64 w-% on dry basis (U). Calculation from M to U-basis is shown in informative Annex A.
[g] The energy density (E) may be calculated according to Annex D in EN 14961-1:2010, on the basis of the bulk density (BD) and the net calorific value. Example: For a firewood with a net calorific value on dry basis of 19 MJ/kg (5,28 kWh/kg) and an actual moisture content of 15 w-%, the net calorific value on as received basis is 15,78 MJ/kg (4,38 kWh/kg). For a bulk density of 410 kg/stacked m^3, the energy density (E) then is 6 480 MJ/stacked m^3 (1 800 kWh/stacked m^3).

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Annex A
(informative)

Comparison of moisture content as received and dry basis

Table A.1 — Comparison of moisture content as received (M) and dry basis (U)

Moisture content, wet basis (M), w-%	Moisture content, dry basis (U), w-%
12	13,64
13	14,94
14	16,28
15	17,65
16	19,05
17	20,48
18	21,95
19	23,46
20	25,00
21	26,58
22	28,21
23	29,87
24	31,58
25	33,33
26	35,14
27	36,99
28	38,89
29	40,85
30	42,86
31	44,93
32	47,06
33	49,25
34	51,52
35	53,85
36	56,25
37	58,73

Moisture content, dry basis (U), w-%	Moisture content, wet basis (M), w-%
12	10,71
13	11,50
14	12,28
15	13,04
16	13,79
17	14,53
18	15,25
19	15,97
20	16,67
21	17,36
22	18,03
23	18,70
24	19,35
25	20,00
26	20,63
27	21,26
28	21,88
29	22,48
30	23,08
31	23,66
32	24,24
33	24,81
34	25,37
35	25,93
36	26,47
37	27,01
38	27,54
39	28,06
40	28,57
41	29,08
42	29,58
43	30,07
44	30,56
45	31,03
46	31,51
47	31,97
48	32,43
49	32,89
50	33,33
51	33,77
52	34,21
53	34,64
54	35,06

The relation between moisture on dry basis, U_d, or wet basis, M_{ar}, expressed as a percentage by mass shall be calculated using Formulas (1) and (2) according to EN 14774-1.

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$$U_d = \frac{M_{ar}}{100 - M_{ar}} \text{ x } 100 \quad (1)$$

$$M_{ar} = \frac{U_d}{100 + U_d} \text{ x } 100 \quad (2)$$

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Annex B
(informative)

Comparison of different cubic meters

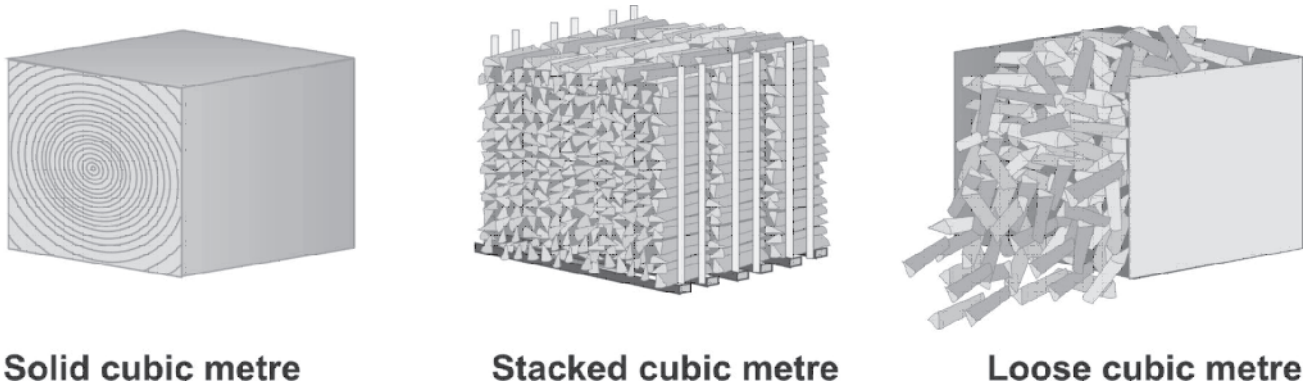

Figure B.1 — Comparison of different cubic meters

NOTE Three loose m^3 is on average about two stacked m^3 of firewood.

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[2] EN 12809, *Residential independent boilers fired by solid fuel — Nominal heat output up to 50 kW — Requirements and test methods*

[3] EN 12815, *Residential cookers fired by solid fuel — Requirements and test methods*

[4] EN 13229, *Inset appliances including open fires fired by solid fuels — Requirements and test methods*

[5] EN 13240, *Room heaters fired by solid fuel — Requirements and test methods*

[6] EN 13556, *Round and sawn timber — Nomenclature of timbers used in Europe*

[7] EN 15234-1, *Solid biofuels — Fuel quality assurance — Part 1. General requirements*

[8] EN 15250, *Slow heat release appliances fired by solid fuel — Requirements and test methods*

[9] EN 15821, *Multi-firing sauna stoves fired by natural wood logs — Requirements and test methods*

[10] prEN 15234-5, *Solid biofuels — Fuel quality assurance — Part 5. Firewood for non-industrial use*

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