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BSI Standards Publication

Solid biofuels — Determination of off-gassing and oxygen depletion characteristics

Part 1: Laboratory method for the determination of off-gassing and oxygen depletion using closed containers

bsi.

National foreword

This Published Document is the UK implementation of CEN ISO/TS 20048-1:2022. It is identical to ISO/TS 20048-1:2020.

The UK participation in its preparation was entrusted to Technical Committee PTI/17, Solid biofuels.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Biogene Festbrennstoffe - Bestimmung von Ausgasungs- und Sauerstoffverarmungseigenschaften - Teil 1: Laboratoriumsverfahren zur Bestimmung von Ausgasung und Sauerstoffverarmung (ISO/TS 20048-1:2020)

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European foreword

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Endorsement notice

The text of ISO/TS 20048-1:2020 has been approved by CEN as CEN ISO/TS 20048-1:2022 without any modification.

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Foreword

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This document was prepared by Technical Committee ISO/TC 238, *Solid biofuels*.

A list of all parts in the ISO 20048 series can be found on the ISO website.

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Introduction

There is a continuous global growth in production, storage, handling, bulk transport and use of solid biofuels especially in the form of pelletized biofuels.

The specific physical and chemical characteristics of solid biofuels, their handling and storage can lead to a risk of fire and/or explosion, as well as health risks such as intoxication due to exposure to carbon-monoxide, asphyxiation due to oxygen depletion or allergic reactions.

Emission from pellets or biomass stored in enclosed space represents a significant health risk due to exposure to carbon-monoxide (CO) and oxygen depletion. It is important to be able to assess the risk by quantifying the emission of CO in combination with oxygen level. This document describes a method for estimating the propensity of a particular quality of pellets or biomass to emit CO, CO_2, CH_4 as well as the depletion of oxygen within the stored environment. In a confined space, the gas composition can result in a toxic as well as explosive atmosphere.

Biomass species, age of the material as well as the ambient temperature impacts the dynamics of the gas emissions. Unless the level of CO and oxygen levels are well understood in an operating environment, there are inherent risk for workers, which have implications for liability.

This document specifies the methodology for measuring the emission and depletion factor and emission and depletion rate of off-gassing in combination with oxygen depletion for permanent gases emitted in an enclosed storage for biomass.

NOTE A method to be used in preliminary screening of CO for operational planning is currently under development within ISO/TC 238/WG 7. Stage at the time of publication ISO/CD 20048-2:2018.

The method described in this document uses highly sensitive gas chromatography to be able to identify the spectrum of gases and their relative concentration to predict the potential for unhealthy conditions during indoor storage of biomass. The sensitivity for detection of gas species and concentrations is only limited by the sensitivity of the chromatographic instrument. The method allows for estimation of emission and depletion factor and emission and depletion rate for each gas species of biomass at different storage temperatures.

The gas instrument analysis part of the method also allows for identification of gas species and determination of concentrations of gases sampled in open storage spaces for occupational hygiene purposes (Annex C).

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TECHNICAL SPECIFICATION **ISO/TS 20048-1:2020(E)**

Solid biofuels — Determination of off-gassing and oxygen depletion characteristics —

Part 1: Laboratory method for the determination of off-gassing and oxygen depletion using closed containers

1 Scope

This document defines a method for determination of off-gassing (permanent gases) and oxygen depletion from woody as well as non-woody biomass, including densified materials such as pellets and briquettes, as well as non-densified materials such as chips. The method is also applicable for thermally treated materials, including torrefied and carbonized materials.

The emission and depletion factor and emission and depletion rate for various gas species emitted from sample within a closed test container is determined by means of gas chromatography.

The emission and depletion factor and emission and depletion rate provide guidance for ventilation requirements to keep gas concentrations below Permissible Exposure Levels (PEL) in spaces where workers can be exposed to the enclosed atmosphere.

2 Normative references

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 16559, *Solid biofuels — Terminology, definitions and descriptions*

ISO 18135, *Solid biofuels — Sampling*

ISO 14780, *Solid biofuels — Sample preparation*

ISO 17827-2, *Solid biofuels — Determination of particle size distribution for uncompressed fuels — Part 2: Vibrating screen method using sieves with aperture of 3,15 mm and below*

ISO 17828, *Solid biofuels — Determination of bulk density*

ISO 18134-1, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*

ISO 18134-2, *Solid biofuels — Determination of moisture content — Oven dry method — Part 2: Total moisture — Simplified method*

ISO 18846, *Solid biofuels — Determination of fines content in quantities of pellets*

ISO 18847, *Solid biofuels — Determination of particle density of pellets and briquettes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16559 and the following apply.

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