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

Biocombustibles solides — Terminologie, définitions et descriptions

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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. 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 has been written in accordance with ISO 10241. This International Standard is based on European standard EN 14588:2010^[6] as well as on approved national standards and manuals. Some of the terms included in this International Standard are only used in particular countries.

In this International Standard instead of the legal definition *waste* the technical terms *residue*, and *by-product* are used to describe co-products from forestry and arboriculture, agriculture and horticulture, and aquaculture as well as related industries. The terms and definitions are harmonized as far as possible with the current language used in management as well as in regulatory activities.

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Solid biofuels — Terminology, definitions and descriptions

1 Scope

This international standard determines the terminology and definitions for solid biofuels. According to the scope of the ISO/TC 238 this standard only includes raw and processed material originating from

- forestry and arboriculture,
- agriculture and horticulture,
- aquaculture

NOTE 1 Raw and processed material includes woody, herbaceous, fruit and aquatic biomass from the sectors mentioned above.

NOTE 2 Chemically treated material does not include halogenated organic compounds or heavy metals at levels higher than those in typical virgin material values or higher than typical values of the country of origin.

Materials originating from different recycling processes of end-of-life-products are not within the scope but relevant terms are included for information. Areas covered by ISO/TC28/SC7 “Liquid biofuels” and ISO/TC193 “Natural gas” are excluded.

Other standards with a different scope than this International Standard may have different definitions than this standard.

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.

Not applicable.

3 Principle

This International Standard only contains terms used to describe solid biofuels within the scope of ISO/TC 238, see [Figure 1](#).

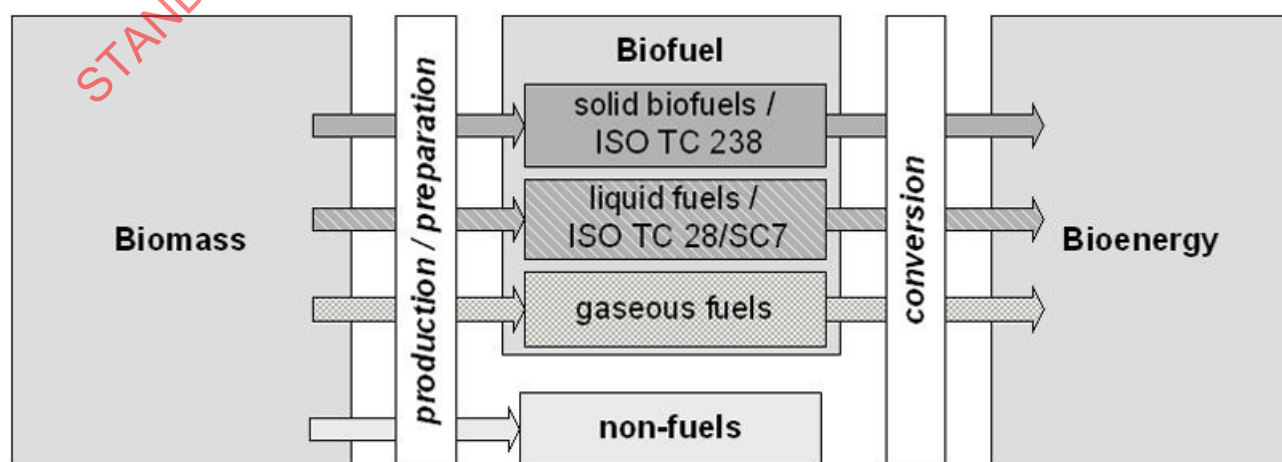


Figure 1 — ISO/TC 238 within the biomass-biofuel-bioenergy field

Solid biofuels are produced from different sources, which are defined within the scope of ISO/TC 238 “Solid Biofuels”. Terms and definitions are categorised in a logical structure based on the fact that solid biofuels are produced from different sources and that solid biofuels are used to produce bioenergy:

- origin and source of solid biofuels in the overall supply chain,
- the different traded forms as well as the different forms of biofuels produced within the preparation processes,
- the most relevant solid biofuel properties and terms of sampling and testing as well as classification and specification
- the description of the solid biofuels itself as well as their handling and processing given in the same structure as the biomass sources
- bioenergy as the result of solid biofuel conversion

Appropriate terms for sampling and testing as well as classification and specification of properties have to be defined and described together with the category *source/origin, type and properties of solid biofuels*. The necessity of terms defined in this International Technical Standard is in many cases based on the classification system of solid biofuels given in ISO 17225-1, in which the classification of solid biofuels is specified in more detail.

4 Terms and definitions

4.1

absorption

phenomenon whereby atoms, ions, or molecules from a gas, liquid, or dissolved solid permeates or is dissolved by a liquid or solid (the absorbent)

Note 1 to entry: Adsorption is a surface-based process while absorption involves the whole *volume* of the material.

[SOURCE: ISO 18757:2003]

4.2

adsorption

phenomenon whereby atoms, ions, or molecules from a gas, liquid, or dissolved solid adheres to a surface whereby the process creates a film of the adsorbate on the surface of the adsorbent

[SOURCE: ISO 18757:2003]

4.3

additive

material which has been intentionally introduced into the *fuel feedstock* 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*.

[SOURCE: ISO 17225-2:2014]

4.4

agrofuels

biofuels obtained from *energy crops* and/or agricultural by-products (agricultural residues)

[SOURCE: FAO unified *bioenergy* terminology (UBET)]

4.5

air dried

condition in which the *solid biofuel* has dried in air to equilibrium *moisture content*

[SOURCE: ISO 1213-2:1992]

4.6**angle of repose****critical angle of repose**

steepest angle of descent measured in degrees of the slope of material relative to the horizontal plane when granular material on the slope face is on the verge of sliding

Note 1 to entry: The slope may be the convex perimeter of a conical pile on a flat surface.

