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Solid biofuels — Vocabulary

Biocombustibles solides — Vocabulaire

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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 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 238, *Solid biofuels,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 335, *Solid biofuels,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16559:2014), which has been technically revised. The main changes compared to the previous edition are as follows:

— Clause 3 has been updated;

— the title of this document has been changed;

— Annex A has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Some of the terms included in this document are only used in particular countries.

In this document, terms for virgin biomass, residue, and by-product are used to describe co-products from forestry, arboriculture, agriculture, horticulture and aquaculture as well as related virgin biomass industries. The terms and definitions are harmonized as far as possible with the current language used in management as well as in regulatory activities.

This document only contains terms used to describe solid biofuels within the scope of ISO/TC 238, see Figure 1.

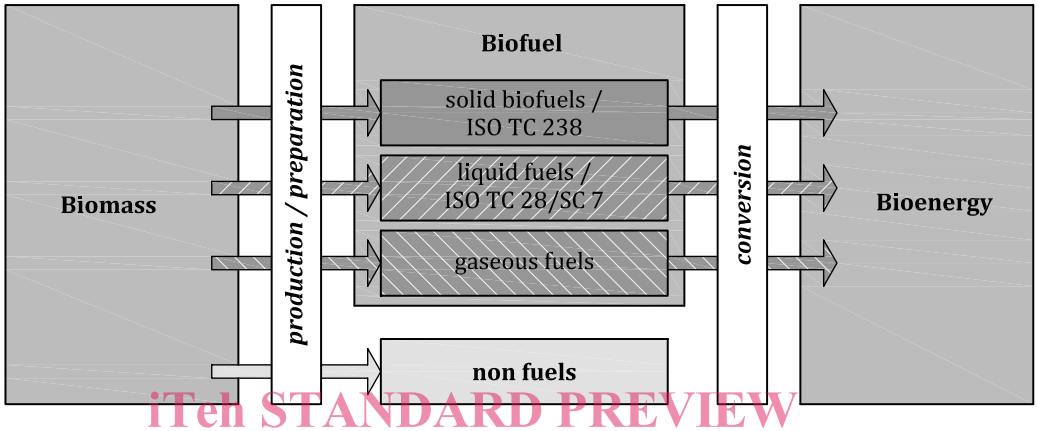

Figure 1 — ISO/TC 238 within the biomass-biofuel-bioenergy field

Solid biofuels are produced from different sources. Terms and definitions are categorized 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 should be defined and described together with the category source/origin, type and properties of solid biofuels. The inclusion of terms defined in this document is, in many cases, based on the detailed classification system of solid biofuels given in ISO 17225-1.

Solid biofuels — Vocabulary

1 Scope

This document establishes a vocabulary for solid biofuels. This document only includes raw and processed material originating from

— forestry and arboriculture,

— agriculture and horticulture, and

— aquaculture.

NOTE 1 Chemically treated material cannot include halogenated organic compounds or heavy metals at levels higher than those in typical virgin material values (see also ISO 17225-1:2021, Annex B) or higher than typical values of the country of origin.

NOTE 2 Raw and processed material includes woody, herbaceous, fruit and aquatic biomass and biodegradable waste originating from above sectors.

Materials originating from different recycling processes of end-of-life-products are outside the scope of this document but relevant terms are included for information. Liquid biofuels (ISO/TC 28/SC 7), natural gas (ISO/TC 193) and solid recovered fuels (ISO/TC 300) are outside the scope of this document.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
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* (3.3) is a surface-based process while *absorption* involves the whole *volume* (3.214) of the material.

3.2
additive
material which has been intentionally introduced into the fuel *feedstock* (3.86) to improve *quality* (3.160) of *fuel* (3.99) (e.gcombustion or durability 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* (3.99) processing stream as part of typical mill operations are not considered as additives.

