



# SLOVENSKI STANDARD

## SIST EN 12498:2019

01-januar-2019

Nadomešča:  
SIST EN 12498:2005

---

**Papir, karton in lepenka - Papier, karton in lepenka v neposrednem stiku z živili - Določevanje kadmija, kroma in svinca v vodnem ekstraktu**

Paper and board - Paper and board intended to come into contact with foodstuffs - Determination of cadmium, chromium and lead in an aqueous extract

Papier und Pappe - Papier und Pappe für den Kontakt mit Lebensmitteln - Bestimmung von Cadmium, Chrom und Blei in einem wässrigen Extrakt

Papier et carton - Papiers et cartons destinés à entrer en contact avec les denrées alimentaires - Détermination du cadmium, du chrome et du plomb dans un extrait aqueux

**Ta slovenski standard je istoveten z: EN 12498:2018**

---

**ICS:**

67.250	Materiali in predmeti v stiku z živili	Materials and articles in contact with foodstuffs
85.060	Papir, karton in lepenka	Paper and board

**SIST EN 12498:2019** en,fr,de

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12498:2019

<https://standards.iteh.ai/catalog/standards/sist/311e6ffa-3d75-4ad7-b070-bc0b5262b02a/sist-en-12498-2019>

EUROPEAN STANDARD

EN 12498

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2018

ICS 67.250; 85.060

Supersedes EN 12498:2005

English Version

## Paper and board - Paper and board intended to come into contact with foodstuffs - Determination of cadmium, chromium and lead in an aqueous extract

Papier et carton - Papiers et cartons destinés à entrer en contact avec les denrées alimentaires - Détermination du cadmium, du chrome et du plomb dans un extrait aqueux

Papier und Pappe - Papier und Pappe für den Kontakt mit Lebensmitteln - Bestimmung von Cadmium, Chrom und Blei in einem wässrigen Extrakt

This European Standard was approved by CEN on 15 July 2018.

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.

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

<b>Contents</b>	<b>Page</b>
European foreword.....	3
1 Scope.....	4
2 Normative references.....	4
3 Principle.....	4
4 Reagents.....	4
5 Apparatus.....	5
6 Preparation of sample.....	5
7 Procedure.....	6
7.1 General.....	6
7.2 Preparation of reference solutions.....	6
7.3 Determination of cadmium, lead and chromium.....	6
7.3.1 General.....	6
7.3.2 Calibration curve.....	6
7.3.3 Suggested spectrometer settings.....	6
7.3.4 Determination of blank value.....	6
8 Expression of results.....	6
9 Test report.....	7

[SIST EN 12498:2019](https://standards.iteh.ai/catalog/standards/sist/311e6ffa-3d75-4ad7-b070-bc0b5262b02a/sist-en-12498-2019)  
<https://standards.iteh.ai/catalog/standards/sist/311e6ffa-3d75-4ad7-b070-bc0b5262b02a/sist-en-12498-2019>

## European foreword

This document (EN 12498:2018) has been prepared by Technical Committee CEN/TC 172 “Pulp, paper and board”, 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 May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

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 EN 12498:2005.

With regards to EN 12498:2005 the following changes have been made:

- a) Chromium has been added to the scope;
- b) The reagents have been modified;
- c) Editorial updating.

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, 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.

## EN 12498:2018 (E)

### 1 Scope

This document is one in a series of Standards for the determination of heavy metals in an aqueous extract of paper or board intended for contact with food. This document specifies the test method for the determination of cadmium, lead and chromium in an aqueous extract.

It is applicable to paper and paperboard with extractable metal contents exceeding

- 0,1 mg per kg for cadmium,
- 0,6 mg per kg for lead,
- 0,25 mg per kg for chromium.

Metal content levels below those given can be measured by this document if very sensitive equipment is available and if all other laboratory conditions fulfil the requirements for trace element analysis.

### 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 645, *Paper and board intended to come into contact with foodstuffs — Preparation of a cold water extract*

EN 647, *Paper and board intended to come into contact with foodstuffs — Preparation of a hot water extract*

### 3 Principle

[SIST EN 12498:2019  
https://standards.iteh.ai/catalog/standards/sist/311e6ffa-3d75-4ad7-b070-bc0b5262b02a/sist-en-12498-2019](https://standards.iteh.ai/catalog/standards/sist/311e6ffa-3d75-4ad7-b070-bc0b5262b02a/sist-en-12498-2019)

An aliquot portion from the stabilized cold water (see EN 645) or stabilized hot water extract (see EN 647) (see Clause 6) is analysed by atomic absorption spectrometry using a graphite tube furnace.