[SOURCE: ISO 4324:1977]

4.7**angle of drain**

steepest angle of descent measured in degrees of the slope of material relative to the horizontal plane when granular material on the slope face is on the verge of sliding

Note 1 to entry: When *biomass* is held in a silo or hopper and drained through a gate at the bottom the material is usually forming a cone within which the material, especially material with high *particle* aspect ratio such as pellets, partially becomes interlocked before released by the forces of gravity.

Note 2 to entry: The angle of drain is normally a few degrees higher than the angle of repose.

4.8**animal biomass**

biomass obtained from livestock

4.9**animal by-products****animal residues**

agricultural by-products (or agricultural residues) obtained from livestock operations

Note 1 to entry: It includes among others solid excreta of animals.

[SOURCE: EN 14588:2010]

4.10**aquatic biomass**

biomass from so called hydrophytic plants or hydrophytes, which are plants that have adapted to living in or on aquatic environments

[SOURCE: ISO 17225-1:2014]

4.11**as analysed****determined basis**

condition in which the *moisture content* of the *solid biofuel* is the content of the material at the moment of analysis/determination

[SOURCE: ISO 1213-2:1992]

4.12**as received****as delivered****ar**

calculation basis for a material in the delivery state

Note 1 to entry: The abbreviation of as received is ar.

[SOURCE: ISO 15357:2011]

4.13

ash

ash content

total ash

A

mass of inorganic residue remaining after combustion of a *fuel* under specified conditions, typically expressed as a percentage of the mass of *dry matter* in *fuel*

Note 1 to entry: See also *ash fusibility*, *natural ash*, *extraneous ash*.

Note 2 to entry: Depending on the combustion efficiency the ash may contain combustibles.

Note 3 to entry: If a complete combustion is realized ash contains only inorganic, non-combustible components.

[SOURCE: ISO 1213-2:1992]

4.14

ash deformation temperature

DT

temperature at which first signs of rounding due to melting of the edges of the *ash* test piece occur

[SOURCE: EN 14588:2010]

4.15

ash flow temperature

FT

temperature at which the *ash* is spread out over the supporting tile in a layer, the height of which is half of the height of the test piece at the *ash hemisphere temperature*

[SOURCE: EN 14588:2010]

4.16

ash fusibility

ash melting behaviour

characteristic physical state of the *ash* obtained by heating under specific conditions

Note 1 to entry: *Ash fusibility* is determined under either oxidising or reducing conditions.

Note 2 to entry: See also *ash deformation temperature*, *ash flow temperature*, *ash hemisphere temperature* and *ash shrinkage starting temperature*.

[SOURCE: EN 14588:2010]

4.17

ash hemisphere temperature

HT

temperature at which the height of a test piece, prepared from *ash* by a specific procedure, is equal to half the width of the base, and its shape becomes approximately hemispherical

[SOURCE: EN 14588:2010]

4.18

ash shrinkage starting temperature

SST

temperature at which shrinking of the test piece occurs

Note 1 to entry: This temperature is defined as when the area of the test piece falls below 95 % of the original test piece area at 550°C.

4.19

bag weight

weight of the *fuel* plus the bag

4.20
baled biofuel
bale

solid biofuel which has been compressed and bound to keep its shape and *density*

EXAMPLE Straw bales, bales of *energy grass*, bales of treetops and branches.

[SOURCE: EN 14588:2010]

4.21
bark

organic cellular tissue which is formed by taller plants (trees, bushes) on the outside of the growth zone (cambium) as a shell for the wooden body

[SOURCE: EN 14588:2010]

4.22
basic density

ratio of the mass on *dry basis* and the *solid volume* on green basis

[SOURCE: EN 14588:2010]

4.23
biobased

derived from *biomass*

[SOURCE: EN 16575:2013]

4.24
biobased content

fraction of a fuel that is derived from biomass

Note 1 to entry: Normally expressed as a percentage of the total mass of the product.

[SOURCE: EN 16575:2013]

4.25
biobased product
biobased industrial product
bioproduct

product wholly or partly derived from biomass

Note 1 to entry: The *biobased product* is normally characterized by the biobased carbon content or the *biobased* content.

[SOURCE: EN 16575:2013]

4.26
bioenergy

energy derived from biomass

Note 1 to entry: *Biomass may either be directly converted into energy or processed into solids, liquids or gases.*

[SOURCE: EN 14588:2010]

4.27
biofuel

solid, liquid or gaseous *fuel* produced directly or indirectly from *biomass*

[SOURCE: EN 14588:2010]

4.28

biofuel blend

biofuel resulting from intentionally mixing of different *biofuels*

EXAMPLE Straw or *energy grass* with wood, dried *biosludge* with *bark*.

[SOURCE: EN 14588:2010]

4.29

biofuel briquette

densified biofuel made with or without *additives* in the form of cubiform, polyhedral, polyhydric or cylindrical units with a diameter of more than 25 mm, produced by compressing *biomass*

Note 1 to entry: Usually the *biomass* has been milled before densification.

Note 2 to entry: See also *non-woody briquette* and *wood briquette*.

[SOURCE: ISO 17225-3:2014]

4.30

biofuel mixture

biofuel resulting from natural or unintentional mixing of different *biofuels* and/or different types of *biomass*

[SOURCE: EN 14588:2010]

4.31

biofuel pellet

biofuel made with or without *additives* in the form of cubiform, polyhedral, polyhydric or cylindrical units with a diameter up to 25 mm, produced by compressing *biomass* NOTE 1 to entry: Usually the biomass has been milled before densification.

