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Biogas — Biogas production, conditioning, upgrading and utilization — Terms, definitions and classification scheme

Biogaz — Production, traitement, épuration et utilisation du biogaz — Termes, définitions et classification

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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 (see www.iso.org/directives).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 255, *Biogas*.

Introduction

The technical committee on biogas (ISO/TC 255) was established in 2011 in order to

— provide liberalization and facilitation for international trade of biogas installations,

— contribute to international cooperation on technical regulations, standards and assessment procedures,

— curb discriminatory technical requirements as the main form of trade protectionism, and

— reduce and eliminate the technical barriers for international trade of biogas installations.

This document about terms, definitions and classifications is applicable for biogas production by anaerobic digestion, gasification from biomass and power to gas from biomass sources, biogas conditioning, biogas upgrading and biogas utilization.

The availability of a set of agreed terms and definitions for biogas installations, as well as a classification scheme for the whole biogas chain, is necessary in order to

— moderate the communication between the different biogas parties through meaningful discussions,

— facilitate development of regional and national regulations and incentive programs to promote biogas production and application,

— contribute to the reinforcement of biogas installations' safety and business competitiveness with recognized terms and definitions that clarify the actors' expectations related to procurement, contracts and services as well as reporting on biogas related action plans and road maps, and

— contribute to the use of standards by facilitating their development and furthering the users' understanding and application of standards.

ISO/TC 255 intends to promote international technology exchange and to accelerate international application of biogas (products) and equipment by developing and maintaining globally harmonized standards.

Biogas — Biogas production, conditioning, upgrading and utilization — Terms, definitions and classification scheme

1 Scope

This document defines terms and describes classifications related to biogas production by anaerobic digestion, gasification from biomass and power to gas from biomass sources, biogas conditioning, biogas upgrading and biogas utilization from a safety, environmental, performance and functionality perspective, during the design, manufacturing, installation, construction, testing, commissioning, acceptance, operation, regular inspection and maintenance phases.

Biogas installations are, among others, applied at industrial plants like food and beverage industries, waste water treatment plants, waste plants, landfill sites, small scale plants next to agricultural companies and small scale household installations.

The following topics are excluded from this document:

— boilers, burners, furnaces and lightening, in case these are not specifically applied for locally produced biogas;

— gas-fuelled engines for vehicles and ships;

— the public gas grid;

— specifications to determine biomethane quality;

— transportation of compressed or liquefied biogas;

— transportation of biomass or digestate;

— assessment and determination whether biomass is sourced sustainably or not.

This document describes the following for information purposes as well:

— the parameters to determine the size (e.g. small, medium-sized, or large scale);

— the parameters to determine the type of installation (e.g. domestic, industrial);

— the parameters to describe the type of technique;

— terms and processes in order to develop health, safety and environmental protection guidelines for biogas installations.

NOTE For an explanation of the Scope, see Annex A.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

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 https://www.electropedia.org/

3.1
anaerobic digestion
biological conversion of biodegradable materials by micro-organisms in the absence of oxygen creating two main products: *biogas* (3.2) and *digestate* (3.19)

Note 1 to entry: An example of anaerobic digestion is the biological conversion of the biodegradable parts of *biomass* (3.9) sources, but also fossil biodegradable sources.

Note 2 to entry: Wet and dry anaerobic digestion systems are applied.

3.2
biogas
gas produced by anaerobic digestion of organic matter, *gasification* (3.25) of *biomass* (3.9) or power to gas from biomass sources and without further upgrading or purification

Note 1 to entry: Biogas comprises mainly methane and carbon dioxide and/or hydrogen and/or carbon monoxide and/or heavier hydrocarbons with two till six carbon atoms.

Note 2 to entry: *Bio-syngas* (3.15) is also a type of biogas.

3.3
biogas boiler
boiler which uses *biogas* (3.2) as fuel

3.4
biogas flare
installation to burn *biogas* (3.2), whether superfluous or not

Note 1 to entry: A flare is applied for biogas generated in *biogas installations* (3.5) or extracted from landfill sites, among others, to avoid methane and/or hazardous compounds to be emitted into the atmosphere. A biogas flare can be applied as safety, environmental and/or process device.

Note 2 to entry: A typical flare consists of, among others, an ignition system, flame and temperature detection system, windproof body and combustion chamber, biogas piping, valves, condensate drainage, electrical control cabinet, installation fixtures, burner head, heat insulation and pilot or ignition burner.

Note 3 to entry: A flare can be classified in three main categories: *open flare* (3.43), *enclosed flare* (3.23) and *enclosed high efficiency flare* (3.24).

3.5
biogas installation
installation including its pipelines, pipes and accessories for anaerobic digestion of *biomass* (3.9), *gasification* (3.25) of biomass and waste, upgrading of *biogas* (3.2), liquefaction of biogas, storage of biogas (in raw, gas or liquid form), storage of CO_2, storage of auxiliaries, storage of biomass and *digestate* (3.19)

Note 1 to entry: Upgrading of biogas includes cooling, compressing, heating, separation, reaction in order to purify or upgrade the biogas to a higher methane percentage.

3.6
biogas pipeline
system of pipework for transportation of *biogas* (3.2) or *biomethane* (3.12) with all associated equipment and stations up to the point of delivery and outside the *biogas installation* (3.5)

Note 1 to entry: This pipework is mainly below ground, but includes also above-ground parts.

3.7
biogas storage
buffer, gas holder, tank, vessel, bag or similar to store *biogas* (3.2)

Note 1 to entry: The biogas storage can be part of the fermenter.

