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SIST EN 14961-1:2010

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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English Version

Solid biofuels - Fuel specifications and classes - Part 1: General requirements

Biocombustibles solides - Partie 1 : Classes et spécifications des combustibles

Feste Biobrennstoffe - Brennstoffspezifikationen und -klassen - Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 1 November 2009.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Symbols and abbreviations	6
5 Principle.....	7
6 Classification of origin and sources of solid biofuels	8
6.1 General.....	8
6.2 Woody biomass	12
6.2.1 Forest, plantation and other virgin wood.....	12
6.2.2 By-products and residues from wood processing industry	12
6.2.4 Blends and mixtures	13
6.3 Herbaceous biomass.....	13
6.3.1 Agriculture and horticulture herbaceous biomass.....	13
6.3.2 By-products and residues from herbaceous processing industry	13
6.3.3 Blends and mixtures	13
6.4 Fruit biomass	13
6.4.1 Orchard and horticulture fruit	13
6.4.2 By-products and residues from fruit processing industry.....	13
6.4.3 Blends and mixtures	13
6.5 Biomass blends and mixtures.....	13
7 Specification of solid biofuels based on traded forms and properties.....	14
7.1 Traded forms of solid biofuels	14
7.2 Specification of properties of solid biofuels.....	14
Annex A (informative) Illustrations of typical forms of wood fuels	34
Annex B (informative) Typical values of solid biomass fuels	36
Annex C (informative) Examples of possible causes for deviant levels for different properties and of consequences of handling and treatments for the properties of biomass	47
Annex D (informative) Calculation of the net calorific value at different bases and energy density as received	49
Bibliography.....	52

Foreword

This document (EN 14961-1:2010) 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 July 2010, and conflicting national standards shall be withdrawn at the latest by July 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 14961:2005.

The series EN 14961, *Solid biofuels — Fuel specifications and classes* is provided as a general requirement and additional product standards. Additional product standards may extend this series over time.

EN 14961, *Solid biofuel — Fuel specification and classes*, consists of the following parts:

- *Part 1: General requirements*
- *Part 2: Wood pellets for non-industrial use* (under development)
- *Part 3: Wood briquettes for non-industrial use* (under development)
- *Part 4: Wood chips for non-industrial use* (under development)
- *Part 5: Firewood for non-industrial use* (under development)
- *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.

In these product standards, "non-industrial" use means use in smaller 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.

Introduction

This European Standard, *Fuel Specifications and Classes — Part 1: General requirements*, has been produced by 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 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 European Standard is made for all user groups.

Figure 1 describes the bioenergy utilisation chain from sources of biomass, to biofuel production to final use of bioenergy. Although biomass can be used for energy generation it has many other primary uses (non-fuels) as a raw material for construction, furniture, packaging, paper products, etc. The classifications given in this European Standard are provided with the objective of using biomass as a biofuel, and therefore do not deal with all other uses. The biofuels covered by this European Standard are identical to the fuels exempted from the Directive 2000/76/EC (Article 2.2 a) from i) to v)) on incineration of waste.

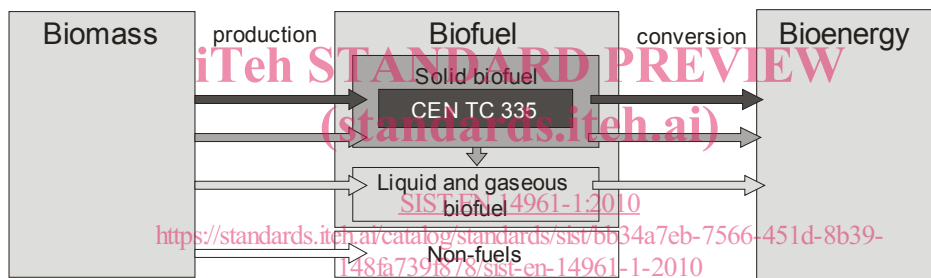


Figure 1 — CEN TC 335 within the biomass – Biofuel – Bioenergy field

1 Scope

This European Standard determines the fuel quality classes and specifications for solid biofuels. According to the mandate given for the standardisation work, the scope of the CEN/TC 335 only includes solid biofuels originating from the following sources:

- a) products from agriculture and forestry;
- b) vegetable waste from agriculture and forestry;
- c) vegetable waste from the food processing industry;
- d) wood waste, with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating, and which includes in particular such wood waste originated from construction and demolition waste;
- e) fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and heat generated is recovered;
- f) cork waste.

