

SVENSK STANDARD

SS-EN ISO 23161:2018



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**Markundersökningar – Bestämning av vissa organiska
tennföreningar – Metod med gas-kromatografi (ISO 23161:2018)**

**Soil quality – Determination of selected organotin compounds –
Gas-chromatographic method (ISO 23161:2018)**

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Denna standard ersätter SS-EN ISO 23161:2011, utgåva 1

The European Standard EN ISO 23161:2018 has the status of a Swedish Standard. This document contains the official version of EN ISO 23161:2018.

This standard supersedes the SS-EN ISO 23161:2011, edition 1

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EUROPEAN STANDARD

EN ISO 23161

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2018

ICS 13.080.10

Supersedes EN ISO 23161:2011

English Version

**Soil quality - Determination of selected organotin
compounds - Gas-chromatographic method
(ISO 23161:2018)**

Qualité du sol - Dosage d'une sélection de composés
organostanniques - Méthode par chromatographie
en phase gazeuse (ISO 23161:2018)

Bodenbeschaffenheit - Bestimmung ausgewählter
Organozinnverbindungen - Gaschromatographisches
Verfahren (ISO 23161:2018)

This European Standard was approved by CEN on 31 August 2018.

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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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword	viii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle	2
5 Reagents	4
5.1 General	4
5.2 Chemicals	4
5.3 Standards	5
5.4 Preparation of reagents and solutions	6
5.4.1 General requirements	6
5.4.2 Blank solution.....	6
5.4.3 Aqueous calibration solutions (multicomponent solution of organotin compounds in water)	6
5.4.4 Methanolic potassium hydroxide solution.....	7
5.4.5 Acetate buffer solution	7
5.4.6 Solvent mixture.....	7
5.4.7 Derivatization agent.....	7
5.5 Clean-up.....	7
5.5.1 General requirements	7
5.5.2 Silica gel for the clean-up column.....	7
5.5.3 Aluminium oxide for the clean-up column.....	7
5.5.4 Clean-up column.....	8
5.5.5 Eluent for extract cleaning with silica gel.....	8
5.5.6 Eluent for extract cleaning with aluminium oxide	8
6 Apparatus	8
7 Procedure	9
7.1 Sampling and sample pretreatment	9
7.2 Sample extraction	10
7.2.1 General.....	10
7.2.2 Acidic extraction and derivatization of an aliquot.....	10
7.2.3 Alkaline treatment and <i>in situ</i> derivatization	10
7.2.4 Separate determination of TTBT in the field-moist sample	11
7.3 Clean-up of the extract	11
7.3.1 General.....	11
7.3.2 Silica and aluminium oxide clean-up.....	11
7.4 Determination of dry mass.....	11
7.5 Measurement.....	11
7.5.1 Gas chromatographic separation	11
7.5.2 Detection and identification.....	12
8 Calibration	12
9 Recovery rates of the internal standard compounds	13
10 Quantification	14
11 Expression of results	14
12 Validation	15
13 Test report	15
Annex A (informative) Information about the procedure	16
Annex B (informative) Additional clean-up procedures	18

Annex C (informative) Information about typical instrumental conditions	20
Annex D (informative) Information about GC-MS identification.....	31
Annex E (informative) Performance data.....	33
Bibliography.....	36

European foreword

This document (EN ISO 23161:2018) has been prepared by Technical Committee ISO/TC 190 "Soil quality" in collaboration with Technical Committee CEN/TC 444 "Test methods for environmental characterization of solid matrices" 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 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.

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Endorsement notice

The text of ISO 23161:2018 has been approved by CEN as EN ISO 23161:2018 without any modification.

Soil quality — Determination of selected organotin compounds — Gas-chromatographic method

WARNING — Persons using this document should be familiar with usual laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests, conducted in accordance with this document, be carried out by suitably qualified staff. It can be noted whether, and to what extent, particular problems will require the specification of additional boundary conditions.

