



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 12460-3:2023**  
**01-junij-2023**

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**Lesne plošče - Ugotavljanje sproščanja formaldehida - 3. del: Metoda plinske analize (ISO/FDIS 12460-3:2023)**

Wood-based panels - Determination of formaldehyde release - Part 3: Gas analysis method (ISO/FDIS 12460-3:2023)

Holzwerkstoffe - Bestimmung der Formaldehydabgabe - Teil 3: Gasanalyse-Verfahren (ISO/FDIS 12460-3:2023)

Panneaux à base de bois - Détermination du dégagement de formaldéhyde - Partie 3: Méthode d'analyse de gaz (ISO/FDIS 12460-3:2023)

**Ta slovenski standard je istoveten z: prEN ISO 12460-3**

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**ICS:**

79.060.01	Lesne plošče na splošno	Wood-based panels in general
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Gas analysis method***Panneaux à base de bois — Détermination du dégagement de  
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Reference number  
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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>1</b>
<b>5 Reagents</b> .....	<b>1</b>
<b>6 Apparatus</b> .....	<b>2</b>
<b>7 Sampling and preparation of test pieces</b> .....	<b>4</b>
7.1 Preparation of test pieces.....	4
7.2 Selection of test pieces for factory production control.....	5
7.3 Selection of test pieces for other purposes.....	5
7.4 Preparation of test pieces in case of dispute.....	5
<b>8 Procedure</b> .....	<b>5</b>
8.1 Number of determinations.....	5
8.2 Determination of moisture content.....	5
8.3 Determination of formaldehyde release.....	5
8.3.1 General.....	5
8.3.2 Determination of formaldehyde release — Option 1.....	7
8.3.3 Determination of formaldehyde release — Option 2.....	7
8.3.4 Determination of formaldehyde release — Option 3.....	7
8.3.5 Determination of formaldehyde release — Option 4.....	7
8.4 Determination of formaldehyde content of the absorber solutions.....	8
8.4.1 General.....	8
8.4.2 Principle.....	8
8.4.3 Analytical procedure.....	8
8.4.4 Calibration curve.....	8
<b>9 Expression of results</b> .....	<b>10</b>
9.1 Gas analysis value.....	10
9.2 Calculation of results.....	10
9.2.1 Calculation of results of test pieces.....	10
9.2.2 Calculation of emission report value.....	11
9.3 Moisture content.....	11
<b>10 Test report</b> .....	<b>11</b>
<b>Bibliography</b> .....	<b>13</b>

## ISO/FDIS 12460-3:2023(E)

### Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 89, *Wood based panels*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 112, *Wood based panels*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 12460-3:2020), which has been technically revised.

The main changes are as follows:

- laser spectroscopy introduced as a further analytical procedure;
- ready to use formaldehyde standards considered in [8.4.4.3](#).

A list of all parts in the ISO 12460 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Wood-based panels — Determination of formaldehyde release —

## Part 3: Gas analysis method

### 1 Scope

This document specifies a procedure for determination of accelerated formaldehyde release from uncoated and coated wood-based panels using the gas analysis method. The procedure is also suitable for the testing of other materials (e.g. edge bands, floor coverings, foams, foils, laminated wood products, veneered wood products, coated wood products).

### 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.

ISO 16979, *Wood-based panels — Determination of moisture content*

ISO 16999, *Wood-based panels — Sampling and cutting of test pieces*

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological 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

A test piece of known surface area is placed in a closed chamber in which the temperature, humidity, airflow, and pressure are controlled to defined values. Formaldehyde released from the test pieces mixes with the air in the chamber. This air is continually drawn from the chamber and passes through gas wash bottles, containing water, which absorbs the released formaldehyde. At the end of the test, the formaldehyde concentration is determined photometrically or fluorimetrically. The formaldehyde release is calculated from this concentration, the sampling time, and the exposed area of the test pieces and is expressed in milligrams per square meter and hour ( $\text{mg}/\text{m}^2\cdot\text{h}$ ).

### 5 Reagents

Reagents of recognized analytical purity and distilled or demineralised water (referred throughout the following text as distilled water) shall be used for the analysis.

**5.1 4 ml acetylacetone solution** are added to a 1 000 ml volumetric flask and made up to the mark with distilled water.

## ISO/FDIS 12460-3:2023(E)

**5.2 200 g ammonium acetate solution** are dissolved with distilled water in a 1 000 ml volumetric flask and made up to the mark.

Optionally, a premixed reagent of acetylacetone and ammonium acetate as described in ISO 12460-4 can be used.

**5.3 Formaldehyde solution**, commercially available (concentration typically between 35 % mass fraction to 40 % mass fraction).

