



# SLOVENSKI STANDARD

## SIST EN 13806-3:2025

01-maj-2025

Nadomešča:  
SIST EN 13806:2002

---

**Živila - Določevanje elementov v sledovih - 3. del: Določevanje celotnega živega srebra v živilih z atomsko absorpcijo neposredno iz živila (elementarna analiza živega srebra)**

Foodstuffs - Determination of trace elements - Part 3: Determination of total mercury in foodstuffs with atomic absorption directly from the foodstuff (elemental mercury analysis)

Lebensmittel - Bestimmung von Elementspuren - Teil 3: Bestimmung des Gesamtquecksilbers in Lebensmitteln durch Atomabsorption direkt aus dem Lebensmittel (Elementare Quecksilberanalyse)

Produits alimentaires - Dosage des éléments traces - Partie 3 : Dosage du mercure total dans les produits alimentaires par absorption atomique directe (analyse du mercure élémentaire)

<https://standards.iteh.ai/catalog/standards/sist/cb5fb57f-8aa5-4129-918d-707c7636928f/sist-en-13806-3-2025>

**Ta slovenski standard je istoveten z: EN 13806-3:2025**

---

**ICS:**

67.050	Splošne preskusne in analizne metode za živilske proizvode	General methods of tests and analysis for food products
--------	--	---

**SIST EN 13806-3:2025**

**en,fr,de**



EUROPEAN STANDARD

EN 13806-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2025

ICS 67.050

Supersedes EN 13806:2002

English Version

**Foodstuffs - Determination of trace elements - Part 3:  
Determination of total mercury in foodstuffs with atomic  
absorption directly from the foodstuff (elemental mercury  
analysis)**

Produits alimentaires - Dosage des éléments-traces -  
Partie 3 : Dosage du mercure total dans les produits  
alimentaires par absorption atomique directe (analyse  
du mercure élémentaire)

Lebensmittel - Bestimmung von Elementspuren - Teil  
3: Bestimmung des Gesamtquecksilbers in  
Lebensmitteln durch Atomabsorption direkt aus dem  
Lebensmittel (Elementare Quecksilberanalyse)

This European Standard was approved by CEN on 17 February 2025.

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, 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 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>
<b>European foreword</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>4</b>
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms and definitions</b> .....	<b>5</b>
<b>4 Principle</b> .....	<b>5</b>
<b>5 Reagents</b> .....	<b>6</b>
<b>6 Apparatus</b> .....	<b>8</b>
<b>7 Sampling</b> .....	<b>8</b>
<b>8 Procedure</b> .....	<b>8</b>
<b>8.1 Preparations for measurement</b> .....	<b>8</b>
<b>8.1.1 Sample carrier cleaning</b> .....	<b>8</b>
<b>8.1.2 Sample weight</b> .....	<b>9</b>
<b>8.2 Direct atomic absorption spectrometry using thermal decomposition</b> .....	<b>9</b>
<b>8.2.1 General</b> .....	<b>9</b>
<b>8.2.2 Instrument blank value</b> .....	<b>9</b>
<b>8.2.3 Instrument calibration and calibration control</b> .....	<b>10</b>
<b>8.2.4 Measurement</b> .....	<b>12</b>
<b>8.3 Quality control</b> .....	<b>13</b>
<b>9 Evaluation</b> .....	<b>13</b>
<b>9.1 Calculation</b> .....	<b>13</b>
<b>9.2 Limit of quantification</b> .....	<b>13</b>
<b>9.3 Precision</b> .....	<b>14</b>
<b>9.4 Reproducibility</b> .....	<b>14</b>
<b>9.5 Trueness</b> .....	<b>14</b>
<b>10 Test report</b> .....	<b>15</b>
<b>Annex A (informative) Precision data</b> .....	<b>16</b>
<b>Annex B (normative) Explanations and notes</b> .....	<b>18</b>
<b>Bibliography</b> .....	<b>20</b>

## European foreword

This document (EN 13806-3:2025) has been prepared by Technical Committee CEN/TC 275 “Food analysis – Horizontal methods”, 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 September 2025, and conflicting national standards shall be withdrawn at the latest by September 2025.

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 13806:2002.

The main changes compared to the previous edition are listed below:

- the document has been split up into three separate parts: EN 13806-1 covering the AAS-cold-vapour technique, EN 13806-2 the AFS-cold-vapour technique and EN 13806-3 the solid sample AAS technique;
- full technical revision to bring the technical realization up to date with the latest technology;
- Stabilization of the digest solution;
- Update of statistical data by new interlaboratory study.