Note 1 to entry: See also *non-woody pellet* and *wood pellet*.

[SOURCE: EN 14588:2010]

4.32

biomass

material of biological origin excluding material embedded in geological formations and/or fossilized

Note 1 to entry: Biomass is organic material that is plant or animal based, including but not limited to dedicated energy crops, agricultural crops and trees, food, feed and fibre crop residues, aquatic plants, algae, forestry and wood residues, agricultural wastes, processing by-products and other non fossil organic matters.

Note 2 to entry: See also *herbaceous biomass*, *fruit biomass*, and *woody biomass*.

[SOURCE: EN 14588:2010]

4.33

biomass by-product

a secondary product which is made incidentally during the production of something else

EXAMPLE Sawdust when sawing timber.

4.34

biomass residue

biomass from well-defined side-streams from forestry, agricultural, aqua cultural and related industrial operations

EXAMPLE Olive cake after pressing of oil, logging residues.

[SOURCE: EN 14588:2010]

4.35**biomass resource owner**

body or enterprise with the right to exploit the *biomass* resources for energy purposes

Note 1 to entry: The *biomass* resource owner can be a land or forest owner, a company etc.

[SOURCE: EN 14588:2010]

4.36**biomethane**

methane produced from *biomass* (e.g. *solid biofuels*)

Note 1 to entry: Biomethane is not a *solid biofuel*. The term is included for information only.

4.37**biosludge**

sludge formed in the aeration basin during biological waste water treatment or biological treatment process and separated by sedimentation or flotation

Note 1 to entry: Biosludge has to be treated to transfer into solid biomass.

[SOURCE: EN 14588:2010]

4.38**black liquor**

liquor obtained from wood during the process of pulp production, in which the energy content is mainly originating from the content of lignin removed from the wood in the pulping process

Note 1 to entry: Black liquor contains also pulping chemicals.

Note 2 to entry: Black liquor is not a *solid biofuel*. The term is included for information only.

[SOURCE: EN 14588:2010]

4.39**bridging****arching**

hindering flow that occurs when *particles* form stable arch across an opening

[SOURCE: Woodcock and Mason. Bulk Solids Handling]

4.40**bulk density**

ρ

mass of a portion (i.e. a large quantity of particulate material) of a solid *fuel* divided by the *volume* of the container which is filled by that portion under specific conditions

[SOURCE: ISO 1213-2:1992]

4.41**bulk volume****loose volume**

volume of a material including space between the *particles*

[SOURCE: EN 14588:2010]

4.42**bundled biofuel****bundle**

solid biofuels which has been bound together and where there is a lengthwise orientation of the material

EXAMPLE Bundles of *energy forest trees* and *logging residues*, small trees, or branches and tops.

[SOURCE: EN 14588:2010]

4.43
calorific value
heating value

q

energy amount per unit mass or *volume* released on complete combustion

Note 1 to entry: See also *gross calorific value*, *energy density*, *net calorific value*.

[SOURCE: EN 14588:2010]

4.44
cereal crops

annual crops grown with the main purpose of using the seed for food production

Note 1 to entry: Some cereal crops can be used as a *solid biofuel*.

EXAMPLE Barley, wheat, rye, oat.

[SOURCE: EN 14588:2010]

4.45
certified reference material
CRM

reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body

[SOURCE: ISO 16967]

4.46
char

solid partially or non-agglomerated carbonaceous material produced from thermo-chemical *conversion* of *solid fuels*

[SOURCE: ISO 1213-2:1992]

4.47
charcoal
biochar
biocarbon
biocoke
biocoal

solid biofuel derived from carbonization distillation and *pyrolysis* of *biomass*

[SOURCE: ANSI/ASABE S593]

4.48
chemical treatment

any treatment with chemicals other than air, water or heat

[SOURCE: ISO 17225-7:2014]

4.49
chopped straw

straw which has been cut into small pieces

[SOURCE: EN 14588:2010]

4.50**chunkwood**

wood cut with sharp cutting devices where most of the material have typical *particle* lengths of 50 to 150 mm, which are substantially longer and coarser than *wood chips*

[SOURCE: EN 14588:2010]

4.51**coke**

the solid *residue* of impure carbon obtained from carbon rich *feedstock* after removal of volatile material by destructive distillation

[SOURCE: ANSI/ASABE S593-2006]

4.52**combined sample**

sample consisting of all the *increments* taken from a *lot* or a *sub-lot*

Note 1 to entry: The *increments* may be reduced by division before being added to the combined *sample*.

[SOURCE: EN 14780:2011]

4.53**complete tree**

tree, including limbs and root system

Note 1 to entry: See also *whole tree*.

[SOURCE: EN 14588:2010]

4.54**condensable gas**

gas which is going through transition from gaseous to liquid or solid state at a certain temperature

Note 1 to entry: The process is reversible but not necessarily at the same temperature.

4.55**contamination**

exposure to impurity such as poisonous or polluting substance to a *fuel*

[SOURCE: EN 14588:2010]

4.56**coproduct**

any of two or more products coming from the same unit process or product system

[SOURCE: ISO 14040:2006]

4.57**critical control point****quality control point****CCP**

point within or between processes at which relevant properties can be most readily assessed; quality control points also offer the greatest potential for *quality* improvement

[SOURCE: EN 14588:2010]

4.58**cross-cut ends**

short pieces of *woody biomass* which occur when the ends of logs or sawn timber are cross cut off, with or without *bark*

[SOURCE: EN 14588:2010]

4.59

customer

organization or person that receives a product

[SOURCE: ISO 9000:2005]

4.60

cutter chips

wood chips made as a *by-product* of the wood processing industry, with or without *bark*

[SOURCE: EN 14588:2010]

4.61

deflagration

violent event describing subsonic combustion propagating by means of hot burning material (usually dust) heating the next layer of cold material and igniting it in consecutive sequence

Note 1 to entry: The process can be characterized as an exploding fire whereby the burning material partly deposits on surfaces in its path and causing significant damage and injuries.

