



# SLOVENSKI STANDARD

## SIST EN 17201:2024

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Nadomešča:

SIST-TS CEN/TS 17201:2019+AC:2019

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**Gradbeni proizvodi - Ocenjevanje sproščanja nevarnih snovi - Vsebnost anorganskih snovi - Metode za analizo po razklopu z zlatotopko**

Construction products - Assessment of release of dangerous substances - Content of inorganic substances - Methods for analysis of aqua regia digests

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Gehalt an anorganischen Stoffen - Verfahren zur Analyse von Königswasserauflösungen

Produits de construction - Évaluation du relargage de substances dangereuses - Teneur en substances inorganiques - Méthodes d'analyse de digestats obtenus par digestion à l'eau régale

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**Ta slovenski standard je istoveten z: EN 17201:2023**

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**ICS:**

13.020.99	Drugi standardi v zvezi z varstvom okolja	Other standards related to environmental protection
91.100.01	Gradbeni materiali na splošno	Construction materials in general

**SIST EN 17201:2024**

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EUROPEAN STANDARD

EN 17201

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes CEN/TS 17201:2018+AC:2018

English Version

## Construction products: Assessment of release of dangerous substances - Content of inorganic substances - Methods for analysis of aqua regia digests

Produits de construction : Évaluation du relargage de substances dangereuses - Teneur en substances inorganiques - Méthodes d'analyse de digestats obtenus par digestion à l'eau régale

Bauprodukte: Bewertung der Freisetzung von gefährlichen Stoffen - Gehalt an anorganischen Stoffen - Verfahren zur Analyse von Königswasserauflösungen

This European Standard was approved by CEN on 14 August 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## European foreword

This document (EN 17201:2023) 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.

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 May 2024, and conflicting national standards shall be withdrawn at the latest by May 2024.

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 supersedes CEN/TS 17201:2018+AC:2018.

In comparison with the previous edition, the following technical modifications have been made:

- the addition of performance data and data from intercomparison validation;
- alignment of terms and definitions within the working groups of CEN/TC 351, i.e. through the revised version of EN 16687.

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

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

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## EN 17201:2023 (E)

### Introduction

This document deals with the determination of the content of inorganic substances in construction products.

Following an extended evaluation of available methods for content analysis in construction products (CEN/TR 16045) it was concluded that eluate analysis methods are very similar to analytical methods used to determine content after digestion of a solid matrix.

This document has a similar structure as EN 17195.

This document is part of a modular horizontal approach which was adopted in CEN/TC 351. “Horizontal” means that the methods can be used for a wide range of materials and products with certain properties. “Modular” means that a test standard developed in this approach concerns a specific step in assessing a property and not the whole chain of measurement (from sampling to analyses). Beneficial features of this approach are that modules can be replaced by better ones without jeopardizing the standard chain and duplication of work of in different Technical Committees for Products can be avoided as far as possible. Similar standards have been developed for content determination in different types of matrices, see Annex A (informative).

The modules that relate to the standards developed in CEN/TC 351 are specified in CEN/TR 16220, which distinguishes between the modules. This document belongs to the analytical step.

The use of modular horizontal standards implies the drawing of test schemes as well. Before executing a test on a certain construction product to determine certain characteristics, it is necessary to draw up a protocol in which the adequate modules are selected and together form the basis for the entire test procedure.

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## 1 Scope

This document specifies analytical methods for the determination of major, minor and trace elements in *aqua regia* digests of construction products. It refers to the following 67 elements:

Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), bismuth (Bi), boron (B), cadmium (Cd), calcium (Ca), cerium (Ce), caesium (Cs), chromium (Cr), cobalt (Co), copper (Cu), dysprosium (Dy), erbium (Er), europium (Eu), gadolinium (Gd), gallium (Ga), germanium (Ge), gold (Au), hafnium (Hf), holmium (Ho), indium (In), iridium (Ir), iron (Fe), lanthanum (La), lead (Pb), lithium (Li), lutetium (Lu), magnesium (Mg), manganese (Mn), mercury (Hg), molybdenum (Mo), neodymium (Nd), nickel (Ni), palladium (Pd), phosphorus (P), platinum (Pt), potassium (K), praseodymium (Pr), rubidium (Rb), rhenium (Re), rhodium (Rh), ruthenium (Ru), samarium (Sm), scandium (Sc), selenium (Se), silicon (Si), silver (Ag), sodium (Na), strontium (Sr), sulphur (S), tellurium (Te), terbium (Tb), thallium (Tl), thorium (Th), thulium (Tm), tin (Sn), titanium (Ti), tungsten (W), uranium (U), vanadium (V), ytterbium (Yb), yttrium (Y), zinc (Zn), and zirconium (Zr).

The methods in this document are applicable to construction products.

NOTE Construction products include e.g. mineral-based products (S); bituminous products (B); metals (M); wood-based products (W); plastics and rubbers (P); sealants and adhesives (A); paints and coatings (C), see also CEN/TR 16045.

The selection of analytical methods to be applied is based on the required sensitivity of the method, which is provided for all combinations of substance and analytical procedure.