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.

**EN 13806-3:2025 (E)****Introduction**

This document has been developed in parallel with EN 13806-1 [2] and EN 13806-2 [3]. All three methods were validated in parallel in interlaboratory studies with the same scope. They are statistically compatible in performances. This allows the users of these documents to employ the most appropriate/available method depending on the purpose of their studies. The statistical parameters of these standards are presented in the respective documents.

**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[SIST EN 13806-3:2025](https://standards.iteh.ai/catalog/standards/sist/cb5fb57f-8aa5-4129-918d-707c7636928f/sist-en-13806-3-2025)

<https://standards.iteh.ai/catalog/standards/sist/cb5fb57f-8aa5-4129-918d-707c7636928f/sist-en-13806-3-2025>

## 1 Scope

This document specifies a method for the determination of total mercury (Hg) in foodstuffs using direct atomic absorption spectrometry after thermal decomposition in an oxygen or air flow and concentration by amalgam formation. The method is applicable for solid and liquid samples.

This method was tested in a interlaboratory study carried out on seven different materials with a mercury concentration in the range from 0,005 mg/kg to 5,20 mg/kg and successfully validated in this range.

The following foodstuffs were analysed:

- Saithe (dried);
- Celery (dried);
- Wheat noodle powder;
- Wild mushrooms (dried);
- Pig liver (dried);
- Cacao powder;
- Tuna fish (dried).

The lower limit of the method's applicability varies depending on the food matrix and the water content of the foodstuff. It is a laboratory-specific value and is defined by the laboratory when calculating the limit of quantification (see 9.2).

## 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 13804, *Foodstuffs - Determination of elements and their chemical species - General considerations and specific requirements*

## 3 Terms and definitions

No terms and definitions are listed in this document.

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/>

## 4 Principle

The samples to be analysed are weighed directly - without pressure digestion - into suitable sample containers and are thermally decomposed in the analyser system in an oxygen atmosphere at approx. 700 °C. The resulting reaction gases are catalytically cleaned together with the mercury vapour, and the

## EN 13806-3:2025 (E)

mercury is concentrated on a consecutive amalgamator. Subsequently, the mercury is released as atomic vapour by fast heating up of the amalgamator, transferred into a system of measurement cuvettes and quantified by absorption at 253,7 nm.

By the simultaneous use of measurement cuvettes of different lengths, a dynamic measurement range over several orders of magnitude can be achieved.

The total content of mercury is understood as the content measured using this document. It is indicated in mg/kg.

**WARNING** — The use of this method can involve the application of dangerous substances, actions or equipment. Nevertheless, the method description cannot mention all dangers possibly involved in its application. Each operator of the method is responsible for taking the appropriate safety precautions and to respect the corresponding regulations.

## 5 Reagents

### 5.1 General

Unless otherwise specified, “solutions” are understood to be aqueous solutions.

The content of mercury in the chemicals and water shall be low enough not to affect the results.

**5.2 Hydrochloric acid**,  $\omega = 30\%$  to  $37\%$ , density = approx. 1,15 g/ml.

**5.3 Nitric acid**,  $\omega = 65\%$  to  $69\%$ , density = approx. 1,4 g/ml.

**5.4 Diluted nitric acid**

Nitric acid (5.3) + water,  $V_1 + V_2$ , approx. 1 + 9.

**5.5 Stabilization**

[SIST EN 13806-3:2025](https://standards.iteh.ai/catalog/standards/sist/cb5fb57f-8aa5-4129-918d-707c7636928f/sist-en-13806-3-2025)

<https://standards.iteh.ai/catalog/standards/sist/cb5fb57f-8aa5-4129-918d-707c7636928f/sist-en-13806-3-2025>

The standard, calibration and zero-point solutions are stabilized with hydrochloric acid (5.2). It is recommended to adjust the hydrochloric acid concentration to approx.  $\omega = 1\%$  in the solutions.

Alternatively, other stabilizing reagents may be used (for details see the instructions of the instrument manufacturer or [2]).

**5.6 Mercury stock solution**, e.g.  $\rho = 1\,000$  mg/l.

The stock solution is commercially available. It is recommended to use certified stock solutions.

**5.7 Mercury standard solution**

The standard solution is prepared from the stock solution (5.6) by means of dilution (e.g. see Table 1).

For this purpose, fill approx. 5 ml of water into a 20 ml volumetric flask, add the necessary amount of stabilizing acid (e.g. 0,6 ml hydrochloric acid (5.2)) and mix. After the mixture has cooled down to room temperature, add the stock solution (5.6) and fill up to the mark with water.