[SOURCE: EN 13857-1:2003]

4.62

deflagration index

measure in bar meter per second and a product of the pressure rate and propagation of an explosion as established by testing standards

4.63

delivery agreement

contract for *fuel* trade, which specifies e.g. origin and source, *quality* and quantity of the *fuel*, as well as delivery terms

[SOURCE: EN 14588:2010]

4.64

delivery lot

solid biofuel batch on which the essential *quality* requirements for *solid biofuel* are focused

Note 1 to entry: The *delivery lot* can be an individual *delivery lot*, which is an agreed quantity of *solid biofuel* (e.g. a package, shipload or truck load), or continuous delivery, where several loads are delivered to the *end-user* during an agreed period of time (usually daily or weekly delivery).

Note 2 to entry: In continuous delivery, the *delivery lot* is the amount of *solid biofuel* delivered during a specified period of time, e.g. 24 h, unless otherwise agreed by *supplier* and *end-user*. If the *delivery lot* in continuous delivery is more than 1,500 to 2,000 m³ in 24 h, it is recommended that it should be divided into two or more individual *lots*.

[SOURCE: EN 14588:2010]

4.65

demolition wood

used wood arising from demolition of buildings or civil engineering installations

[SOURCE: EN 13965-1:2004]

4.66

densified biofuel

compressed biofuel

solid biofuel made by mechanically compressing *biomass* or thermally treated biomass to mould the *solid biofuel* into a specific size and shape such as cubes, pressed logs, *biofuel pellets* or *biofuel briquettes*

Note 1 to entry: See also *biofuel briquette* and *biofuel pellet*.

[SOURCE: EN 14588:2010]

4.67

density

ratio of mass to volume or ratio of energy content to volume

Note 1 to entry: It must always be stated whether the *density* refers to the *density* of individual *particles* or to the *bulk density* of the material and whether the mass of water in the material is included.

Note 2 to entry: See also *bulk density*, *solid density*, *particle density* and *energy density*

[SOURCE: EN 14588:2010]

4.68

desorption

phenomenon whereby a substance is released from or through a surface

Note 1 to entry: The process is the opposite of sorption.

4.69

detonation

violent event generated by sudden expansion of gas in to a supersonic shock wave (molecular speed higher than the speed of sound) not followed by fire

[SOURCE: EN 13857-1:2003]

4.70

devolatilization

process (usually pyrolysis or gasification) whereby *volatile matter* is removed from carbon rich *feedstock* (e.g. *biomass*)

[SOURCE: ANSI/ASABE S593]

4.71

dry ash free

dry ash free basis

daf

calculation basis in which the *solid biofuel* is considered free from *moisture* and *inorganic matter*

Note 1 to entry: The abbreviation of dry ash free is daf.

[SOURCE: EN 14588:2010]

4.72

dry

dry basis

d

calculation basis in which the *solid biofuel* is considered free from *moisture*

Note 1 to entry: See oven dry.

Note 2 to entry: The abbreviation of *dry basis* is d.

[SOURCE: EN 14588:2010]

4.73

dry matter

material remaining after removal of *moisture* under specific conditions

[SOURCE: EN 14588:2010]

4.74

dry matter content

portion of *dry matter* in the total material on mass basis

Note 1 to entry: Expressed as a percentage of the *total mass* of the *solid biofuel*.

[SOURCE: EN 14588:2010]

4.75

dust

fragmented material of small size caused by a non-voluntary process as opposed to powder which is normally manufactured to size

Note 1 to entry: There is no official definition of what constitutes dust in terms of physical size.

4.76

edgings

parts of *woody biomass* which occur when trimming sawn timber and which show a remainder of the original rounded surface of the tree, with or without *bark*

[SOURCE: EN 14588:2010]

4.77

end-user

consumer (private person, enterprise, utility etc.) using *fuel* for energy purposes

[SOURCE: EN 14588:2010]

4.78

energy crops

woody or herbaceous crops grown and harvested specifically for their *fuel* value

Note 1 to entry: See also *energy forest trees*, *energy grass*.

[SOURCE: EN 14588:2010]

4.79

energy density

E

ratio of net energy content and *bulk volume*

Note 1 to entry: The *energy density* is calculated using the *net calorific value* determined and the *bulk density*.

[SOURCE: EN 14588:2010]

4.80

energy forest trees

woody biomass grown specifically for its *fuel* value in medium to long rotation forestry

[SOURCE: EN 14588:2010]

4.81

energy grain

grain used for energy purpose

[SOURCE: EN 14588:2010]

4.82

energy grass

herbaceous *energy crop*

EXAMPLE Sugar cane, Miscanthus, Reed canary grass.

[SOURCE: EN 14588:2010]

4.83

explosibility

propensity by gaseous, liquid or solid material to ignite and violently transform to high pressure gas while emitting sound and light and normally followed by fire

4.84

explosion (primary and secondary)

violent event emitting sound and light immediately followed by fire

Note 1 to entry: An initial explosion followed by fire may dislodge dust deposited on beams, floor, machinery etc. and ignite this material resulting in a secondary explosion, usually a few seconds after the first explosion.