1 Scope

This document specifies a gas-chromatographic method for the identification and quantification of organotin compounds (OTCs) in soils as specified in [Table 1](#).

This document is also applicable to samples from sediments, sludges and wastes (soil-like materials).

The working range depends on the detection technique used and the amount of sample taken for analysis.

The limit of quantification for each compound is about 10 µg/kg.

Table 1 — Organotin compounds

$R_nSn^{(4-n)+}$	R	<i>n</i>	Name	Acronym
Organotin cations^a				
BuSn ³⁺	Butyl	1	Monobutyltin cation	MBT
Bu ₂ Sn ²⁺	Butyl	2	Dibutyltin cation	DBT
Bu ₃ Sn ⁺	Butyl	3	Tributyltin cation	TBT
OcSn ³⁺	Octyl	1	Monooctyltin cation	MOT
Oc ₂ Sn ²⁺	Octyl	2	Diocetyl tin cation	DOT
Ph ₃ Sn ⁺	Phenyl	3	Triphenyltin cation	TPhT
Cy ₃ Sn ⁺	Cyclohexyl	3	Tricyclohexyltin cation	TCyT
Peralkylated organotin				
Bu ₄ Sn	Butyl	4	Tetrabutyltin	TTBT

^a Organotin compounds are measured after derivatization.

Organotin cations can only be determined in accordance with this document after derivatization. The anionic part bound to the organotin cation is mainly dependent on the chemical environment and is not determined using this method. The peralkylated organotin compounds behave in a completely different way from their parent compounds. Tetraalkylated organotin compounds which are already peralkylated, such as tetrabutyltin, are determined directly without derivatization.

The properties such as particle size distribution, water content and organic matter content of the solids to be analysed using this document vary widely. Sample pretreatment is designed adequately with respect to both the properties of the organotin compounds and the matrix to be analysed.

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*

SS-EN ISO 23161:2018 (E)

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO 16720, *Soil quality — Pretreatment of samples by freeze-drying for subsequent analysis*

ISO 22892, *Soil quality — Guidelines for the identification of target compounds by gas chromatography and mass spectrometry*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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 <http://www.electropedia.org/>

3.1

organotin compound

substance containing 1 to 4 Sn-C bonds

Note 1 to entry: The number of Sn-C bonds is a measure for the degree of substitution.

3.2

organotin cation

part of the organotin *compound* (3.1) that contains all Sn-C bonds and is formally charged

3.3

organotin cation derivatives

non-dissociated tetrasubstituted organotin compounds which are produced by derivatization

3.4

solid

soil, sediment, sludge and waste (soil-like material)

4 Principle

For the ionic and the non-ionic organotin compounds (see [Table 1](#)), a different sample pretreatment and sample preparation are necessary. For the determination of organotin cations, laboratory samples are pretreated by freeze drying and grinding. This procedure enables to achieve homogeneity of the sample. The determination of non-ionic TTBT cannot be carried out with freeze-dried materials due to evaporation losses; thus, it shall be determined in the field-moist sample. Organotin cations can only be determined after derivatization, whereas TTBT is already peralkylated and can be determined without derivatization (see the flowchart in [Figure 1](#)).

