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BSI Standards Publication

Characterization of waste — Determination of gross calorific value and calculation of net calorific value

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National foreword

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

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Characterization of waste - Determination of gross calorific value and calculation of net calorific value

Caractérisation des déchets - Détermination du pouvoir calorifique supérieur et calcul du pouvoir calorifique inférieur

Charakterisierung von Abfällen - Bestimmung des Brennwertes und Berechnung des Heizwertes

This Technical Specification (CEN/TS) was approved by CEN on 6 August 2013 for provisional application.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword

This document (CEN/TS 16023:2013) has been prepared by Technical Committee CEN/TC 292 “Characterization of waste”, the secretariat of which is held by NEN.

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Introduction

This method is a quick and easy way to evaluate the suitability of waste to be treated by thermal processes.

The determination of gross calorific value is carried out without thermo-chemical corrections. These corrections typically result in minor changes of the result. The influence of these corrections is shown in Annex C.

The result obtained is the gross calorific value at constant volume with both the water of the combustion products and the moisture of the waste as liquid water.

The net calorific value is obtained by calculation from the gross calorific value. For the purpose of this Technical Specification, the value of the net calorific value does not need to be determined exactly. The correction for hydrogen is simplified by the use of typical hydrogen contents derived from table values of hydrogen contents in common types of waste.

This Technical Specification specifies a quick method to determine calorific value; a more comprehensive analysis is described in ISO 1928.

Waste can contain water and (unburnable) solids in large amounts. Therefore their calorific value – especially on the “as received” basis – can be quite low. For some purposes it may be sufficient to determine the gross calorific value only, and not the net calorific value.

WARNING — Strict adherence to all of the provisions prescribed in this Technical Specification should ensure against explosive rupture of the bomb, or a blow-out, provided that the bomb is of proper design and construction and in good mechanical condition. Anyone dealing with waste and sludge analysis is required to be aware of the typical risks of this kind of material irrespective of the parameter to be determined. Waste and sludge samples may contain hazardous (e.g. toxic, reactive, flammable, infectious) substances, which can be liable to biological and/or chemical reaction. Consequently, it is recommended that these samples be handled with special care. The gases that may be produced by microbiological or chemical activity are potentially flammable and will pressurize sealed bottles. Bursting bottles are likely to result in hazardous shrapnel, dust and/or aerosol. National regulations should be followed with respect to all hazards associated with this method.

1 Scope

This Technical Specification specifies a simplified method for the determination of the gross calorific value of waste at constant volume and at the reference temperature of 25 °C in a bomb calorimeter calibrated by combustion of certified benzoic acid. This Technical Specification does not include thermo-chemical corrections.

This Technical Specification also specifies a simplified calculation of the net calorific value from the gross calorific value.

This Technical Specification is applicable for the evaluation of suitability of waste to be treated by thermal processes and for the energy to be recovered.

This Technical Specification is applicable to all kinds of waste.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13965-2:2010, *Characterization of waste - Terminology - Part 2: Management related terms and definitions*

EN 14346, *Characterization of waste - Calculation of dry matter by determination of dry residue or water content*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13965-2:2010 and the following apply.

3.1
corrected temperature rise
change in calorimeter temperature caused solely by the processes taking place within the combustion bomb

Note 1 to entry: It is the total observed temperature rise corrected for heat exchange, stirring power etc.

3.2
gross calorific value at constant volume
absolute value of the specific energy of combustion, in Joules, for unit mass of waste burned in oxygen in a calorimetric bomb under the conditions specified

Note 1 to entry: The products of combustion are assumed to consist of gaseous oxygen, nitrogen, carbon dioxide and sulfur dioxide, of liquid water (in equilibrium with its vapour) saturated with carbon dioxide under the conditions of the bomb reaction, and of solid ash, all at the reference temperature.

3.3
net calorific value at constant pressure
absolute value of the specific energy of combustion, in Joules, for unit mass of waste burned in oxygen at constant pressure under such conditions that all the water of the reaction products remains as water vapour (in a hypothetical state at 0,1 MPa)

Note 1 to entry: The other products are assumed to remain at the reference temperature.