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Bestämning av vissa ämnen i elektriska och elektroniska produkter – Del 11: Tris(2-kloretyl)fosfat i plast genom gaskromatografi-masspektrometri (GC-MS) och vätskekromatografi-masspektrometri (LC-MS)

*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)*

Som svensk standard gäller europastandarden EN IEC 62321-11:2024. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 62321-11:2024.

Nationellt förord

Europastandarden EN IEC 62321-11:2024

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 62321-11, First edition, 2023 - 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)**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 13.020.01; 43.040.10

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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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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

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.

The following dates are fixed:

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The text of the International Standard IEC 62321-11:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

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

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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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
spectrometry (LC-MS)**

**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)**

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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)****FOREWORD**

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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. The main document types developed by IEC are described in greater detail at 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 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]¹ 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.

¹ 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*

IEC 62321-2:2021, *Determination of certain substances in electrotechnical products – Part 2: Disassembly, disjointment and mechanical sample preparation*