Note 2 to entry: Thermal energy is transferred from the first to the second explosion through deflagration.

[SOURCE: EN 16256-1:2012]

4.85

extraneous ash

ash from contaminants entering the material at harvest, logging, treatment, transport, storage etc

[SOURCE: EN 14588:2010]

4.86

extraneous substances

foreign materials entering the *biomass* or *solid biofuel* during any stages of the overall *supply chain*

EXAMPLE *Particles* not belonging to the particular *biomass* such as stone, glass or corn in wood pellets.

4.87

feedstock

material that is further processed for *conversion* to bioenergy, *biofuel* and/or *biobased products*

4.88

fibre saturation point

FSP

the *moisture content* at which only the cell walls are completely saturated (all bound water) but no free water exists in the cell lumens – typically about 30 % *total moisture (on wet basis)*

Note 1 to entry: Below the fibre saturation point the physical and mechanical properties of wood begin to change as a function of *moisture content*.

4.89

fibre sludge

sludge formed in the sedimentation basin as a part of the waste water treatment process in a pulp and paper mill and separated by sedimentation or flotation

Note 1 to entry: The main component is pieces of wood fibres. The sludge can be dewatered and further processed into a *solid biofuel*.

[SOURCE: EN 14588:2010]

4.90

fines

F

Small sized *particles* in *fuel* below a certain pre-defined size, usually less than 3.15 mm

Note 1 to entry: The amount of fines can be different after completion of production, bagging, transportation, unloading, distribution etc.

4.91

firewood

cut, and split *fuelwood* usually with a length of 20 to 100 cm used in household appliances like stoves, fireplaces and central heating devices

[SOURCE: EN 14588:2010]

4.92

fixed carbon

remaining carbon after removal of water, *ash* and *volatile matter*

[SOURCE: ISO 1213-2:1992]

4.93

flash point

propensity by vapour of a material to ignite under atmospheric conditions in the presence of a thermal source at a temperature and as determined by testing method

Note 1 to entry: A lower flash point temperature indicates higher flammability.

4.94

flammability

propensity by gaseous, liquid or solid material to catch fire upon exposure to ignitable external source

Note 1 to entry: For solids like dust from *biomass* the flammability is determined by testing method establishing the speed of burning in mm per time unit.

4.95

flowability

ability of a solid to flow

Note 1 to entry: See also *bridging* or *arching*.

[SOURCE: EN 14588:2010]

4.96

foreign material

impurity

material other than claimed, which has entered the *fuel*

Note 1 to entry: Examples of impurities for *biofuels* are stones, soil, pieces of metal, plastics, rope, ice and snow.

[SOURCE: EN 14588:2010]

4.97

forest chips

forest wood in the form of *wood chips*

[SOURCE: EN 14588:2010]

4.98

forest fuels

fuelwood

forest fuel is produced directly from forest wood or plantation wood by a mechanical process, the raw material has not previously had another use

[SOURCE: EN 14588:2010]

4.99**forest wood****plantation and other virgin wood**

wood from forest, plantation and other virgin wood including segregated wood from gardens, parks, roadside maintenance, vineyards, fruit orchards and driftwood from freshwater

Note 1 to entry: See also *complete tree*, *energy forest trees*, *logging residues*, *stump*, *thinning residues*, *tree section*, *whole trees*, drift wood from fresh water.

[SOURCE: EN 14588:2010]

4.100**fruit biomass**

part of a plant which holds seeds

EXAMPLE Nuts, olives, oil palm fruit.

[SOURCE: EN 14588:2010]

4.101**fuel**

energy carrier intended for energy conversion

Note 1 to entry: Fuels are solid, liquid or gaseous.

[SOURCE: EN 14588:2010]

4.102**fuel classification**

division of *fuels* into defined *fuel* classes

Note 1 to entry: The aim of classification can be to describe the *fuel* and/or to physically separate certain *particle* types.

[SOURCE: EN 14588:2010]

4.103**fuel dust**

pulverised fuel with a typical *particle size* of 1 to 5 mm

EXAMPLE Saw dust.

[SOURCE: EN 14588:2010]

4.104**fuel powder****fuel flour**

pulverised fuel with a typical *particle size* less than 1 mm

EXAMPLE Wood powder, wood flour, straw powder.

[SOURCE: EN 14588:2010]

4.105**fuel specification**

description of *fuel* properties

[SOURCE: EN 14588:2010]

4.106

fuelwood

energy wood

wood fuel where the original composition of the wood is preserved, unaltered from original form

[SOURCE: EN 14588:2010]

4.107

general analysis sample

sub-sample of a *laboratory sample* having a *nominal top size* of 1 mm or less and used for a number of chemical and physical analyses

[SOURCE: EN 14780:2011]

4.108

green biomass

material with a moisture content close to fresh after cutting but no further quality specified

4.109

fresh chips

green chips

Wood chips produced from recently harvested *woody biomass*

[SOURCE: EN 14588:2010]

4.110

grinding dust

dust-like wood *residue* formed in grinding timber and wood boards

[SOURCE: EN 14588:2010]

4.111

gross calorific value

$Q_{v,gr}$

measured value of specific energy of combustion of a solid *fuel* burned in oxygen in a calorimetric bomb under such conditions that all the water of the reaction products is in the form of liquid water

Note 1 to entry: The result of combustion are assumed to consist of gaseous, oxygen, nitrogen, carbon dioxide and sulfur dioxide, of liquid water (in equilibrium with its vapor) saturated with carbon dioxide under conditions of the bomb reaction, and of solid *ash*, all at the reference temperature and at constant *volume*.