**5.4 Standard iodine solution**,  $c(I_2) = 0,05 \text{ mol/l}$ .

**5.5 Standard sodium thiosulphate solution**,  $c(Na_2S_2O_3) = 0,1 \text{ mol/l}$ .

**5.6 Standard sodium hydroxide solution**,  $c(NaOH) = 1 \text{ mol/l}$ .

**5.7 Standard sulphuric acid solution**,  $c(H_2SO_4) = 1 \text{ mol/l}$ .

**5.8 Starch solution**, 1 % mass fraction.

## 6 Apparatus

**6.1 Main composites of test apparatus** (see [Figure 1](#)).

**6.1.1 Dust or particle filter.**

**6.1.2 Formaldehyde filter** (bottle filled with water, silicagel or other formaldehyde absorber).

**6.1.3 Desiccator**, 500 ml, containing silica gel.

**6.1.4 Air pump.**

**6.1.5 Needle valve.**

**6.1.6 Equipment for measuring rate of air flow through apparatus.**

NOTE Needle valve and equipment for measuring rate of air flow can be replaced by a mass flow controller.

**6.1.7 Test chamber** (diameter: 90 mm to 100 mm with a length which gives an internal volume of  $(4\,000 \pm 200) \text{ ml}$  with double casing of stainless steel or glass).

**6.1.8 Heating equipment for air** (e.g. copper coil inside the double casing).

**6.1.9 Thermostat.**

**6.1.10 Magnetic valves.**

**6.1.11 Pairs of gas wash bottles**, 100 ml or optionally, pairs of gas wash bottles, 30 ml.

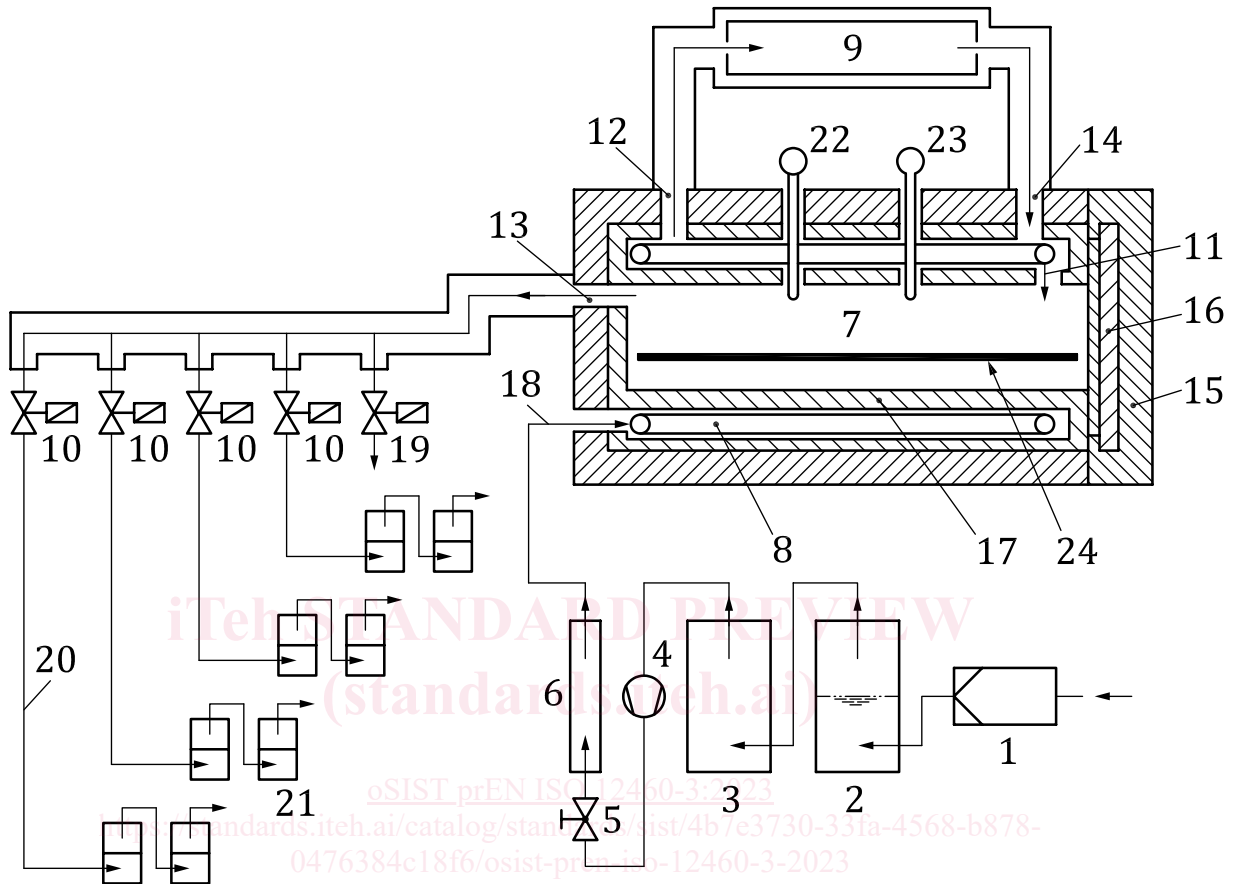
**6.1.12 Pressure monitor.**

**6.1.13 Temperature monitor.**



**6.1.14 Test piece holder**, constructed as a shelf with three rods made from stainless steel or another inert material.

