



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 16179:2023**  
**01-december-2023**

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**Obutev - Možna prisotnost kritičnih snovi v obutvi ali delih obutve - Ugotavljanje organskih sestavin v materialih obutve (ISO/DIS 16179:2023)**

Footwear - Critical substances potentially present in footwear and footwear components - Determination of organotin compounds in footwear materials (ISO/DIS 16179:2023)

Schuhe - Möglicherweise in Schuhen und Schuhbestandteilen vorhandene kritische Substanzen - Bestimmung zinnorganischer Verbindungen in Schuhwerkstoffen (ISO/DIS 16179:2023)

Chaussures - Substances critiques potentiellement présentes dans les chaussures et les composants de chaussures - Détermination des composés organostanniques dans les matériaux de chaussures (ISO/DIS 16179:2023)

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**ICS:**

61.060            Obuvala                                      Footwear

**oSIST prEN ISO 16179:2023**                                      **en,fr,de**



# DRAFT INTERNATIONAL STANDARD

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## Footwear — Critical substances potentially present in footwear and footwear components — Determination of organotin compounds in footwear materials

*Chaussures — Substances critiques potentiellement présentes dans les chaussures et les composants de chaussures — Détermination des composés organostanniques dans les matériaux de chaussures*

ICS: 61.060

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## ISO/DIS 16179:2023(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)).

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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).

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).

This document was prepared by Technical Committee ISO/TC 216, *Footwear*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 309, *CEN/TC 309*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO/TS 16179:2012, which has been technically revised.

The main changes compared to the previous edition are as follows:

- the technical specification becomes a ISO standard
- new [Table 1](#) of concerned substance
- preparation reference to ISO 21061
- new [Table 2](#)
- new extraction solvent
- new [Annex B](#) for mass spectroscopy

## Introduction

Certain organotin compounds have been identified as carcinogenic. Thus, several countries have restricted them in articles such as footwear, e.g. in the European Union by commission regulation (EU) 276/2010<sup>[1]</sup> amending regulation (EC) No 1907/2006<sup>[2]</sup>.

Further organotin compounds are restricted by footwear brands in their restricted substances lists (RSL).

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# Footwear — Critical substances potentially present in footwear and footwear components — Determination of organotin compounds in footwear materials

## 1 Scope

This document specifies a test method for the qualification and quantification of organotin compounds. This test method is applicable to all types of footwear materials.

NOTE ISO/TR 16178<sup>[3]</sup> defines which materials are concerned by this determination.

## 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 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 4787, *Laboratory glass and plastic ware — Volumetric instruments — Methods for testing of capacity and for use*

ISO 21061, *Footwear — Chemical tests — General principles on the preparation of samples*

## 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/>

— The definitions given in ISO TR 16178<sup>[3]</sup> clause 5.24 are applicable

## 4 Principle

The organotin substances are extracted from the footwear material with methanol, in a medium-strength acidic condition, using tropolone as a complexing agent.

NOTE In the previous version of this test method, the extraction solvent was a mixture of methanol-ethanol. Comparisons have shown that methanol gives equivalent results to methanol-ethanol solution. Therefore, extraction with methanol-ethanol solution is still possible to be used.

The polar and high-boiling organotin is then converted to the corresponding volatile alkyl derivative, by reaction with sodium tetraethylborate, NaB(Et)<sub>4</sub>. Finally, it is detected and quantified by using a gas chromatograph fitted with a mass selective detector (Gas chromatograph with a single quadrupole mass spectrometer (GC-MS) or gas chromatograph with a triple quadrupole mass spectrometer (GC-MS/MS)).

[Table 1](#) indicates the list of target compounds which can be analysed with this document.

## ISO/DIS 16179:2023(E)

Table 1 — List of target compounds and internal standards that can be analysed

Type of compound	Compound	CAS Registry Number® <sup>1)</sup>
Monosubstituted	Internal standard: n-heptyltin trichloride	59344-47-7
	methyltin trichloride	993-16-8
	n-butyltin trichloride	1118-46-3
	n-octyltin trichloride	3091-25-6
	phenyltin trichloride	1124-19-2
Disubstituted	Internal standard: Di-n-heptyltin dichloride	74340-12-8
	Dimethyltin dichloride	753-73-1
	Di-n-propyltin dichloride	867-36-7
	Di-n-butyltin dichloride	683-18-1
	Di-n-octyltin dichloride	3542-36-7
	Diphenyltin dichloride	1135-99-5
Trisubstituted	Internal standard: Tri-n-pentyltin chloride	3342-67-4
	Trimethyltin chloride	1066-45-1
	Tri-n-propyltin chloride	2279-76-7
	Tri-n-butyltin chloride <sup>a</sup>	1461-22-9
	Tri-n-octyltin chloride	2587-76-0
	Triphenyltin chloride (or fentin chloride)	639-58-7
	Tricyclohexyltin chloride	3091-32-5
Tetrasubstituted	Internal standard: Tetra-n-propyltin	2176-98-9
	Tetra-n-ethyltin	597-64-8
	Tetra-n-butyltin	1461-25-2

<sup>a</sup> If bis(tri-n-butyltin) oxide (TBTO), CAS RN® 56-35-9, is present, it is detected as tri-n-butyltin.

## 5 Reagents

Unless otherwise specified, use only reagents of recognized analytical grade.

- 5.1 **Water**, grade 3 according to ISO 3696.
- 5.2 **Glacial acetic acid**, CAS RN®: 64-19-7.
- 5.3 **Sodium tetraethylborate**, CAS RN®: 15523-24-7.
- 5.4 **Tetrahydrofuran (THF)**, stabilized, CAS RN®: 109-99-9.
- 5.5 **n-heptyltin trichloride**, CAS RN®: 59344-47-7 (internal standard).
- 5.6 **Di-n-heptyltin dichloride**, CAS RN®: 74340-12-8 (internal standard).
- 5.7 **Tri-n-pentyltin chloride**, CAS RN®: 3342-67-4 (internal standard).
- 5.8 **Tetra-n-propyltin**, CAS RN®: 2176-98-9 (internal standard).

1) CAS Registry Number® (CAS RN®) is a trademark of CAS corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.