NOTE 1 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" (prEN 14588).

NOTE 2 Aquatic biomass is not included in the scope of this European Standard.

2 Normative references

The following referenced documents are 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.

prEN 14588:2009, *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 14775, *Solid biofuels — Determination of ash content*

CEN/TS 14778 (all parts), *Solid biofuels — Sampling*

CEN/TS 14780, *Solid biofuels — Methods for sample preparation*

EN 14918, *Solid Biofuels — Determination of calorific value*

EN 15103, *Solid Biofuels — Determination of bulk density*

CEN/TS 15104, *Solid biofuels — Determination of total content of carbon, hydrogen and nitrogen — Instrumental methods*

EN 14961-1:2010 (E)

CEN/TS 15149-1, *Solid biofuels — Methods for the determination of particle size distribution — Part 1: Oscillating screen method using sieve apertures of 3,15 mm and above*

CEN/TS 15149-2, *Solid biofuels — Methods for the determination of particle size distribution — Part 2: Vibrating screen method using sieve apertures of 3,15 mm and below*

CEN/TS 15150, *Solid biofuels — Methods for the determination of particle density*

EN 15210-1, *Solid Biofuels — Determination of mechanical durability of pellets and briquettes — Part 1: Pellets*

CEN/TS 15210-2, *Solid biofuels — Methods for the determination of mechanical durability of pellets and briquettes — Part 2: Briquettes*

CEN/TS 15234, *Solid biofuels — Fuel quality assurance*

CEN/TS 15289, *Solid Biofuels — Determination of total content of sulphur and chlorine*

CEN/TS 15290, *Solid Biofuels — Determination of major elements*

CEN/TS 15296, *Solid Biofuels — Calculation of analyses to different bases*

CEN/TS 15297, *Solid Biofuels — Determination of minor elements*

CEN/TS 15370-1, *Solid biofuels — Method for the determination of ash melting behaviour — Part 1: Characteristic temperatures method*

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in prEN 14588:2009 and the following apply.

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3.1**chemical treatment**

any treatment with chemicals other than air, water or heat (e.g. glue and paint)

NOTE Examples of chemical treatments are listed in informative Annex C.

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)

daf dry, ash-free

ar as received

w-% weight-percentage

A	Designation for ash content [w-%, dry basis] ¹⁾
BD	Designation for bulk density as received [kg/m ³] ¹⁾
D	Designation for diameter as received [mm] ¹⁾
<i>D</i>	Diameter as received [mm]
DE	Designation for particle density as received [g/cm ³] ¹⁾
DT	Designation for deformation temperature [°C]
DU	Designation for mechanical durability as received [w-%] ¹⁾
<i>E_{ar}</i>	Energy density as received [GJ/m ³ or MWh/m ³ loose or stacked volume] (amount of energy/volume unit)
E	Designation for energy density [GJ/m ³ or MWh/m ³ loose or stacked volume] ¹⁾
F	Designation for amount of fines [w-%, as received]
L	Length as received [mm]
L	Designation for length as received [mm] ¹⁾
<i>M_{ar}</i>	Total moisture content as received [w-%] on wet basis
M	Designation for moisture content as received [w-%] ¹⁾
P	Designation for particle size distribution as received [mm] ¹⁾
<i>q_{V,gr,d}</i>	Gross calorific value at constant volume on dry basis [MJ/kg]
<i>q_{p,net,d}</i>	Net calorific value at constant pressure on dry basis [MJ/kg]
Q	Designation for net calorific value as received, <i>q_{p,net,ar}</i> [MJ/kg or kWh/kg or MWh/t] at constant pressure ¹⁾

NOTE 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/cm³ equals 1 kg/dm³.

5 Principle

Solid biofuels are specified by:

- origin and source, Clause 6;
- major traded forms and properties, Clause 7.

For specification of origin and source, see Table 1. For major traded forms, see Table 2.

For specification of properties see Tables 3 to 15. The major traded forms of solid biofuels are covered by Tables 3 to 14. Table 15 is a general master table to be used for solid biofuels not covered by Tables 3 to 14.

1) Designation symbols are used in combination with a number to specify property levels in Tables 3 to 15. For designation of chemical properties chemical symbols like S (sulphur), Cl (chlorine), N (nitrogen) are used and the value is added at the end of the symbol.

EN 14961-1:2010 (E)

If solid biofuels fall outside the specifications of the major traded fuels given in Tables 3 to 14 then Table 15 should be used for specification purposes.