## 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 16687:2023, *Construction products: Assessment of release of dangerous substances — Terminology*

EN 17087, *Construction products: Assessment of release of dangerous substances — Preparation of test portions from the laboratory sample for testing of release and analysis of content*

EN 17196, *Construction products: Assessment of release of dangerous substances — Digestion by aqua regia for subsequent analysis of inorganic substances*

EN 17197, *Construction products: Assessment of release of dangerous substances — Analysis of inorganic substances in eluates and digests — Analysis by inductively coupled plasma optical emission spectrometry (ICP-OES)*

EN 17200, *Construction products: Assessment of release of dangerous substances — Analysis of inorganic substances in eluates and digests— Analysis by inductively coupled plasma mass spectrometry (ICP-MS)*

EN ISO 5667-3, *Water quality — Sampling — Part 3: Preservation and handling of water samples (ISO 5667-3:2018)*

EN ISO 12846:2012, *Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment (ISO 12846:2012)*

EN ISO 15586:2003, *Water quality — Determination of trace elements using atomic absorption spectrometry with graphite furnace (ISO 15586:2003)*

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EN ISO 17852:2008, *Water quality — Determination of mercury — Method using atomic fluorescence spectrometry (ISO 17852:2006)*

ISO 17378-1:2014, *Water quality — Determination of arsenic and antimony — Part 1: Method using hydride generation atomic fluorescence spectrometry (HG-AFS)*

ISO 17378-2:2014, *Water quality — Determination of arsenic and antimony — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

ISO/TS 17379-1:2013, *Water quality — Determination of selenium — Part 1: Method using hydride generation atomic fluorescence spectrometry (HG-AFS)*

ISO/TS 17379-2:2013, *Water quality — Determination of selenium — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 16687:2023 and the following 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*****aqua regia***

solution obtained by mixing one volume of nitric acid and three volumes of hydrochloric acid

[SOURCE: EN 16687:2023, 3.2.2.10]

**3.2****digest**

solution resulting from acid digestion of a sample

[SOURCE: EN 16687:2023, 3.2.2.8]

**3.3****digestion**

mineralization of the organic matter of a sample and dissolution of its mineral part (as completely as possible) when reacted with a reagent mixture

[SOURCE: EN 16687:2023, 3.2.2.9 – modified, Note 1 to entry removed]

**3.4****laboratory sample**

sample or sub-sample(s) sent to or received by the laboratory

[SOURCE: EN 16687:2023, 3.2.2.1 – modified, Notes to entry removed]



**3.5****method detection limit****MDL**

lowest analyte concentration that can be detected with a specified analytical method including sample preparation with a defined statistical probability

[SOURCE: EN 16687:2023, 3.3.1.12; modified – Note 1 to entry removed]

**3.6****sample**

portion of material selected from a larger quantity of material

[SOURCE: EN 16687:2023, 3.2.1.5; modified – Notes to entry removed]

**3.7****test portion**

analytical portion

amount of the test sample taken for testing/analysis purposes, usually of known dimension, mass or volume

[SOURCE: EN 16687:2023, 3.2.2.3; modified – Examples removed]

**3.8****test sample**

analytical sample

sample, prepared from the laboratory sample, from which test portions are removed for testing or for analysis

[SOURCE: EN 16687:2023, 3.2.2.2]

**4 Abbreviations**

For the purposes of this document, the following abbreviations apply.

CV-AAS	Cold vapour atomic absorption spectrometry
CV-AFS	Cold vapour atomic fluorescence spectrometry
GF-AAS	Graphite furnace atomic absorption spectrometry
HG-AAS	Hydride generation atomic absorption spectrometry
ICP	Inductively coupled plasma
LOD	Limit of detection
MS	Mass spectrometry
OES	Optical emission spectrometry
QC	Quality control

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### 5 Sample pre-treatment

The digestion of the construction products is executed according to EN 17196.

The laboratory sample as obtained from sampling as specified in product specific requirements complemented with requirements as set out in CEN/TR 16220, shall be prepared for digestion according to the specifications provided in the *aqua regia* digestion method EN 17196.

If necessary apply sample pre-treatment as specified in EN 17087.

Split the digest in an adequate number of test portions for different chemical analyses and preserve them according to the requirements in EN ISO 5667-3.

### 6 Selection of suitable analytical test method

#### 6.1 Table of test methods

Select the appropriate standardized test method listed in Table 1 to analyse the digest resulting from the *aqua regia* digestion according to the concentration range of the parameter of interest, regulatory requirements, the expected interferences and the precision needed.

For analytical quality control purposes ISO/TS 13530 and EN ISO/IEC 17025 should be considered.

#### 6.2 General validation information

A selection of the test methods listed in Table 1 has been validated in robustness validation ([ALS, 2017], [Vanhoof et al., 2016]) and in an interlaboratory trial for a limited number of construction product matrices [García-Ruiz et al., 2020]. Their suitability for other construction product digests shall be checked in the laboratory performing the analysis.

It is pointed out that the standardized test methods listed in Table 1 have primarily been developed for the analysis of water samples. Most of them were validated by CEN/TC 223, CEN/TC 292 and CEN/TC 308 in interlaboratory trials for a limited number of digests from various matrices. The validation data on these other matrices obtained in the evaluation of the analytical performance of laboratories are referenced in the bibliography.

If the methods referred to in Table 1 are found to be inappropriate by reason of, for example, detection limits, repeatability or interferences, other methods validated for water analysis may be used. Their suitability for construction product eluates shall be checked in the laboratory performing the analysis. The reason for the deviation shall be stated in the test report.

Indicative values for MDL are listed in Table B.1 in Annex B (informative). The values for MDL as listed in Annex B (informative) are indicative values in the sense that they are not to be used as sole guideline to select between methods to be applied. An actual MDL will depend on the equipment, matrix properties, interferences, and laboratory experience. Detection limits also depend on the amount of sample processed. If based on better precision for the listed methods another MDL is chosen than the MDL that would result from applying the tabulated values, this shall be mentioned in the test report.