Note 2 to entry: Another term is *higher heating value*.

[SOURCE: EN 14918:2009]

4.112

gross density

ratio of the mass of a wooden body and its *volume*, including all cavities (pores and vessels), based on specific *total moisture*

Note 1 to entry: See also *particle density*

[SOURCE: EN 14588:2010]

4.113

heat rate

measure of the number of heating units required to generate output energy over a length of time expressed in MWh

Note 1 to entry: MWh is used to express thermal efficiency of thermal conversion facilities such as power plants.

[SOURCE: EN 14588:2010]

4.114**herbaceous biomass**

biomass from plants that has a non-woody stem and which dies back at the end of the growing season

Note 1 to entry: See also *energy grass*.

[SOURCE: BioTech's Life Science Dictionary]

4.115**herbaceous fuels**

all types of *biofuels* originating from *herbaceous biomass*

[SOURCE: EN 14588:2010]

4.116**higher heating value**

see gross calorific value

4.117**hog fuel****shred**

fuelwood that has pieces of varying size and shape, produced by crushing with blunt tools such as rollers, hammers, or flails

[SOURCE: EN 14588:2010]

4.118**hygroscopic**

material with propensity to adsorb or absorb *moisture* from the air

4.119**hydrophilic**

material with propensity to attract water

4.120**hydrophobic**

material with propensity to repel water

4.121**hydrothermal carbonised biomass**

solid biofuel produced by hydrothermal carbonisation of biomass

Note 1 to entry: Hydrothermal carbonisation is a thermo-chemical conversion process of biomass performed in pressurized hot (liquid) water, typically at temperatures between 160 °C to 250 °C and at pressures between 6 bar to 40 bar.

4.122**increment**

portion of *fuel* extracted in a single operation of the *sampling* device

[SOURCE: EN 14780:2011]

4.123**inorganic matter**

non-combustible fraction of a fuel

[SOURCE: EN 14588:2010]

4.124**laboratory sample**

combined *sample* or a sub-*sample* of a combined *sample* for use in a laboratory

[SOURCE: EN 14588:2010]

4.125

lignocellulose

plant cell wall *biomass* composed primarily of cellulose, hemicelluloses and lignin

[SOURCE: ANSI/ASABE S593]

4.126

log wood

cut *fuelwood* in which most of the material has a length of 500 mm and above

[SOURCE: EN 14588:2010]

4.127

logging residues

woody biomass residues created during wood harvesting

Note 1 to entry: *Logging residues* include branches and tree tops that can be salvaged when fresh or after seasoning.

[SOURCE: EN 14588:2010]

4.128

lot

defined quantity of *fuel* for which the *quality* is to be determined

Note 1 to entry: See also *sub-lot*.

[SOURCE: EN 14780:2011]

4.129

major elements

the elements in the *fuel* that predominantly will constitute the *ash*; including aluminium (Al), calcium (Ca), iron (Fe), magnesium (Mg), phosphorus (P), potassium (K), silicon (Si), sodium (Na) and titanium (Ti)

[SOURCE: EN 14588:2010]

4.130

mass-reduction

reduction of the mass of a *sample* or *sub-sample*

[SOURCE: EN 14778:2011]

4.131

mechanical durability

DU

ability of *densified fuel* units (e.g. briquettes, pellets) to remain intact during handling and transportation

[SOURCE: EN 14588:2010]

4.132

minor elements

elements in the *fuel* that are at small concentrations

Note 1 to entry: The term trace elements is often used synonymous to *minor elements*; if the elements are metal, the term trace metals also is used.

Note 2 to entry: Concerning *solid biofuels*, minor elements include, but not limited to elements (not all are metals) such as arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), mercury (Hg), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), antimony (Sb), selenium (Se), tin (Sn), thallium (Tl), vanadium (V) and zinc (Zn).

[SOURCE: EN 14588:2010]

4.133**moisture analysis sample**

sample taken specifically for the purpose of determining *total moisture*

[SOURCE: EN 14780:2011]

4.134**municipal solid waste****MSW**

waste stream consisting of end-of-life-materials

Note 1 to entry: Municipal solid waste can contain *biomass* fractions as well as non-*biomass* fractions.

Note 2 to entry: Only separated and not contaminated *biomass* fractions could be *solid biofuels*, see also *solid recovered fuels*.

Note 3 to entry: The term is included for information only.

[SOURCE: EN 14588:2010]

4.135**natural ash**

ash of uncontaminated *solid biofuel*

[SOURCE: EN 14588:2010]

4.136**net calorific value****lower heating value**

$q_{p, net}$

calculated value of specific energy of combustion of a solid fuel burned in oxygen under such conditions that all the water of the reaction products remain as water vapour

Note 1 to entry: The net calorific value is calculated from the *gross calorific value* at either constant pressure or at constant volume. The net calorific value at constant pressure is however the one generally used.

[SOURCE: EN 14918:2009]

4.137**nominal top size**

aperture size of the sieve through which at least 95 % by mass of the material passes during the determination of *particle size distribution* of solid *fuels*

[SOURCE: EN 14780:2011]

4.138**non-woody biomass**

biofuel made from herbaceous, fruits or aquatic biomass as well from blended or mixture

Note 1 to entry: Stem of fruit trees and *energy crops* like poplar and willow are included in *woody biomass*.

4.139**non-woody briquette**

densified biofuel made with or without additives in form of cubiform, prismatic or cylindrical unit with diameter of more than 25 mm produced by compressing milled biomass

Note 1 to entry: The raw material for non-woody briquettes can be herbaceous, fruit or aquatic biomass or biomass blends and mixtures.