Tables 3 to 15 list the normative properties, which shall be specified and informative properties, which are voluntary. Normative properties vary depending on both origin and traded form.

EXAMPLE OF SPECIFICATION

Origin: Logging residues (1.1.4)
 Traded form: Wood chips
 Properties: Particle size distribution P45, Moisture M40, Ash A1.5

In the case of wood chips (Table 5) the properties of dimensions, moisture and ash are normative in the specification. Other properties are informative.

Specifications for high quality classes of solid biofuels are recommended for smaller scale appliances, such as in households and small commercial and public sector buildings. Product standards for such biofuels are given in other parts of EN 14961.

6 Classification of origin and sources of solid biofuels**6.1 General**

The classification is based on the biofuel origin and source. In the hierarchical classification system (Table 1) the main origin-based solid biofuel groups are:

- a) woody biomass;
 b) herbaceous biomass;
 c) fruit biomass; and
 d) blends and mixtures.

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Woody biomass is biomass from trees, bushes and shrubs.

Herbaceous biomass is from plants that have a non-woody stem and which die back at the end of the growing season. It includes grains and their by-products such as cereals.

Fruit biomass is the biomass from the parts of a plant which are from or hold seeds.

If appropriate, also the actual species (e.g. spruce, wheat) of biomass should be stated.

The term "Blends and mixtures" in Table 1 refers to material of various origin within the given box in the classification table and appears on four levels. Blends are intentionally mixed biofuels, whereas mixtures are unintentionally mixed biofuels. The origin of the blend and mixture shall be described using Table 1.

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

The second level of classification in Table 1 describes fuels from different sources within the main groups, primarily stating whether the biomass is a virgin material, a by-product or a residue from the industry.

Groups in Table 1 are further divided into third and fourth level sub-groups. The purpose of Table 1 is to allow the possibility to differentiate and specify biofuel material based on origin with as much detail as needed. With the help of typical values from informative Annex B information on physical and chemical properties can be deduced.

Examples for classification according to Table 1:

- a) Whole trees without roots from birch (1.1.1.1);
- b) Logging residues (1.1.4);
- c) Logging residues from spruce stands (1.1.4.2);
- d) Sawdust from broad-leaf (1.2.1.1);
- e) Ply from coniferous(1.2.1.2);
- f) Plywood residues (1.2.2.1);
- g) Grinding dust from furniture industry (1.2.2.1);
- h) Lignin (1.2.2.4);
- i) Construction wood (1.3.1.1);
- j) Pallets (1.3.2.1);
- k) Reed canary grass (2.1.2.1);
- l) Straw from wheat, barley, oat, rye (2.1.1.2);
- m) Rice husk (2.1.1.4);
- n) Grains or seeds crops from food processing industry (2.2.1.1);
- o) Olive residues from olive pressing (3.2.2.4).

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Table 1 — Classification of origin and sources of solid biofuels

1. Woody biomass	1.1 Forest, plantation and other virgin wood	1.1.1 Whole trees without roots	1.1.1.1 Broad-leaf
			1.1.1.2 Coniferous
			1.1.1.3 Short rotation coppice
			1.1.1.4 Bushes
			1.1.1.5 Blends and mixtures
		1.1.2 Whole trees with roots	1.1.2.1 Broad-leaf
			1.1.2.2 Coniferous
			1.1.2.3 Short rotation coppice
			1.1.2.4 Bushes
			1.1.2.5 Blends and mixtures
		1.1.3 Stemwood	1.1.3.1 Broad-leaf
			1.1.3.2 Coniferous
			1.1.3.3 Blends and mixtures
	1.1.4 Logging residues	1.1.4.1 Fresh/Green, Broad-leaf (including leaves)	
		1.1.4.2 Fresh/Green, Coniferous (including needles)	
		1.1.4.3 Stored, Broad-leaf	
		1.1.4.4 Stored, Coniferous	
		1.1.4.5 Blends and mixtures	
	1.1.5 Stumps/roots	1.1.5.1 Broad-leaf	
		1.1.5.2 Coniferous	
		1.1.5.3 Short rotation coppice	
		1.1.5.4 Bushes	
		1.1.5.5 Blends and mixtures	
1.1.6 Bark (from forestry operations) ^a			
1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards and fruit orchards			
1.1.8 Blends and mixtures			
1.2 By-products and residues from wood processing industry	1.2.1 Chemically untreated wood residues	1.2.1.1 Without bark, Broad-leaf	
		1.2.1.2 Without bark, Coniferous	
		1.2.1.3 With bark, Broad-leaf	
		1.2.1.4 With bark, Coniferous	
		1.2.1.5 Bark (from industry operations) ^a	
	1.2.2 Chemically treated wood residues, fibres and wood constituents	1.2.2.1 Without bark	
		1.2.2.2 With bark	
		1.2.2.3 Bark (from industry operations) ^a	
		1.2.2.4 Fibres and wood constituents	
	1.2.3 Blends and mixtures		
1.3 Used wood	1.3.1 Chemically untreated wood	1.3.1.1 Without bark	
		1.3.1.2 With bark	
		1.3.1.3 Bark ^a	
	1.3.2 Chemically treated wood	1.3.2.1 Without bark	
		1.3.2.2 With bark	
		1.3.2.3 Bark ^a	
1.3.3 Blends and mixtures			
1.4 Blends and mixtures			