NOTE ICP (inductive coupled plasma) can be used, if validated.

### 4 Reagents

All reagents and the water used shall be suitable for trace element analysis. Store the solutions in high density polyethylene/polypropylene bottles.

**4.1 Nitric acid (HNO<sub>3</sub>), 65 % (d = 1,42)**

**4.1.1 Nitric acid (4.1), diluted 1: 1 (V/V) with water**

**4.1.2 Nitric acid (4.1), diluted to 1 % (V/V) with water**

**4.2 Hydrochloric acid (HCl), 36 % (d = 1,19)**

**4.3 Hydrochloric acid (HCl), 0,3 mol/l solution**

#### 4.4 Cadmium – Lead – Chromium – stock solution (Cd, Pb, Cr) = 1 000 mg/l

The stock solutions are reference materials such as defined in the ISO guide 30. The solutions with a single element and the solutions multielements with their suited specifications indicating the used acid and the method of preparation are both available. The solutions of elements having concentrations of analytes different (for example 100 mg/l) are also admitted.

These solutions are considered as stable during more than a year, but it is advisable, in reference to a guaranteed stability, to take into account recommendations of the manufacturer.

#### 4.5 Matrix modifiers

##### 4.5.1 Ammonium dihydrogen phosphate ( $\text{NH}_4\text{H}_2\text{PO}_4$ ), solution, 100 g/l

##### 4.5.2 Palladium nitrate ( $\text{Pd}(\text{NO}_3)_2$ ), solution, 21,7 g/l (= 1 % Pd)

##### 4.5.3 Magnesium nitrate ( $\text{Mg}(\text{NO}_3)_2$ ), solution, 61,0 g/l (= 1 % Mg)

NOTE Commercially available standard solutions and matrix modifiers can be used if preferred.

#### 4.6 Gases for atomic absorption spectrometry

— Nitrogen, as appropriate;

— Argon, as appropriate.

### 5 Apparatus

#### 5.1 General laboratory equipment

#### 5.2 Volumetric flasks, 1000 ml

#### 5.3 Analytical balance, accuracy 0,1 mg

#### 5.4 Micropipettes, from 5,0 $\mu\text{l}$ to 20,0 $\mu\text{l}$ with plastic tips polyethylene/polypropylene of high density

#### 5.5 Atomic absorption spectrophotometer with graphite tube furnace, and with background correction

Wash all flasks etc. with nitric acid and store them in dilute nitric acid until required. Rinse with demineralized water before use.

### 6 Preparation of sample

Prepare a cold water or a hot water extract from the paper or board using the test methods described in EN 645 or EN 647 respectively.

Stabilize the extract by addition of nitric acid (4.1) in the ratio of 1,0 ml per 100,0 ml of sample.

Mix the aqueous extract well and take an aliquot portion for analysis.

Use the appropriate matrix modifier(s) (4.5) according to the particular instrument in use and the analytical matrix of the extract.

**EN 12498:2018 (E)****7 Procedure****7.1 General**

Detailed instructions depend on the form of the equipment used. Follow the instructions of the manufacturer of the equipment.

Correct the background absorption by use of a suitable system.

**7.2 Preparation of reference solutions**

Prepare the reference solutions daily by diluting the single element solutions with nitric acid (4.1.2). The concentration to be selected will depend on the instrument used and the expected concentrations in the extract.

However, solutions of 10,0 µg/l are usually appropriate. For Cadmium a solution of 1 µg/l is appropriate.

Prepare a calibration blank using all the reagents except for the metal stock solutions.

**7.3 Determination of cadmium, lead and chromium****7.3.1 General**

Determine the concentration of the element by means of the calibration graph (7.3.2) or alternatively, by use of the method of standard addition.

**7.3.2 Calibration curve**

The calibration curve shall contain at least 3 points and cover the total range of concentrations being measured. Calculate the concentration of the element from the measured absorption.

**7.3.3 Suggested spectrometer settings**

- Cadmium                    228,8 nm;
- Lead                        217,0 nm, or  
283,3 nm (preferred);
- Chromium                357,9 nm.

**7.3.4 Determination of blank value**

Submit the water and reagents used for the extraction to the test procedure to provide a blank value to be deducted from the extract value.

NOTE If not prepared in the laboratory, the extract can only be supplied to the laboratory, together with the water used for the extraction. Without this, no blank can be determined and therefore not deducted from the extract value. If a partial blank is determined it is advisable to be reported.

**8 Expression of results**

Calculate the results with a computer or graphically. Take the blank value into consideration in the evaluation.

Express the results according to Formula (1) in mg/kg or according to Formula (2) in mg/dm<sup>2</sup> of the extract.