Note 2 to entry: Briquettes are usually manufactured in a piston press, with the total moisture content on wet basis usually being less than 15 % of the mass.

[SOURCE: ISO 14588:2010]

4.140

non-woody pellet

biofuel made from herbaceous, fruits or aquatic biomass as well from blends and mixtures with or without additives in the form of cubiform, polyhedral, polyhydric or cylindrical units, random length and typically 3,15 mm to 40 mm, a diameter up to 25 mm and with broken ends

Note 1 to entry: The raw material for non-woody pellets is herbaceous, fruits or aquatic biomass in accordance with Table 1 of ISO 17225-1. Pellets are usually manufactured in a die, with a total moisture content usually less than 15 % of their mass on wet basis.

[SOURCE: EN 14588:2010]

4.141

off-gassing

spontaneous emission of condensable (e.g. terpenes) and non-condensable gases (e.g. carbon-monoxide, carbon-dioxide, methane) from *biomass*

4.142

operator

body or enterprise, which is responsible for one or several activities in the *fuel supply chain*

Note 1 to entry: The *operator* can be, for example, a *biofuel producer* or a subcontractor to the *biofuel supplier*.

Note 2 to entry: The first *operator* is a body or an enterprise which operates at the beginning of the *supply chain*.

[SOURCE: EN 14588:2010]

4.143

organic matter

combustible fraction of the fuel

[SOURCE: EN 14588:2010]

4.144

oscillating screen classifier

device containing one or multiple oscillating (flat) screens used to separate material into size classes for calculation of *particle size distribution*

[SOURCE: EN 14588:2010]

4.145

oven dry matter

biomass free of *moisture*, produced by drying to constant weight under specific conditions

[SOURCE: EN 14588:2010]

4.146

over size particles

particles exceeding a specific particle size limit value or values

Note 1 to entry: Limit values may be given in three dimensions.

[SOURCE: EN 14588:2010]

4.147

particle

any discrete unit of matter

[SOURCE: EN 14588:2010]

4.148**particle density****DE**

density of a single particle

Note 1 to entry: Pores within the *particle* are included.

[SOURCE: EN 14588:2010]

4.149**particle size****P**size of the *particle* as determined

Note 1 to entry: Different methods of determination may give different results.

Note 2 to entry: See also *particle size distribution* and *fines*.

[SOURCE: EN 14588:2010]

4.150**particle size distribution**proportions of various *particle sizes* in a solid *fuel*

[SOURCE: ISO 1213-2:1992]

4.151**particle size reduction**

reduction of the nominal top size of a sample or sub-sample

[SOURCE: EN 15443:2011]

4.152**peat**

sedentarily accumulated material consisting partly of dead organic material

Note 1 to entry: The term is included for information only.

[SOURCE: Parish, F., Sirin, A., Charman, D., Joosten, H., minayeva, T., Silvius, M. and Stringer, L. 2008 Assessment on Peatlands, Biodiversity and Climate Change: Main Report. Global Environment Centre, Kuala Lumpur and Wetlands International, Wageningen]

4.153**permeability in storage****bulk permeability**ability of gas such as air to pass through the void in *biomass* during storageNote 1 to entry: Permeability is measured in pressure (Pa) vs. flow of gas (m³/s/m²) and depends for example on the viscosity and *density* of the gas (including *moisture content* and temperature), shape, and orientation of *particles* and the bulk porosity of *biomass*.**4.154****point of delivery**location specified in the delivery agreement, at which the proprietary rights of and responsibilities for a *fuel lot* are transferred from one organization or unit to another

[SOURCE: EN 14588:2010]

4.155**pressing aid***additive* used for enhancing the production of *densified fuels*

[SOURCE: EN 14588:2010]

4.156

primary biomass

biomass produced directly by photosynthesis and harvested or collected from the field or forest where it is grown

Note 1 to entry: Examples are *energy grain*, perennial grasses and wood crops, crop *residues* and *residues* from logging.

[SOURCE: ANSI/ASABE S593]

4.157

producer

organization or unit responsible for the production of the *fuel*

Note 1 to entry: The *producer* can be responsible for any operation with the purpose of changing the *biofuel* properties.

Note 2 to entry: The *producer* can also be the *supplier* of the *fuel*.

[SOURCE: EN 14588:2010]

4.158

product declaration

document dated and signed by the *producer/supplier* to the *retailer* or *end-user*, specifying origin and source, traded form and properties of defined *lot*, delivery period or delivery agreement

4.159

proximate analysis

quantitative analysis of a solid *fuel* reported in terms of prescribed methods for *total moisture*, *volatile matter*, *ash content* and *fixed carbon* measured at specified conditions

[SOURCE: ISO 1213-2:1992]

4.160

pulverised fuel

grinded fuel

solid *fuel* in the form of dust and powder, produced by milling or grinding

Note 1 to entry: See also *fuel dust* and *fuel powder*.

[SOURCE: EN 14588:2010]

4.161

quality

degree to which a set of inherent characteristics fulfils requirements

[SOURCE: ISO 9000:2005]

4.162

quality assurance

part of *quality* management, focused on providing confidence that the *quality* requirements will be fulfilled

[SOURCE: ISO 9000:2005]

4.163

quality control

part of *quality* management, focused on fulfilling *quality* requirements

[SOURCE: ISO 9000:2005]

4.164**recovered construction wood**

used wood arising from construction of buildings or from civil engineering works

[SOURCE: EN 13965-1:2004]

4.165**reference material****RM**

material or substance, one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials

[SOURCE: EN 15297:2011]

4.166**repeatability**

precision from independent test results when the same method was used in the same laboratory on representative portions taken from the same test sample material

[SOURCE: EN 14588:2010]

4.167**reproducibility**

precision from test results when the same method was used by different laboratories by different operators using different equipment on representative portions taken from the same test sample material

[SOURCE: ISO 1213-2:1992]

4.168**retailer**

supplier of fuels (usually packaged in small quantities) to end-user

Note 1 to entry: Retailers are usually suppliers to the private household consumers.