^a Cork waste is included in bark sub-groups.

NOTE 1 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” (see prEN 14588).

NOTE 2 If appropriate, also the actual species (e.g. spruce, wheat) of biomass may be stated. Wood species may be stated e.g. according to EN 13556, *Round and sawn timber — Nomenclature of timbers used in Europe*^[1].

NOTE 3 Chemical treatment before harvesting of biomass does not need to be stated. Where any operator in the fuel supply chain has reason to suspect 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.

Table 1 (continued)

2. Herbaceous biomass	2.1 Herbaceous biomass from agriculture and horticulture	2.1.1 Cereal crops	2.1.1.1 Whole plant
			2.1.1.2 Straw parts
			2.1.1.3 Grains or seeds
			2.1.1.4 Husks or shells
			2.1.1.5 Blends and mixtures
		2.1.2 Grasses	2.1.2.1 Whole plant
			2.1.2.2 Straw parts
			2.1.2.3 Seeds
			2.1.2.4 Shells
			2.1.2.5 Blends and mixtures
		2.1.3 Oil seed crops	2.1.3.1 Whole plant
			2.1.3.2 Stalks and leaves
			2.1.3.3 Seeds
			2.1.3.4 Husks or shells
			2.1.3.5 Blends and mixtures
		2.1.4 Root crops	2.1.4.1 Whole plant
			2.1.4.2 Stalks and leaves
	2.1.4.3 Root		
	2.1.4.4 Blends and mixtures		
	2.1.5 Legume crops	2.1.5.1 Whole plant	
		2.1.5.2 Stalks and leaves	
		2.1.5.3 Fruit	
		2.1.5.4 Pods	
		2.1.5.5 Blends and mixtures	
	2.1.6 Flowers	2.1.6.1 Whole plant	
		2.1.6.2 Stalks and leaves	
		2.1.6.3 Seeds	
2.1.6.4 Blends and mixtures			
2.1.7 Segregated herbaceous biomass from gardens, parks, roadside maintenance, vineyards, and fruit orchards			
2.1.8 Blends and mixtures			
2.2 By-products and residues from herbaceous processing industry ^b	2.2.1 Chemically untreated herbaceous residues	2.2.1.1 Cereal crops and grasses	
		2.2.1.2 Oil seed crops	
		2.2.1.3 Root crops	
		2.2.1.4 Legume crops	
		2.2.1.5 Flowers	
		2.2.1.6 Blends and mixtures	
	2.2.2 Chemically treated herbaceous residues	2.2.2.1 Cereal crops and grasses	
		2.2.2.2 Oil seed crops	
		2.2.2.3 Root crops	
		2.2.2.4 Legume crops	
		2.2.2.5 Flowers	
		2.2.2.6 Blends and mixtures	
2.2.3 Blends and mixtures			
2.3 Blends and mixtures			
^b Group 2.2 also includes residues and by-products from the food processing industry.			