[SOURCE: ISO 17225-2:2021, 3.1]

3.3
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

3.4
agrofuel
biofuel (3.27) obtained from *energy crops* (3.76) and/or agricultural by-products (agricultural residues)

[SOURCE: FAO unified bioenergy terminology (UBET)]

3.5
air-dried
in a condition, in which the *solid biofuel* (3.185) has been brought to equilibrium *moisture content* (3.132) by drying in air

3.6
angle of drain
steepest angle of descent within a silo or a hopper when granular material on the slope face is on the verge of sliding

Note 1 to entry: The angle of drain is measured in degrees of slope relative to the horizontal plane.

Note 2 to entry: The angle of drain is typically a few degrees higher than the *angle of repose* (3.7).

3.7
angle of repose
critical angle of repose
steepest angle of descent of a stock pile when granular material on the slope face is on the verge of sliding

Note 1 to entry: The angle of response is measured in degrees of the slope of material relative to the horizontal plane.

Note 2 to entry: The *angle of repose* is typically a few degrees lower than the *angle of drain* (3.6).

3.8
animal biomass
biomass (3.32) obtained from livestock

Note 1 to entry: *Animal biomass* is not a *solid biofuel* (3.185). The term is included for information only.

3.9
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.

3.10
aquatic biomass
biomass (3.32) from hydrophytic plants or hydrophytes

Note 1 to entry: Hydrophytes are plants that have adapted to living in or on aquatic environments.

3.11
as determined
as analysed
ad
reference *moisture content* (3.132) of the material at the moment of analysis/determination

Note 1 to entry: "ad" is used as a subscript, e.g. M_{ad} is equivalent to *moisture content* (3.132) at the time of determination.

3.12
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".

3.13
ash
ash content
total ash
A
mass of inorganic residue remaining after complete combustion of a *fuel* (3.99) under specified conditions, typically expressed as a percentage of the mass of *dry matter* (3.71) in *fuel* (3.99)

Note 1 to entry: See also *ash melting behaviour* (3.17) and ash fusibility.

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

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

3.14
ash deformation temperature
deformation temperature
DT
temperature at which first signs of melting occur

Note 1 to entry: *Ash deformation temperature* can be seen as rounding of the edges, smoothing of surfaces, expansion of the cylinder or general changing of the cylinder shape. If the test piece starts to swell or bubble without the edges being rounded, the temperature is registered as *DT* (since swelling and bubbling only occur when a fraction of the *ash* (3.13) is melted).

[SOURCE: ISO 21404:2020, 3.2, modified — First preferred term added, Notes 1 and Note 3 to entry deleted, Note 2 to entry changed to Note 1 to entry.]

3.15
ash flow temperature
flow temperature
FT
temperature at which the *ash* (3.13) 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* (3.16)

3.16
ash hemisphere temperature
hemisphere temperature
HT
temperature at which the test piece forms approximately a hemisphere, i.e. when the height is half of the base diameter

[SOURCE: ISO 21404:2020, 3.3, modified — First preferred term added.]

3.17
ash melting behaviour
ash fusibility
characteristic set of temperatures at which the *ash* (3.13) undergoes certain physical stages of melting during 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* (3.14), *ash flow temperature* (3.15), *ash hemisphere temperature* (3.16) and *ash shrinkage starting temperature* (3.18).

3.18
ash shrinkage starting temperature
shrinkage starting temperature
SST
temperature at which the area of a test piece falls below 95 % of the original test piece area under specific conditions due to shrinking of a test piece

Note 1 to entry: Shrinkage can be due to liberation of carbon dioxide and volatile alkali compounds. It can also be due to sintering and may be a first sign of partial melting.

[SOURCE: ISO 21404:2020, 3.1, modified — First preferred term added.]

3.19
bag weight
weight of the *fuel* (3.99) including the bag

3.20
baled biofuel
bale
solid biofuel (3.185) which has been compressed and bound to keep its shape and *bulk density* (3.40)

EXAMPLE Straw bales, bales of *energy grass* (3.80), bales of *logging residues* (3.124).

3.21
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

3.22
basic density
ratio of the mass on *dry basis* (3.70) and the *solid volume* (3.187) *as received* (3.12)

3.23
bio-based
derived from *biomass* (3.32)

[SOURCE: EN 16575:2013, 2.1 modified — Notes to entry deleted.]