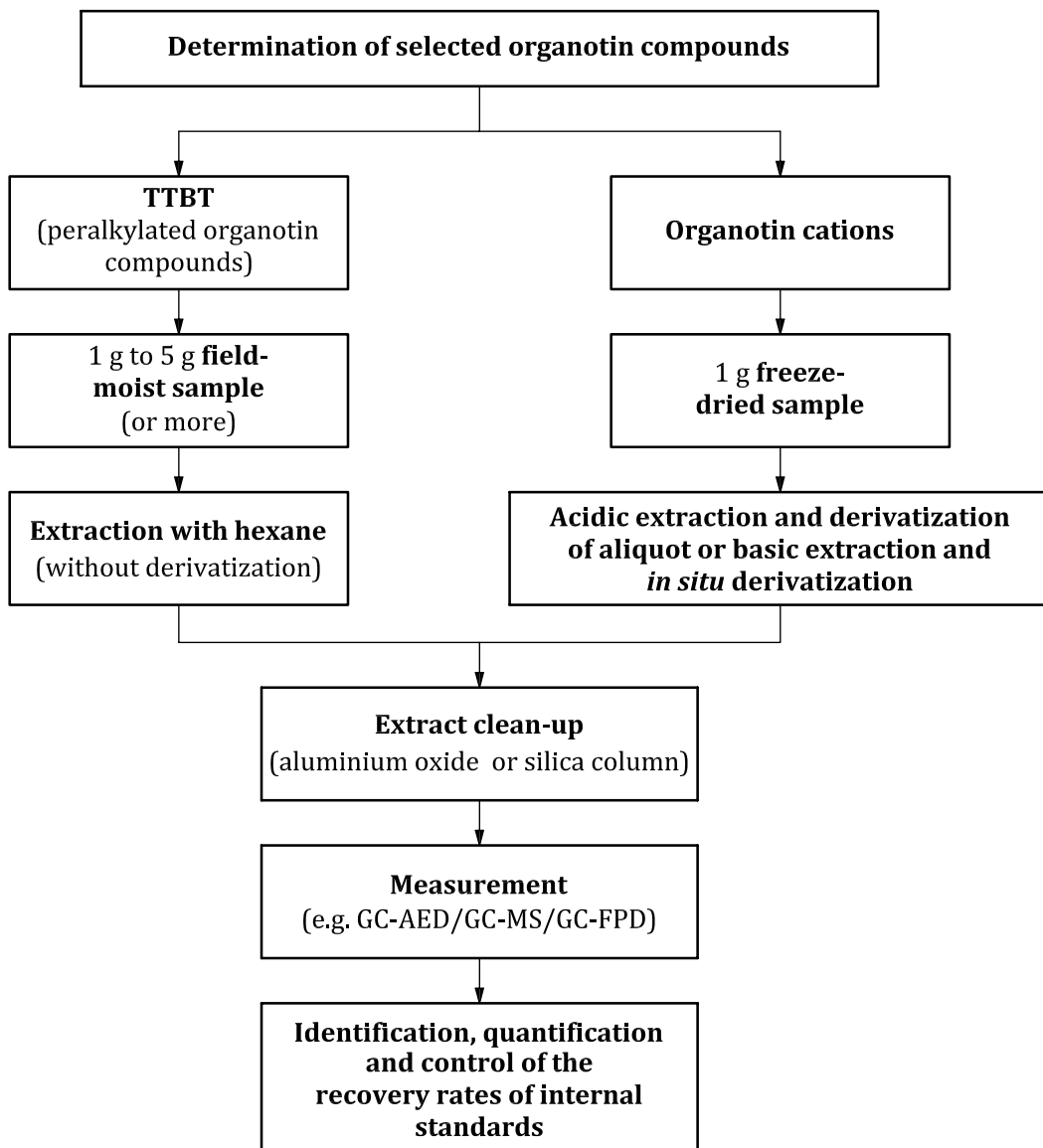


Figure 1 — Flowchart for the pretreatment and analysis of selected organotin compounds

Beside freeze drying, other pretreatment procedures can be carried out, if the suitability has been proven.

For the determination of organotin compounds, two alternative extraction methods are given, both followed by *in situ* derivatization with a tetraethylborate compound and simultaneous extraction with hexane:

- a) treatment with acetic acid;
- b) treatment with methanolic potassium hydroxide.

Treatment with potassium hydroxide provides some degree of digestion and is recommended especially when the solid contains high amounts of organic and biological materials.

NOTE 1 If it is necessary to take a large amount of sample, extraction and derivatization can be done in two steps. An aliquot of the extract can be taken for derivatization. This also applies for samples with high levels of contamination by organotin compounds.