Table 1 (concluded)

3. Fruit biomass	3.1 Orchard and horticulture fruit	3.1.1 Berries	3.1.1.1 Whole berries
			3.1.1.2 Flesh
			3.1.1.3 Seeds
			3.1.1.4 Blends and mixtures
		3.1.2 Stone/kernel fruits	3.1.2.1 Whole fruit
			3.1.2.2 Flesh
			3.1.2.3 Stone/kernel
			3.1.2.4 Blends and mixtures
		3.1.3 Nuts and acorns	3.1.3.1 Whole nuts
			3.1.3.2 Shells/husks
	3.1.3.3 Kernels		
	3.2 By-products and residues from fruit processing industry ^c	3.2.1 Chemically untreated fruit residues	3.2.1.1 Berries
			3.2.1.2 Stone/kernel fruits
			3.2.1.3 Nuts and acorns
			3.2.1.4 Crude olive cake
3.2.1.5 Blends and mixtures			
3.2.2 Chemically treated fruit residues		3.2.2.1 Berries	
		3.2.2.2 Stone/kernel fruits	
		3.2.2.3 Nuts and acorns	
		3.2.2.4 Exhausted olive cake	
		3.2.2.5 Blends and mixtures	
3.2.3 Blends and mixtures			
3.3 Blends and mixtures			
4 Blends and mixtures		4.1 Blends	
		4.2 Mixtures	

^c Group 3.2 also includes residues and by-products from the food processing industry.

NOTE 4 Group 4 "Blends and mixtures" include blends and mixtures from the main origin-based solid biofuel groups 1 to 3.

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6.2 Woody biomass

6.2.1 Forest, plantation and other virgin wood

Forest, plantation and other virgin wood in this group may only have been subjected to size reduction, debarking, drying or wetting. Forest, plantation and other virgin wood includes wood from forests, parks, gardens, plantations and from short rotation forests and coppice.

6.2.2 By-products and residues from wood processing industry

Wood by-products and wood residues from industrial production are classified in this group. These biofuels can be chemically untreated (for example residues from debarking, sawing or size reduction, shaping, pressing) or chemically treated wood residues from wood processing and the production of panels and furniture (glued, painted, coated, lacquered or otherwise treated wood), as long as they do not contain heavy metals or halogenated organic compounds as a result of treatment with wood preservatives or coating.

NOTE This classification is in accordance with the classification in the European Waste Catalogue^[2] including the waste code No. 03 01 (Wastes from wood processing and the production of panels and furniture).

6.2.3 Used wood

This group includes post consumer/post society wood waste; natural or merely mechanically processed wood, contaminated only to an insignificant extent during use by substances that are not normally found in wood in its natural state (for example pallets, transport cases, boxes, wood packages, cable reels, construction wood). With respect to treatment the same criteria apply as with respect to "wood processing industry by-products and residues", i.e. the used wood shall not contain heavy metals or halogenated organic compounds as a result of treatment with wood preservatives or coating.

NOTE This classification is in accordance with the classification in the European Waste Catalogue^[2] including the waste codes No. 15 01 03 (Wooden packaging), 17 02 01 (Construction and demolition wood wastes, but without the demolition wood wastes, which are excluded according the scope) and 20 01 38 (Municipal wood wastes including separately collected fractions).

6.2.4 Blends and mixtures

This refers to blends and mixtures of woody biomass in the groups 1.1 to 1.3 in Table 1. The mixing can be either intentional (blends) or unintentional (mixtures).

6.3 Herbaceous biomass

6.3.1 Agriculture and horticulture herbaceous biomass

Material, which comes directly from the field, perhaps after a storage period, and may only have been subject to size reduction and drying is included here. It covers herbaceous material from agricultural and horticultural fields and from gardens and parks.

6.3.2 By-products and residues from herbaceous processing industry

This refers to any herbaceous biomass material that is left over after industrial handling and treatment.

Examples are residues from the production of sugar from sugar beets, barley malt residues from beer production and raw vegetable residues from food processing industry.

6.3.3 Blends and mixtures

This refers to blends and mixtures of herbaceous biomass in the groups 2.1 to 2.2 in Table 1. The mixing can be either intentional (blends) or unintentional (mixtures).

6.4 Fruit biomass

6.4.1 Orchard and horticulture fruit

Fruit from trees, bushes and fruit from herbs (e.g. tomatoes and grapes) are classified in this group.

6.4.2 By-products and residues from fruit processing industry

This refers to a fruit biomass material that is left over after industrial handling and treatment.

Examples are pressing residues from olive oil or apple juice production and processed (e.g. heated, steamed, cooked, etc.) vegetable residues from food processing industry.

6.4.3 Blends and mixtures

This refers to blends and mixtures of fruit biomass in the groups 3.1 to 3.2 in Table 1. The mixing can be either intentional (blends) or unintentional (mixtures).

6.5 Biomass blends and mixtures

These include blends and mixtures of different biomasses mentioned above under 6.2 to 6.4. The mixing can be either intentional (blends) or unintentional (mixtures).

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