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# INTERNATIONAL STANDARD

HORIZONTAL PUBLICATION

**Determination of certain substances in electrotechnical products - Part 14: Short-chain chlorinated paraffins (SCCPs) and medium-chain chlorinated paraffins (MCCPs) in plastics by gas chromatography-negative chemical ionization-mass spectrometry (GC-NCI-MS)**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# Determination of certain substances in electrotechnical products - Part 14: Short-chain chlorinated paraffins (SCCPs) and medium-chain chlorinated paraffins (MCCPs) in plastics by gas chromatography-negative chemical ionization-mass spectrometry (GC-NCI-MS)

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IEC 62321-14 has been prepared by IEC technical committee 111: Environmental standardization for electrical and electronic products and systems. It is an International Standard.

This document has been given the status of a horizontal document in accordance with the ISO/IEC Directives, Part 1.

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

| Draft | Report on voting |
|---|---|
| 111/870/FDIS | 111/888/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– withdrawn, or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 62321-14 introduces a new subject covering short-chain chlorinated paraffins (SCCPs) and medium-chain chlorinated paraffins (MCCPs).

## 1 Scope

This part of IEC 62321 specifies one technique for the determination of short-chain and medium-chain chlorinated paraffins (SCCPs: C10-C13 and MCCPs: C14-C17) in plastics of electrotechnical products.

This document specifies a quantitative method for the determination of short-chain and medium-chain chlorinated paraffins in electrotechnical products by means of solvent extraction and gas chromatography-negative chemical ionization-mass spectrometry (GC-NCI-MS).

This test method has been evaluated for use with ABS (acrylonitrile butadiene styrene) and PVC (polyvinyl chloride) containing individual SCCPs ranging from 369,7 mg/kg to 8 653,9 mg/kg and MCCPs ranging from 2 141,1 mg/kg to 27 329,6 mg/kg as shown in the pre-IIS 14 results in Annex C. The use of this test method for other plastics and concentration ranges has not been specifically evaluated.

This document is a basic environment horizontal publication focusing on test methods and is primarily intended for use by committees in the preparation of publications within the area of environment in accordance with the principles laid down in IEC Guide 123. Wherever applicable, it is the responsibility of committees to make use of environment basic publications in the preparation of their environment group and product publications. Committees can apply this document directly to products when they do not develop a product publication in the area of environment.

**WARNING** – Persons using this International Standard should be familiar with normal laboratory practice. This International Standard 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.

## 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, *Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjointment and mechanical sample preparation*

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*

# 3 Terms, definitions and abbreviated terms

## 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62321-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/
– ISO Online browsing platform: available at https://www.iso.org/obp

## 3.2 Abbreviated terms

| | |
|---|---|
| ABS | acrylonitrile butadiene styrene |
| CCC | continuing calibration check |
| CI | chemical ionization |
| GC | gas chromatography |
| GC-NCI-MS | gas chromatography negative chemical ionization mass spectrometry |
| IS | internal standard |
| MDL | method detection limit |
| MCCPs | medium-chain chlorinated paraffins |
| PSE | peak shape evaluation |
| PVC | polyvinyl chloride |
| RSD | relative standard deviation |
| SCCPs | short-chain chlorinated paraffins |
| SIM | selective ion monitoring |
| TIC | total ion chromatogram |

# 4 Principle

The test samples are extracted by ultrasonic extraction followed by a sulfuric acid clean-up. The analysis is carried out using gas chromatography-negative chemical ionization-mass spectrometry (GC-NCI-MS).

# 5 Reagents and materials

Analytical grade chemicals shall be used, unless otherwise specified:

a) water (Grade 1 specified in ISO 3696 used for preparation of labware and others);
b) n-hexane;
c) toluene;
d) SCCPs standard solution: Standard substances of short-chain chlorinated paraffins with 55,5 % and 63 % chlorination degree, respectively, with a concentration of 100 µg/ml;
e) MCCPs standard solution: Standard substances of medium-chain chlorinated paraffins with 52 % and 57 % chlorination degree, respectively, with a concentration of 100 µg/ml;
f) IS solution A: Lindane as internal standard in solution, about 100 µg of IS/ml in n-hexane;
g) IS solution B: Dilute IS solution A (see item f)) in a ratio 1/50 in n-hexane. Lindane as internal standard in solution, 2 µg of IS/ml in n-hexane;