3.24
bio-based content
fraction of a *fuel* (3.99) that is derived from *biomass* (3.32)

Note 1 to entry: Typically expressed as a percentage of the *total mass* (3.205) of the product.

[SOURCE: EN 16575:2013, 2.4, modified — "product" changed to "fuel" and Note 2 to entry deleted.]

3.25
bio-based product
bio-based industrial product
bioproduct
product wholly or partly derived from *biomass* (3.32)

Note 1 to entry: The *bio-based product* is typically characterized by the *bio-based* (3.23) *carbon content* (3.202) or the *bio-based content* (3.24).

[SOURCE: EN 16575:2013, 2.5, modified — Two new preferred terms added; Note 1 to entry modified and Notes 2 and 3 to entry deleted.]

3.26
bioenergy
energy derived from *biomass* (3.32)

3.27
biofuel
solid, liquid or gaseous *fuel* (3.99) produced directly or indirectly from *biomass* (3.32)

3.28
biofuel blend
biofuel resulting from intentionally mixing of different *biofuels* (3.27)

EXAMPLE Straw or *energy grass* (3.80) with wood, dried *biosludge* (3.37) with *bark* (3.21).

3.29
biofuel briquette
densified biofuel (3.64) made with or without *additives* (3.2) in pre-determined geometric form with at least two dimensions (length, width, height) of more than 25 mm, produced by compressing *biomass* (3.32)

3.30
biofuel mixture
biofuel (3.27) resulting from natural or unintentional mixing of different *biofuels* (3.27) and/or different types of *biomass* (3.32)

3.31
biofuel pellet
densified biofuel (3.64) made with or without *additives* (3.2) usually with a cylindrical form, random length typically 5 mm to 40 mm and diameter up to 25 mm and broken ends, produced by compressing *biomass* (3.32)

Note 1 to entry: Usually the *biomass* (3.32) has been milled before densification.

Note 2 to entry: See also *non-woody pellet* (3.140) and *wood pellet* (3.224).

3.32
biomass
material of biological origin excluding material embedded in geological formations and/or fossilized

EXAMPLE Including but not limited to *energy crops* (3.76), 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* (3.143).

Note 1 to entry: See also *aquatic biomass* (3.10), *fruit biomass* (3.98), *herbaceous biomass* (3.110) and *woody biomass* (3.227).

3.33
biomass by-product
secondary product which is made incidentally during the production of something else

EXAMPLE *Sawdust* (3.176) when sawing timber.

3.34
biomass residue
biomass (3.32) from well-defined side-streams from forestry, agriculture, aquaculture and related industrial operations

EXAMPLE Olive press cake after pressing of oil, *logging residues* (3.124).

3.35
biomass resource owner
body or enterprise with the right to exploit the *biomass* (3.32) resources

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

3.36
biomethane
methane produced from *biomass* (3.32), e.g. *solid biofuels* (3.185)

Note 1 to entry: Biomethane is not a *solid biofuel* (3.185). The term is included for information only.

3.37
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* must be treated for the transformation into solid *biomass* (3.32).

3.38
black liquor
fluid containing *lignin* (3.121) removed from the wood in the pulping process

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

Note 2 to entry: *Black liquor* is not a *solid biofuel* (3.185). The term is included for information only.

3.39
bridging
arching
tendency of *particles* (3.147) to form a stable arch across an opening which restricts flow

[SOURCE: ISO 21637:2020, 3.8, modified — "bridge" replaced by "arch".]

3.40
bulk density
BD
mass of a portion of a particulate matter divided by the *volume* (3.214) of the container which is filled by that portion under specific conditions

[SOURCE: ISO 21637:2020, 3.9, modified — abbreviation “BD” added, "solid fuel" replaced by "particulate matter", text in parentheses deleted.]

3.41
bulk permeability
permeability in storage
ability of gas such as air to pass through the void spaces in *biomass* (3.32) during storage

Note 1 to entry: Permeability is measured in pressure (Pa) vs. flow of gas ($m^3/s/m^2$) and depends for example on the viscosity and *density* (3.65) of the gas (including *moisture content* (3.132) and temperature), shape, and orientation of *particles* (3.147) and the bulk porosity of *biomass* (3.32).