[SOURCE: EN 14588:2010]

4.169**rotary screen**

device with cylindrical screens used to separate material into size classes for calculation of *particle size distribution*

[SOURCE: EN 14588:2010]

4.170**sample**

quantity of material (all *increments*), representative of a larger quantity for which the *quality* is to be determined

Note 1 to entry: See also *combined sample*, *general analysis sample*, *increment*, *laboratory sample*, *moisture analysis sample*, *size analysis sample*, and *sub-sample*.

[SOURCE: EN 14780:2011]

4.171**sample division**

division of a *sample* or *sub-sample* to an appropriate size which normally leads to a mass reduction of a *sample* or *sub-sample*

[SOURCE: EN 14780:2011]

4.172

sample preparation

actions taken to obtain representative *laboratory samples* or *test portions* from the original *sample*

[SOURCE: EN 14588:2010]

4.173

sampling

process of drawing or constituting a *sample*

[SOURCE: ISO 3534-1:2006]

4.174

sampling form

document that shall be used during *sampling* to record data about the way in which the *sampling* is actually being carried out

[SOURCE: EN 14588:2010]

4.175

sampling plan

predetermined procedure for the selection, withdrawal, preservation, transportation, and preparation of the portions to be removed from a population as a *sample*

[SOURCE: EN 14778:2011]

4.176

sampling certificate

report which serves as a check list and provides the investigator with all necessary information about the *sampling* techniques applied at the site and any additional important information

[SOURCE: EN 14778:2011]

4.177

sawdust

fine *particles* created when sawing wood, in which most of the material has a typical *particle* length of 1 mm to 5 mm

[SOURCE: EN 14588:2010]

4.178

secondary biomass

residues and by-product streams from food, feed, fiber, wood and materials processing plants (such as *sawdust*, *black liquor* and cheese whey), and manures from animal feeding operations

[SOURCE: ANSI/ASABE S593]

4.179

short rotation coppice

SRC

production of *woody biomass*, generally on agricultural lands, by regenerating new stems (shoots) from the (stool) stump or roots and relying on rapid growth, (harvested) generally over a 1 – 8 year cycle

4.180

short rotation forestry

production of trees (generally) on forest land, that rely on rapid growth of individuals harvested in short cycles (of 5-15 years)

4.181**shredded biofuel**

solid *biofuel* which has been mechanical treated into smaller *particles* with blunt tools

EXAMPLE Chopped straw, shredded *bark*, *wood* and *hog fuel*.

[SOURCE: EN 14588:2010]

4.182**size analysis sample**

sample taken specifically for the purpose of determining *particle size distribution*

[SOURCE: EN 14588:2010]

4.183**size-reduction**

reduction of the nominal top size of a sample or sub-sample

[SOURCE: EN 14588:2010]

4.184**slab**

parts of *woody biomass* created when cuts are made into the edges of logs and whereby one side shows the original rounded surface of the tree, either completely or partially, with or without *bark*

Note 1 to entry: Approximate length 200 cm to 800 cm.

[SOURCE: EN 14588:2010]

4.185**slag**

biofuel derived *ash* that is or has been in a molten (or liquid) state

[SOURCE: ANSI/ASABE S593]

4.186**smallwood**

fuelwood cut with sharp cutting devices and in which most of the material has a *particle* length typically 50 mm to 500 mm

EXAMPLE *Chunkwood*, *firewood*.

[SOURCE: EN 14588:2010]

4.187**solid biofuel**

solid *fuels* produced directly or indirectly from *biomass*

[SOURCE: EN 14588:2010]

4.188**solid density**

density of solid material excluding any interior pores

4.189**solid recovered fuel**

solid *fuel* prepared from non-hazardous waste to be utilised for energy recovery in incineration or co-incineration plants

Note 1 to entry: This term is for information only.

[SOURCE: EN 15359:2011]

4.190

solid volume

volume of the individual *particle* excluding the *volume* of the void between the *particles*

Note 1 to entry: Typically determined by a fluid displaced by a specific amount of material.

[SOURCE: EN 14588:2010]

4.191

soot

fine black *particles*, chiefly composed of carbon, produced by incomplete combustion of carbon rich *feedstock*

[SOURCE: ANSI/ASABE S593]

4.192

sorption

phenomenon whereby a substance is absorbed or adsorbed through a surface or adsorbed on a surface

Note 1 to entry: Sorption also applies to desorption processes.

4.193

stacked volume

volume of stacked material including the space between the material pieces

[SOURCE: EN 14588:2010]

4.194

stem wood

roundwood

part of tree stem with the branches and top removed, with a length of more than 100 cm

[SOURCE: EN 14588:2010]

4.195

stem wood chips

wood chips made of *stem wood*, with or without *bark*

[SOURCE: EN 14588:2010]

4.196

stump

part of the tree stem below the felling cut

Note 1 to entry: In total-tree utilization the root system is included in the stump.

[SOURCE: EN 14588:2010]

4.197

sub-lot

portion of a *lot* for which a test result is required

[SOURCE: EN 14780:2011]

4.198

sub-sample

portion of a *sample*

[SOURCE: EN 14588:2010]