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Sludge recovery, recycling, treatment and disposal — Requirements and recommendations for the operation of anaerobic digestion facilities

Valorisation, recyclage, traitement et élimination des boues — Exigences et recommandations pour l'exploitation des installations de digestion anaérobie

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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 275, *Sludge recovery, recycling, treatment and disposal*.

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.

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Introduction

Anaerobic digestion of sewage treatment plant sludge is an increasing market at world scale. It presents advantages for sludge treatment in terms of sludge volume decrease, organic matter recycling and energy recovery.

Standardization of conditions of operation is therefore a main issue to ensure an efficient development of anaerobic digestion treatment. Anaerobic digestion process is subject to appropriate safety measures because it can represent many risks. Safety parameters are included in risks analyses (e.g. HAZOP).

Therefore, the objectives of this document are:

— to reduce volatile solids, mitigate odours production and generate biogas;

— to obtain good process stability and performance;

— to maximize qualities of by-products: digestate quality, biogas quality for different uses (injection of upgraded biogas into the gas grid, liquefied storage, fuel reuse, electricity and heat production);

— to perform safe and reliable operation: industrial safety for piping and automatism network and biogas equipment is in particular an important issue;

— to reduce emission of greenhouse gasses, especially of methane.

Anaerobic stabilization does not mean sludge sanitization: pathogens reduction is limited to 1 log to 3 logs. Higher reduction can only be obtained with specific conditions of temperature and residence time which are not discussed in this document.

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Sludge recovery, recycling, treatment and disposal — Requirements and recommendations for the operation of anaerobic digestion facilities

1 Scope

This document establishes requirements and recommendations for the operation of the anaerobic digestion of sludge in order to support safe and sufficient operation of anaerobic digestion facilities to produce to produce sufficient biogas and control by-products qualities.

In particular, conditions to optimize mixing within the reactor and appropriate control systems management for safe and reliable operation are described in this document. Performance of the processes in terms of biogas and digestate production are presented depending on type of technologies available on the market. Blending sludge with waste (co-substrate) and mixing the sludge with organic wastes to increase digester loading are also considered.

This document is applicable to decision-makers and operators in charge of an anaerobic digestion system.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions 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 Terms and definitions

3.1.1
acetoclastic methanogenic microorganism
anaerobic microorganism which use acetate as a main substrate

3.1.2
anaerobic digestion
anaerobic process which achieves two equally important functions, the anaerobic stabilization of substrate and the production of energy through conversion of substrate into biogas

3.1.3
biochemical methane potential
BMP
volume of methane generated during the sample degradation referred to the mass of the sample of biosolid and expressed in normal conditions of temperature (0 °C) and pressure (1 013 hPa)

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3.1.4
digestate
digested sludge
remaining effluent from the anaerobic digestion process including solid fraction and liquid fraction

[SOURCE: ISO 20675:2018, 3.19]

3.1.5
digester gas
biogas
gas mixture generated during anaerobic digestion consisting mainly of methane and carbon dioxide

3.1.6
feeding
process of adding substrate into an anaerobic digester

3.1.7
hydrolysis
biological, chemical, thermal or physical transformation of solid chemical oxygen demand into dissolved chemical oxygen demand by reaction with water

3.1.8
phase
distinct metabolic pathways

EXAMPLE Two-phase digestion: hydrolysis/acidogenesis followed by acetogenic/methogenic.

3.1.9
readily degradable substance
substance which is easily and completely degradable by microorganisms

3.1.10
sludge age
solids retention time in a reactor

Note 1 to entry: The common unit is d.

3.1.11
stabilization
process in which organic substances are converted to materials that are not biodegradable or are slowly biodegradable

3.1.12
stage
consecutive part of a process

EXAMPLE Two-stage digester, i.e. a primary digester followed by secondary digester for completing processes.

3.1.13
substrate
feedstock containing degradable organic components

3.1.14
volumetric organic load
mass of substrate, measured as total solids, volatile solids, biochemical oxygen demand or chemical oxygen demand, fed per digester volume and day

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