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

Biocombustibles solides — Terminologie, définitions et descriptions

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. 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*.

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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

ISO 16559:2014

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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](#).

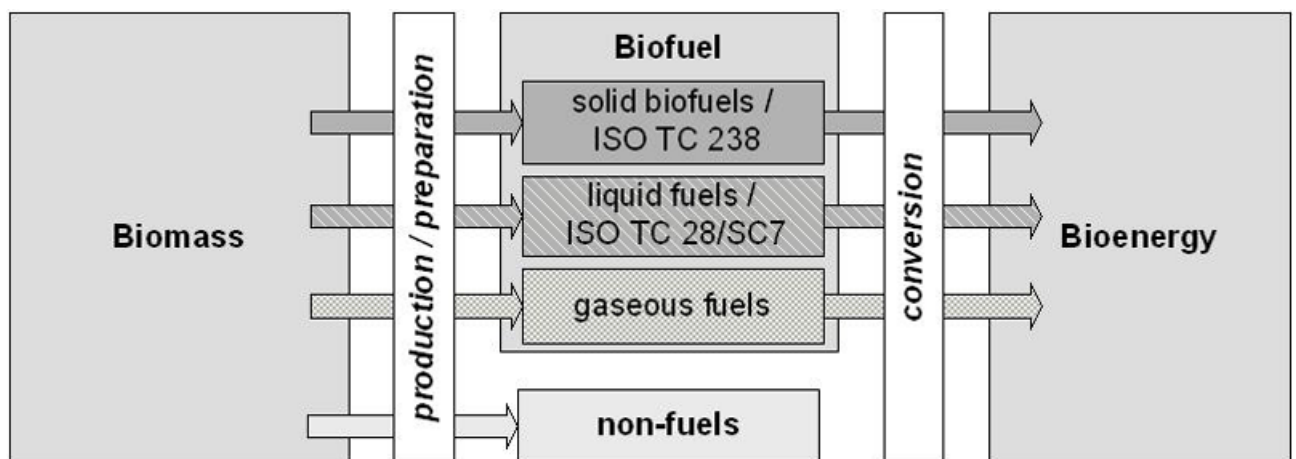


Figure 1 — ISO/TC 238 within the biomass-biofuel-bioenergy field

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] <https://standards.iteh.ai/catalog/standards/sist/e9597eb6-6747-4c72-bc57-442694d31d9a/iso-16559-2014>

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]

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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]

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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.