The standard solution is stable for at least one month.



**Table 1 — Example for the preparation of Hg standard solution in a 20 ml volumetric flask**

Standard solution [Hg concentration]	Stabilization	Initial solution	Fill up to the mark with water to
Standard solution [10 mg/l]	600 µl hydrochloric acid (5.2)	200 µl Hg stock solution (5.6)	20 ml

### 5.8 Mercury calibration solutions and zero-point solution

To produce the examples of calibration solutions and zero-point solution described in Table 2, a 20 ml volumetric flask is filled with approx. 5 ml of water, the necessary amount of stabilizing acid added according to Table 2, and mixed. After the mixture has cooled down to room temperature, pipette the standard solution/calibration solution into the flask and fill up to the mark with water.

**Table 2 — Example for the preparation of the Hg calibration solutions and zero-point solution in 20 ml volumetric flasks**

Zero-point/ calibration solution [Hg concentration]	Stabilization	Standard solution/ calibration solution	Fill up to the mark with water to
Zero-point solution	600 µl hydrochloric acid (5.2)	-	20 ml
Calibration solution 1 [1 000 µg/l]	600 µl hydrochloric acid (5.2)	2 000 µl standard solution (5.7)	20 ml
Calibration solution 2 [100 µg/l]	600 µl hydrochloric acid (5.2)	2 000 µl calibration solution 1	20 ml
Calibration solution 3 [10 µg/l]	600 µl hydrochloric acid (5.2)	2 000 µl calibration solution 2	20 ml
Calibration solution 4 [1 µg/l]	600 µl hydrochloric acid (5.2)	2 000 µl calibration solution 3	20 ml

The mercury calibration solutions and the zero-point solution are used to set up the calibration of the instrument as specified under 8.2.3.2. For this purpose, they shall be prepared fresh.

NOTE Alternatively, appropriate, certified reference materials can be used for calibration.

### 5.9 Oxygen or air

The manufacturer's instructions shall be taken into account, e.g. for the analytical purity.

## EN 13806-3:2025 (E)

### 6 Apparatus

#### 6.1 General

All equipment and labware that come into direct contact with the sample and the solutions used, shall be carefully pre-treated/cleaned according to EN 13804 to minimize contamination.

For the cleaning of glass and quartz glass equipment the following steps in particular are recommended: rinsing with tap water, treating with a detergent solution, rinsing again with tap water and immersing overnight or longer in diluted nitric acid (5.4). Finally, rinse the equipment with high-purity water and dry them before use. Steam stripping with nitric acid is an effective cleaning method and is used regularly in element trace analysis.

When preparing solutions, special care shall be taken to avoid contaminations. The volumetric flasks used for the preparation of the solutions should be made of glass or quartz glass.

Due to the strong adsorption behaviour of mercury on vessel walls it is recommended to always reuse the same flasks for each concentration of standard and calibration solution. Nevertheless, they shall be cleaned before each use.

#### 6.2 Elemental mercury analyser

Elemental mercury analyser with instrument control unit and sample containers made of suitable materials (e.g. nickel, quartz glass or ceramic). The sample containers usually have a capacity of approx. 500 mg of solid sample or 500 µl, 1 000 µl and 1 500 µl of liquids. The instructions in Annex B shall be observed.

#### 6.3 Analytical balance, readability of at least 0,000 1 g.

For an automated transfer of the sample weights, it is recommended to link the balance to the Hg-analyser's control unit (6.2) via a data interface.

### 7 Sampling

The sampling procedure is not part of the analytical method specified in this document.

Sampling shall be carried out in such a way that there is no loss of or contamination with mercury.

### 8 Procedure

#### 8.1 Preparations for measurement

##### 8.1.1 Sample carrier cleaning

Mechanically remove any residues adhering to the sample containers. Sample containers made of quartz glass may be pre-cleaned with diluted nitric acid (5.4) according to EN 13804. Sample containers made from nickel are only cleaned of adhering residues mechanically.

Subsequently, rinse the sample carriers with water and decontaminate them in a muffle furnace according to the manufacturers' instructions, e.g. at approx. 600 °C for at least 15 min. Alternatively, the sample carriers, without sample weight, could be decontaminated by measuring them in the mercury analyser by the sample program.

After cleaning, store the sample carriers in a dust-protected place (e.g. in a covered glass petri dish).

Irrespective of the material they are made of, carefully cleaned sample carriers do not show any memory effects.