

ICS 91.100.01

English Version

Construction products - Assessment of release of dangerous substances - Determination of activity concentrations of radium-226, thorium-232 and potassium-40 in construction products using semiconductor gamma-ray spectrometry

Produits de construction - Evaluation de l'émission de substances dangereuses - Détermination de l'activité du radium-226, du thorium-232 et du potassium-40 dans les produits de construction par spectrométrie gamma

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Messung der spezifischen Aktivität von Radium-226, Thorium-232 und Kalium-40 in Bauprodukten mittels Halbleiter-Gammaspektrometrie

This Technical Specification (CEN/TS) was approved by CEN on 14 May 2018 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	4
Introduction	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	6
4 Symbols and abbreviations	8
5 Principles of the test method.....	11
6 Sampling and sample preparation.....	11
6.1 Sampling hierarchy	11
6.2 Sampling and sub-sampling	14
6.3 Test specimen/test portion preparation.....	14
7 Test procedure	18
7.1 General.....	18
7.2 Measurement.....	18
8 Processing the test data	21
8.1 General.....	21
8.2 Analysis of counting spectrum	22
8.3 Calculating activity concentration	22
8.4 Standard uncertainty.....	24
8.5 Decision threshold.....	27
8.6 Detection limit.....	27
9 Test report.....	29
Annex A (normative) Method for the determination of the radon-tightness of a test specimen container	31
A.1 Principle	31
A.2 Apparatus, equipment and reagents.....	31
A.3 Test.....	31
A.4 Processing experimental data.....	32
Annex B (normative) Preparation of standardized calibration sources.....	35
B.1 Principle	35
B.2 Apparatus, equipment and reagents.....	35
B.3 Test.....	35
Annex C (normative) Method for the determination of the activity concentration in a composite product.....	39

Annex D (informative) Complementary photopeaks to verify the activity concentration in the test specimen 40

Annex E (informative) Method for the determination of the corrected number of pulses in a photopeak (only to be used for completely stand-alone single peaks) 41

Bibliography 42

European foreword

This document (CEN/TS 17216:2018) has been prepared by Technical Committee CEN/TC 351 “Construction products - Assessment of release of dangerous substances”, the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN 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.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a Technical Specification developed under Mandate M/366 issued by the European Commission in the framework of the “Construction Products Directive” 89/106/EEC. This document addresses the part of Mandate M/366 which provides for the preparation of horizontal measurement/test methods for the determination of the activity concentrations of the radionuclides radium-226, thorium-232 and potassium-40 in construction products using gamma-ray spectrometry. Mandate M/366 is a complement to the product mandates issued by the European Commission to CEN under the Construction Products Directive (CPD). The harmonized product standards (hEN) developed in CEN under mandates (and ETAs developed in EOTA for products or kits) specify construction product(s) as placed on the market and address their intended conditions of use.

The information produced by applying this Technical Specification can be used for purposes of CE marking and evaluation/attestation of conformity. Product specification, standardization of representative sampling and procedures for any product-specific laboratory sample preparation are the responsibility of product TCs and are not covered in this Technical Specification.

This Technical Specification supports existing regulations and standardized practices, and is based on methods described in standards, such as ISO 10703 [1], ISO 18589-2 [2], ISO 18589-3 [3] and NEN 5697 [4]. In summary, the Technical Specification describes the following:

- sampling, sub-sampling and test specimen preparation;
- measurement using gamma-ray spectrometry;
- background subtraction, energy and efficiency calibration, analysis of the spectrum;
- calculation of activity concentrations with associated uncertainties;
- reporting of test results.

Determination of the activity concentration is based on the principles of gamma-spectrometry, and procedures for all stages of the testing are provided in this document. Although the tested material sample rarely reflects a product’s form under its intended conditions of use, the measured activity concentration is an intrinsic property of the material, which does not vary with the construction product’s form. Consequently, the test results reflect the radiation behaviour of the product under its intended use. In addition, the Technical Specification is intended to be non product-specific in scope, with only a limited number of product-specific elements.

1 Scope

This document describes a test method for the determination of the activity concentrations of the radionuclides radium-226, thorium-232 and potassium-40 in construction products using semiconductor gamma-ray spectrometry.

This document describes sampling from a laboratory sample, sample preparation, and the sample measurement by semiconductor gamma-ray spectrometry. It includes background subtraction, energy and efficiency calibration, analysis of the spectrum, calculation of the activity concentrations with the associated uncertainties, the decision threshold and detection limit, and reporting of the results. The preparation of the laboratory sample from the initial product sample lies outside its scope and is described in product standards.

This document is intended to be non product-specific in scope, however, there are a limited number of product-specific elements such as the preparation of the laboratory sample and drying of the test portion. The method is applicable to samples from products consisting of single or multiple material components.

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.

EN 16687:2015, *Construction products - Assessment of release of dangerous substances - Terminology*

ISO 11929, *Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionizing radiation - Fundamentals and application*

ISO IEC Guide 98-3, *Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM, 1995)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

blank

volume of demineralized or distilled water that corresponds to the volume and geometry of the test specimen

3.2

calibration source

sample with known radioactivity concentration and material properties that corresponds to the volume and geometry of the test specimen

[SOURCE: EN 16687:2015, 4.4.2]