

**Sludge, treated biowaste and soil - Determination of  
Kjeldahl nitrogen**

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ICS 13.030.01, 13.080.10

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ICS 13.030.01; 13.080.10

English Version

**Sludge, treated biowaste and soil - Determination of Kjeldahl  
nitrogen**

Boues, bio-déchets traités et sols - Détermination de l'azote  
Kjeldahl

Schlamm, behandelter Bioabfall und Boden - Bestimmung  
des Kjeldahl-Stickstoffs

This European Standard was approved by CEN on 24 May 2012.

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## Foreword

This document (EN 16169:2012) has been prepared by Technical Committee CEN/TC 400 "Project Committee - Horizontal standards in the fields of sludge, biowaste and soil", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The preparation of this document by CEN is based on a mandate by the European Commission (Mandate M/330), which assigned the development of standards on sampling and analytical methods for hygienic and biological parameters as well as inorganic and organic determinants, aiming to make these standards applicable to sludge, treated biowaste and soil as far as this is technically feasible.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

This European Standard is applicable and validated for several types of matrices as indicated in Table 1 (see also Annex A for the results of the validation).

**Table 1 — Matrices for which this European Standard is applicable and validated**

| Matrix   | Materials used for validation            |
|----------|--|
| Sludge   | Municipal sludge                         |
| Biowaste | Fresh compost<br>Compost                 |
| Soil     | Sludge amended soil<br>Agricultural soil |

**WARNING —** Persons using this European Standard should be familiar with usual laboratory practice. This European Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

**IMPORTANT —** It is absolutely essential that tests conducted according to this European Standard be carried out by suitably trained staff.

## 1 Scope

This European Standard specifies the determination of Kjeldahl nitrogen according to the Kjeldahl procedure in sludge, treated biowaste and soil.

Nitrate and nitrite are not included.

Compounds with nitrogen bound in N-N, N-O linkages and some heterocycles (pyridines) are only partially determined.

The limit of detection (LOD) is usually 0,03 % nitrogen, and the limit of quantification (LOQ) is 0,1 % nitrogen (using 0,25 mol/l sulfuric acid for titration).

## 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 15934, *Sludge, treated biowaste, soil and waste — Calculation of dry matter fraction after determination of dry residue or water content*

EN 16179, *Sludge, treated biowaste and soil — Guidance for sample pretreatment*

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696)*

EN ISO 5667-15, *Water quality — Sampling — Part 15: Guidance on the preservation and handling of sludge and sediment samples (ISO 5667-15)*

ISO 18512, *Soil quality — Guidance on long and short term storage of soil samples*

## 3 Terms and definitions

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

### 3.1

#### **Kjeldahl nitrogen**

nitrogen that is contributed by free ammonia, inorganic ammonia compounds and those types of organic nitrogen compounds that are converted to ammonium sulfate by the digestion process described in this standard (catalytic sulfuric acid digestion)

[SOURCE: EN 13342:2000, 3.1]

## 4 Principle

The dried and homogenized, moist or liquid material is digested in a suitable Kjeldahl tube with sulfuric acid, thus converting most nitrogen compounds present to ammonium sulfate. To raise the temperature, potassium sulfate is added and e.g. a mixture of titanium dioxide and copper sulfate is used as a catalyst. After adding sodium hydroxide to the digestion solution the produced ammonium is evaporated by distillation as ammonia. This is condensed in the cooling system and flows into a conical flask with boric acid solution (or diluted sulfuric acid). This solution is analyzed for ammonia by titration with sulfuric or hydrochloric acid.