

<b>STN</b>	<b>Stanovenie obsahu určených látok v elektrotechnických výrobkoch: Časť 11: Tris (2-chlóretyl) fosfát (TCEP) v plastoch stanovený plynovou chromatografiou s hmotnostnou spektrometriou (GC-MS) a kvapalinovou chromatografiou s hmotnostnou spektrometriou (LC-MS)</b>	<b>STN EN IEC 62321-11</b>  34 6705
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Determination of certain substances in electrotechnical products - Part 11: Tris(2-chloroethyl) phosphate (TCEP) in plastics by gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS)

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/24

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EUROPEAN STANDARD

EN IEC 62321-11

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2024

ICS 13.020.01; 43.040.10

English Version

Determination of certain substances in electrotechnical products  
- Part 11: Tris(2-chloroethyl) phosphate (TCEP) in plastics by  
gas chromatography-mass spectrometry (GC-MS) and liquid  
chromatography-mass spectrometry (LC-MS)  
(IEC 62321-11:2023)

Détermination de certaines substances dans les produits  
électrotechniques - Partie 11: Phosphate de tris(2-  
chloroéthyle) (TCEP) dans les plastiques par  
chromatographie en phase gazeuse-spectrométrie de  
masse (GC-MS) et chromatographie en phase liquide-  
spectrométrie de masse (LC-MS)  
(IEC 62321-11:2023)

Verfahren zur Bestimmung von bestimmten Substanzen in  
Produkten der Elektrotechnik - Teil 11: Tris(2-  
chloroethyl)phosphat (TCEP) in Kunststoffen mit  
Gaschromatographie-Massenspektrometrie (GC-MS) und  
Flüssigkeitschromatographie-Massenspektrometrie  
(LC-MS)  
(IEC 62321-11:2023)

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

**EN IEC 62321-11:2024 (E)****European foreword**

The text of document 111/723/FDIS, future edition 1 of IEC 62321-11, prepared by IEC/TC 111 "Environmental standardization for electrical and electronic products and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62321-11:2024.

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ISO 472:2013 NOTE Approved as EN ISO 472:2013 (not modified)

## Annex ZA (normative)

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NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cencenelec.eu](http://www.cencenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62321-1	2013	Determination of certain substances in electrotechnical products - Part 1: Introduction and overview	EN 62321-1	2013
IEC 62321-2	2021	Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjointment and mechanical sample preparation	EN IEC 62321-2	2021



IEC 62321-11

Edition 1.0 2023-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Determination of certain substances in electrotechnical products –  
Part 11: Tris(2-chloroethyl) phosphate (TCEP) in plastics by gas  
chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass  
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chromatographie en phase liquide-spectrométrie de masse (LC-MS)**

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IEC 62321-11

Edition 1.0 2023-12

# INTERNATIONAL STANDARD

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**Determination of certain substances in electrotechnical products –  
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chromatographie en phase liquide-spectrométrie de masse (LC-MS)**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DETERMINATION OF CERTAIN SUBSTANCES  
IN ELECTROTECHNICAL PRODUCTS –****Part 11: Tris(2-chloroethyl) phosphate (TCEP) in plastics by gas  
chromatography-mass spectrometry (GC-MS) and liquid  
chromatography-mass spectrometry (LC-MS)**

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IEC 62321-11 has been prepared by IEC technical committee 111: Environmental standardization for electrical and electronic products and systems, in collaboration with ISO subcommittee SC 5: Physical-chemical properties of ISO technical committee 61: Plastics. It is an International Standard.

It is published as a double logo standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
111/723/FDIS	111/735A/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts in the IEC 62321 series, published under the general title *Determination of certain substances in electrotechnical products*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

## INTRODUCTION

The widespread use of electrotechnical products has drawn increased attention to their impact on the environment. In many countries, this has resulted in the adoption of regulations affecting wastes, substances, and energy use of electrotechnical products.

The use of certain substances (e.g. lead (Pb), cadmium (Cd), and polybrominated diphenyl ethers (PBDEs)) in electrotechnical products is a source of concern in current and proposed regional legislation.

The purpose of the IEC 62321 series is therefore to provide test methods that will allow the electrotechnical industry to determine the levels of certain substances of concern in electrotechnical products on a consistent global basis.

This first edition of IEC 62321-11 introduces a new subject covering tris(2-chloroethyl) phosphate (TCEP) in the IEC 62321 series.

TCEP is a halogenated phosphorus-based flame retardant that is disclosable as a substance of very high concern (SVHC) as it is classified as toxic to reproduction category 2 (R60) and was included in the candidate list for authorization on 13 January 2010, following ECHA's decision ED/68/2009 [1]<sup>1</sup> and in regulation (EC) No 1907/2006 ANNEX XVI [2].

TCEP is used as a flame retardant in plastics such as polyester and polyurethane foam and as a plasticizer in polyvinyl chloride. Additionally, TCEP is used as an alternative for brominated flame retardants that have been restricted. No applicable testing standard exists for TCEP analysis in plastics.

As a result, analysis criteria have been established by an IEC TC 111 and ISO/TC 61/SC 5 joint working group for the joint development of an IEC and ISO double logo International Standard, to provide a test method that will allow the industry to determine the concentrations of TCEP in plastics.

**WARNING** – Persons using this document should be familiar with normal 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 and to ensure compliance with any national regulatory conditions.

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<sup>1</sup> Numbers in square brackets refer to the Bibliography.

## DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –

### Part 11: Tris(2-chloroethyl) phosphate (TCEP) in plastics by gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS)

#### 1 Scope

This part of IEC 62321 specifies two different techniques for the determination of tris(2-chloroethyl) phosphate (TCEP) in plastics, the GC-MS or LC-MS method, both of which are applicable to quantitative analysis.

These two techniques are applicable to use with polyurethane, polyvinylchloride, and polyethylene materials containing TCEP between 200 mg/kg to 2 000 mg/kg.

These test methods do not apply to plastic materials having a processing temperature higher than 230 °C.

GC-MS using a pyrolyser/thermal desorption accessory (Py/TD-GC-MS) technique is described in Annex A and can be used for the screening of TCEP in plastics.

NOTE TCEP starts thermal decomposition at approximately 230 °C. Polymer types that have a processing temperature into shapes of plastics (e.g. pellets, moulded parts or sheets) not exceeding the decomposition temperature can contain TCEP.

#### 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.

IEC 62321-1:2013, *Determination of certain substances in electrotechnical products – Part 1: Introduction and overview*

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