NOTE The test apparatus described in [Figure 1](#) is based on a waterborne heating system. A test apparatus with an electrical heating system can be used optionally.



#### Key

- |    |                                       |    |                              |
|----|---------------------------------------|----|------------------------------|
| 1  | dust or particle filter               | 13 | outlet of test air           |
| 2  | formaldehyde filter                   | 14 | heating medium (inlet)       |
| 3  | desiccator                            | 15 | insulation                   |
| 4  | air pump                              | 16 | test chamber door            |
| 5  | needle valve                          | 17 | double casing                |
| 6  | equipment for measurement of air flow | 18 | inlet for air (heating coil) |
| 7  | test chamber                          | 19 | magnetic valve for purging   |
| 8  | heating coil                          | 20 | connection tube              |
| 9  | thermostat                            | 21 | pairs of wash bottles        |
| 10 | magnetic valves                       | 22 | pressure monitor             |
| 11 | inlet of air (test chamber)           | 23 | temperature monitor          |
| 12 | heating medium (outlet)               | 24 | test piece holder            |

**Figure 1 — Gas analysis test apparatus**

## 6.2 Laboratory equipment

**6.2.1 Ventilated oven**, as described in ISO 16979 for determination of moisture content (if requested).

## ISO/FDIS 12460-3:2023(E)

**6.2.2 Spectrophotometer**, with cells of 50 mm optical path length and capable of measuring absorbance at 412 nm.

**6.2.3 Water bath**, capable of maintaining a temperature of  $(60 \pm 1)$  °C.

**6.2.4 Water bath**, capable of maintaining a temperature in the range of 20 °C to 25 °C.

**6.2.5 Six volumetric flasks**, 100 ml (calibrated at 20 °C).

**6.2.6 Four volumetric flasks**, 250 ml or optionally, four volumetric flasks, 100 ml (calibrated at 20 °C).

**6.2.7 Two volumetric flasks**, 1 000 ml (calibrated at 20 °C).

**6.2.8 Volumetric pipettes** (calibrated at 20 °C), 1 ml, 2 ml, 5 ml, 10 ml, 15 ml, 20 ml, 25 ml, 30 ml, 50 ml, 100 ml.

**6.2.9 Six flasks**, 50 ml (with stoppers).

**6.2.10 Microburette**.

**6.2.11 Burette**, 50 ml, graduated (calibrated at 20 °C).

**6.2.12 Balance**, capable of measuring to 0,00 1 g.

## 7 Sampling and preparation of test pieces

### 7.1 Preparation of test pieces

Three test pieces, each with the dimensions of  $(400 \pm 1)$  mm  $\times$   $(50 \pm 1)$  mm  $\times$  board thickness, shall be prepared for the determination of formaldehyde release giving a total emitting surface area of 0,04 m<sup>2</sup>.

If the sample available does not allow the preparation of test pieces of the specified dimension, then the combined emitting surface area of the test pieces(s) should be as close as possible to 0,04 m<sup>2</sup>.

For testing layer glued materials (e.g. plywood, veneered particleboard), specimens shall be cut from the respective panel with the fibre direction of the faces perpendicular to the longitudinal axis of the specimen.

Each test piece has to be hermetically wrapped immediately after cutting and stored at ambient temperature.

Before testing, each test piece shall be stored hermetically wrapped at least one day at ambient temperature in order to improve the repeatability. For factory production control with hot test pieces, a valid correlation has to be established.

Test pieces shall be representative for the tested boards.

For testing, the test pieces shall be edge sealed with temperature resistant (i.e.  $\geq 60$  °C) self-adhesive aluminium tape or an alternative sealing method if equivalence has been demonstrated. The emitting (unsealed) surface area of the sealed test piece has to be measured and calculated in square metres (m<sup>2</sup>).

For decor finish foils it is recommended to pre-condition the material as follows in order to take into account inhomogeneity as to improve precision: 7 days at  $(20 \pm 2)$  °C and  $(65 \pm 5)$  % relative humidity.