

ISO/DTR 23585:2023(E)

ISO TC 255/TC 255/WG 4

Secretariat: SAC (China)

Safety and environment **guidelines** information for biogas plants, biogas transportation, and biogas use

Directives de sécurité et d'environnement pour les installations de production de biogaz, le transport de biogaz et l'utilisation de biogaz

~~DTR stage v1.3~~

~~Revised document (version 1.3 dated September 16, 2022)~~

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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 255, *Biogas*, ~~Working Group 4~~.

~~This was the first edition.~~

~~A list of all parts in the ISO 23585 series can be found on the ISO website.~~

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

~~The Technical Committee~~This document contains information on ~~Biogas (ISO/TC 255)~~ was established in 2011 in order to:

- ~~— provide liberalization and facilitation for international trade~~the state of the art of biogas systems;technology.
- ~~— contribute to international co-operation 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 systems.~~

~~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.~~

~~ISO/TC 255 Working Group 4 was established to prepare a standard that covers~~There are many and complex links in the process of biogas plants construction, biogas production and biogas utilization. In addition, the requirements for safe production and environmental protection have been continuously enhanced. Safety accidents and environmental pollution risks are directly related to the survival and sustainable development of the biogas industry.

The safety and ~~environment~~environmental information for biogas plants, biogas transportation,~~and biogas use~~ and biogas use introduced in this document are indispensable in the processes of safe, environmental protection and stable operation of biogas plants.

~~This document is applicable for biogas plants, biogas transportation, and biogas use. The main purpose of this document is~~By introducing the safe and environment friendly production and environmental protection operation of the whole process of biogas systems.

~~This document for plants, the risk of safety and environment guidelines for biogas plants, biogas transportation, and biogas use is applicable to:~~ISO/DTR 23585

- ~~— enhancing the safety of biogas plant construction, operation, and maintenance, preventing accidents and environmental pollution and achieving the full benefits of biogas energy ;—~~

~~contributing~~plants can be reduced to reduce a certain extent, and eliminate the environmental impacts during purpose of effectively ensuring the processes of biogas production, storage, purification, transportation and utilization.safe, environmental protection operation and application of biogas technology can be achieved.

Biogas is a flammable gas, mainly comprises methane, carbon dioxide, nitrogen, oxygen, hydrogen sulphide and/or water and furthermore ~~could~~can contain hydrogen, carbon monoxide, heavier hydrocarbons (including aromatic hydrocarbons), siloxanes and/or other substances~~7.1~~, generated by the anaerobic fermentation (without oxygen) of organic matter.

Biogas can be treated to eliminate hydrogen sulphide, siloxanes, water and other substances and be upgraded to a gas with higher methane content. Sometimes, the biogas ~~will be~~is pressurized.

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Safety and environmental information for biogas plants, biogas transportation and biogas use

1 Scope

This document provides safety-related and environmental-friendly operations for biogas plants, biogas transportation, and biogas use.

This document is applicable to:

- the enhancement of the safety of biogas plant construction, operation and maintenance, the prevention of environmental pollution, and the achievement of the full benefits of biogas energy;
- the contribution to reduce and eliminate the environmental impacts during the processes of biogas production, storage, purification, transportation and utilization.

This document is limited to the existing technologies.

2 ~~2~~ Normative references

~~There are no normative references in this document.~~

~~3—The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.~~

~~ISO 20675, Biogas — Biogas production, conditioning, upgrading and utilization — Terms & definitions and classification scheme~~

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ~~ISO 20675 “Terms, definitions and classification scheme for the biogas production, conditioning, upgrading and utilization”~~ in ISO 20675 and the following apply.

ISO and IEC maintain terminology 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

biogas plant

installation including its pipelines, accessories for AD of biomass, storage and upgrading of biogas, storage of feedstock and digestate

Note 1 to entry: To purify or upgrade the biogas to a higher methane percentage, it should include cooling, compressing, heating, separation, and reaction installations.

3.2

hazard

source, situation, or act with a potential for harm in terms of human injury or ill health, damage to plants (such as fire and explosion), impacts (fire, explosion, discharges...) to the environment (fauna and flora), or a combination of these

3.3

explosion

violent release of energy caused by a chemical or mechanical reaction

3.4

harmful ~~substance~~ substance

chemical, physical, ~~or~~ biological ~~substance~~ substance which can threaten or put the health of the operator at risk

3.5

desulfurization system

equipment filling with water-based and chemical compounds or desulfurization agent through physico-chemical, biological, ~~or~~ combined processes which can remove sulphides such as H₂S from the biogas

3.6

decarbonization system

equipment which can remove CO₂ from the biogas

3.7

condenser

equipment in which H₂O vapor and other vapor can be condensed into liquid form

3.8

gas-water separator

equipment which can separate H₂O and possibly other liquids from gas

3.9

desulfurization agent

chemical or biological ~~compounds~~ compound that is used for H₂S removal in the biogas

3.10

flammable gas detection

portable detector or fixed detection system that detects presence of flammable gas in the atmosphere at a given location and triggers safety actions (typically sending alarms or activating safety actions such as fast closing of a valve) when gas concentration exceeds a percentage of the lower explosion limit of that gas

3.11

biogas purification

biogas upgrading

removal of carbon dioxide and contaminants from biogas to increase the percentage of methane

~~Note 1 to entry: instead of biogas purification also the term biogas upgrading is used [remark: in ISO 20675 the term upgrading is used].~~

3.12

boiler

device using the heat energy or other heat energy released by fuel combustion to heat hot water or other working fluids to produce steam, hot water or other working fluids with specified parameters (temperature, pressure) and quality

3.13

conductive material

material that ~~become~~becomes charged with static electricity due to its conductivity and operational use

3.14**conductive area**

area where static electricity ~~might~~can be generated if *conductive material* (3.13) is not earth grounded and not at equipotentiality

4 Abbreviations

~~AD~~ — ~~Anaerobic Digestion~~

~~CHP~~ — ~~Combined Heat and Power~~

~~GHG~~ — ~~Green House Gas~~

~~GWP~~ — ~~Global Warming Potential~~

~~HDPE~~ — ~~High Density Polyethylene~~

~~LNG~~ — ~~Liquefied Natural Gas~~

~~PPE~~ — ~~Personal Protective Equipment~~

~~5~~ —

AD Anaerobic digestion

CHP Combined heat and power

GHG Greenhouse gas

GWP Global warming potential

HDPE High density polyethylene

LNG Liquefied natural gas

PEL Permissible exposure limits

PPE Personal protective equipment

5 Description of occupational and typical hazards in biogas plants**5.1 General**

The main hazards specific for biogas plants are mentioned in this ~~paragraph~~clause.

5.2 Mechanical hazard

Hazards due to the moving parts of machinery, in particular, the presence of undesired parts in solid biomass input (e.g. construction materials, stones~~...~~) can lead to plugging at various stages (pumps, pipes) or to breakage of material (e.g. rotating elements, shredders~~...~~) and thus lead to additional wearing of the infrastructure which in turn increases risks.