3.8
biogenic content
organic material from *biomass* (3.9)

3.9
biomass
material of biological origin excluding material embedded in geological formations and/or transformed to fossilized material

Note 1 to entry: Biomass is organic material that is plant-based or animal-based, including, but not limited to dedicated energy crops, agricultural crops and trees, food, feed and fibre crop residues, aquatic plants, alga, forestry and wood residues, organic agricultural, animal and processing by-products, agricultural, municipal and industrial organic waste and residues whether or not in landfills, sludge, waste water, and other non-fossil organic matter.

3.10
biomass pipeline
digestate pipeline
system of pipework for transportation of liquid *biomass* (3.9) or *digestate* (3.19) with all associated equipment and up to the point of delivery

3.11
biomass pretreatment
treatment of *biomass* (3.9) with chemical, physical, thermal and biological methods in order to increase methane production when the biomass is digested or gasified

3.12
biomethane
methane-rich gas with the properties similar to natural gas derived from *biogas* (3.2) produced by anaerobic digestion or *gasification* (3.25) or from power to gas by upgrading

Note 1 to entry: Requirements for chemical and physical properties of biomethane, such as heat content, flame characteristics, dew points, traces of chemical compounds, are part of standards for injection of biomethane in public grids and standards for vehicle fuels and are not in the scope of, and thus not described by, this document.

Note 2 to entry: In the business, the term “upgraded biogas” is also used instead of the term "biomethane”.

3.13
biomethane potential of biomass
potential of *biomethane* (3.12) production expressed in normal cubic metres per tonne dry matter of *biomass* (3.9)

3.14
biomethane storage
buffer, gas holder, tank, vessel, cylinder or similar to store *biomethane* (3.12)

Note 1 to entry: In case of liquefied biomethane, this often concerns vacuum insulated tanks.

3.15
bio-syngas
type of *biogas* (3.2), comprising principally carbon monoxide and hydrogen, obtained from *gasification* (3.25) of *biomass* (3.9)

Note 1 to entry: Bio-syngas also contains traces of methane and carbon dioxide.

3.16
combined heat and power installation
CHP
gas engine, pilot spark ignition engine, gas turbine or fuel cell using gas to generate electrical power and useful heat at the same time

Note 1 to entry: This is also called co-generation.

3.17
compressed biomethane
CBM
biomethane (3.12) used as a fuel for vehicles or for other purposes, typically compressed up to 20 000 kPa in the gaseous state

3.18
compressed natural gas
CNG
natural gas (3.39) used as a fuel for vehicles or other purposes, typically compressed up to 20 000 kPa in the gaseous state

[SOURCE: ISO 14532:2014, 2.1.1.11, modified — the definition has been revised and Note 1 to entry has been deleted.]

3.19
digestate

remaining effluent from the anaerobic digestion process including solid fraction and liquid fraction

3.20
digester
anaerobic digestion installation including reactors, tanks and related equipment

3.21
dry matter
remaining part of *biomass* (3.9) or *digestate* (3.19) after the removal of water

3.22
emergency flare
biogas flare (3.4) which is meant to combust *biogas* (3.2) during exceptional situations when the biogas is not utilized

Note 1 to entry: Emergency flares can be of the type *enclosed flare* (3.23), *enclosed high efficiency flare* (3.24) or *open flare* (3.43).

3.23
enclosed flare
biogas flare (3.4) which consists of an enclosed combustion chamber, where the flame is invisible from the outside

Note 1 to entry: An enclosed flare is burning more efficiently with a relatively higher temperature than an *open flare* (3.43), and the burning temperature can be monitored.

3.24
enclosed high efficiency flare
biogas flare (3.4) which consists of an enclosed combustion chamber, where the flame is invisible from the outside and the biogas is combusted at a monitored and automatically controlled temperature of 1 000 °C to 1 200 °C with a retention time of at least 0,3 s

3.25
gasification
process that converts biogenic or fossil-based materials into carbon monoxide and hydrogen

Note 1 to entry: This is achieved by exposing the material at high temperatures (>700 °C), without combustion, with a controlled amount of oxygen and/or steam.

Note 2 to entry: Normally, the gasification is followed by conversion into methane and carbon dioxide (methanation).

Note 3 to entry: The resulting gas mixture of carbon monoxide and hydrogen is called *syngas* (3.58). When the feedstock of gasification is *biomass* (3.9), the resulting gas mixture is called *bio-syngas* (3.15).

3.26
gas infrastructure
pipeline systems including pipework and their associated stations or plants for the *transmission* (3.59) and distribution of gas

3.27
gas pipeline
system of pipework for transportation of gas with all associated equipment and stations up to the point of delivery

Note 1 to entry: This pipework is mainly below ground but includes also above-ground parts.

3.28
hydraulic retention time
theoretical average period of time a soluble compound remains in the *digester* (3.20)

Note 1 to entry: The hydraulic retention time (HRT) is calculated as net digester volume (m^3)/daily feedstock input (m^3/day).

3.29
hydrocarbon dew temperature
temperature at a specified pressure at which hydrocarbon vapour condensation initiates

3.30
injectable biomethane
upgraded *biogas* (3.2) having *natural gas* (3.39) quality suitable to feed into the public grid and which fulfils the legal requirements for feeding into the public grid

3.31
installation owner
legal entity, a company or natural person owning the *biogas installation* (3.5)

3.32
liquefied biogas
biogas (3.2) which has been liquefied

EXAMPLE Liquefied biomethane.

3.33
liquefied biomethane
LBM
biomethane (3.12) which has been liquefied, after processing, for storage or transportation purposes